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Blakely Disaster Reader



PART I

Seeing the Problem

1. AN ALARMING VIEW FROM DOWN UNDER

I GOT MY FIRST VIEW OF HURRICANE KATRINA AND ITS devastation from computer news feeds in Australia. I had moved to Sydney with my wife Maaike, an Australian, in 2003. My goals were to retire—to Sydney, a city we both loved—and to fulfill a childhood aspiration to live outside the United States. Although we were comfortable financially, when the University of Sydney offered me a professorship and, with it, permanent residency, I accepted. I also started a consulting practice. With few cares in the world, we settled into a beautiful cottage in a nice town close to one of Sydney's most precious and beautiful beaches.

Early on the morning of August 30, 2005 (we're a day ahead of North America), my wife yelled at me from my home office to come look at what was going on in New Orleans: "You have to see this!" I went into the office and saw on television blurry figures and a bus. Some people got off the bus, and new people moved toward it. The difference was their color: blacks got off so whites could board. I couldn't make out what was going on.

"Where's the Army?" I mumbled.

"I don't know," she said, turning her head up and peering at me. "Where should they be?"

"They should be getting the people out," I said.

I went back to the bedroom and put on my running clothes. I wanted to get out of the house and clear my head of what I had seen on TV. I walked out onto the pavement by my large, shady oak tree. It was 6:50 a.m. My neighbor's door flew open, and he hurried to join me. "Morning, mate!" I said. "Are you ready to roll?"

"G'day Ed," he responded cheerfully.

"It isn't such a good day in New Orleans."

“Guess you’re right,” he volunteered. Like me, Frank is a professor at the university. But since we never see each other on campus we use our walks to talk about new developments there and in the world generally. We moved down the path in the park across the street toward the road that leads to the beach. It was late winter Down Under, and a characteristically beautiful Sydney day, a bit cool with fresh, clean air coming at us from the blue waters of Sydney Harbor.

Frank assumed I knew something about New Orleans. His first question was, “Is New Orleans all African American?”

“No. No major American city is,” I replied. “However, the people you’re seeing on TV are mostly poor, with many blacks too poor to get out of the city before the storm.” He looked at me curiously, so I added, “In New Orleans, I mean.”

When I got home from my walk, the radio was on. A couple of semi-hysterical Australian women were speaking on a phone hookup from a hotel in New Orleans. They told horrific stories of people murdered and raped at the Superdome, and they voiced fears that they’d be sent there. Could the situation be *that* bad?

My wife asked. “How can this be happening?”

I said nothing. I had no answer.

Then she asked, as she poured my morning cereal, “So, what are you going to do about it? Can’t you call the White House or something?”

“Honey,” I responded, with dripping sarcasm, “I am sure the President is aware of all this and help is on the way.”

“No, you’re wrong,” she said. “Go look for yourself.”

I did, and I saw the mayor of New Orleans on television. He was begging for help. “C. Ray Nagin,” the caption read. There he stood, in a wet tee-shirt with a glistening bald head, asking the world for help.

My wife had followed me into the office. “This is different,” she said solemnly. “Do something! You know people in Washington and many other places.”

“Hmm,” I replied. This was the first time I’d ever heard her refer to my various contacts as anything more than a nuisance.

Weeks went by, and the more I saw and read about what was happening in New Orleans, the more I felt that I *did* need to be involved, although I was now living many thousands of miles away. The city and its crisis wouldn’t leave me alone—and, besides, I was part of a very select group worldwide: disasters are my specialty.

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I had been in the planning and recovery business since the 1960s. I'd wanted to join the Peace Corps in 1963, following military service, but that wasn't possible because former military personnel couldn't serve in the Corps. Instead, I worked my way across the United States to get used to civilian life again. In lieu of the Peace Corps, I signed up to be a volunteer for the American Friends Service Committee (AFSC).

My assignment was in Italy, specifically the town of Villa Mimosa in Reggio Emilia. When I got there, I felt ready to get back to work. The villagers met me like the prodigal son, because they thought I was a trained engineer with building skills. A guy I'd met in the AFSC volunteer school had created that impression. His name was Jim Brown. Jim had arrived in the village several weeks before me, and had become a real man about town. He was dashing, tanned, handsome, and girls threw themselves at him. He was also savvy about the town rebuilding project.

I, on the other hand, knew nothing about Villa Mimosa or its needs. But when I awoke the first morning and went to the cattle trough where we washed up, I learned that my pal Jim had maneuvered me into the role of project architect-engineer-builder and leader.

"*You, Kemo Sabe,*" Jim said with a big smirk, pausing for effect, "are going to rebuild the school and the town square. You are in charge, my good man."

Destiny had tapped me on the shoulder. From that point on, I was involved in planning. Using the GI Bill, I studied education, urban planning, and management at California's public universities, earning an MA at UC-Berkeley in 1963 and a doctorate at UCLA in 1970. I found my way to Oakland after stints as executive officer at Pacific Telephone, the U.S. Department of State as special assistant to the assistant secretary of state, the University of Pittsburgh (assistant to the chancellor), and UC-Davis (teacher-administrator and associate dean of agriculture). I got married and, at each of those places, did volunteer football coaching. In 1976, I returned to Berkeley as a professor. There, I was reunited with many former colleagues who worked in programs to promote economic development in low-income communities.

My first foray into the field of crisis management came in 1974 after I met Lionel Wilson, chairman of the Oakland Anti-Poverty Program. Lionel, a 5'5", athletic dynamo, was a former judge who'd gone on to become Oakland's part-time, poorly paid mayor. I'd known him for years. He was a mentor in my college days at UC-Riverside and later as a Berkeley grad student. We

Blakely Disaster Readings

shared a love of sports, and our friendship matured on the Berkeley tennis courts.

When Lionel became mayor in 1978, he made me one of his advisors. He and Frank Ogawa, a longtime Asian American city councilman I knew, persuaded me to join the mayor's team pro bono. Both Berkeley alums, they asked me to act as their go-between to get university faculty and staff involved in policy issues facing the city. They didn't want to depend on the civil service city manager for all their advice. As I was about to leave our first three-way meeting, Frank said, "That isn't all we need. We have to change the members of many boards and commissions. So please find people to serve—and please serve on key commissions yourself."

I was dubious. "How can I do that?"

Frank grinned. "You will be the Mikado."

"Un-hunh. When vacancies or resignations occur you want me to be the fill-in person until we can identify an acceptable replacement. Right, I got it." Frank, a big bear of a man, grinned broadly. We all agreed, and I walked out with what resulted in a twelve-year commitment to serve when called on and to build a university-city partnership. The partnership became the largest and best funded of its kind in the nation.

When the Bay Area earthquake hit in October 1989, Wilson was in his last term as mayor. I joined him on the scene of the caved-in Cypress Freeway. As he struggled over the rubble, he said, "Get things organized, I'm busy here." I had no idea what he meant. But when I saw him again two days later, I had a plan in my hands for rebuilding the city center. As a result, my picture ran in the *New York Times*. "A Blessing in Disguise" was its story of how the earthquake would kick off a renaissance for Oakland's downtown.

Only two years later, with the earthquake debris barely cleared and new mayor Elihu Harris on the job, I accepted a similar role. Harris wanted to build on my university connections and put together a new public-private partnership for economic development, alongside our university partnership, that would improve the city's long-term economic outlook. At Harris's request, and this time as a *paid* advisor, I took on several important jobs, such as chairing the city's first employment and training commission. Many of these jobs were political, others economic, such as running the public-private operation known as Oakland Sharing the Vision.

And when the big fire in the Oakland Hills erupted in October 1991, Mayor Harris asked me to devise a plan to rebuild and to prevent a recurrence of this kind of urban conflagration. I took Jane Gross, the *New York Times* Bay Area

Blakely Disaster Readings

correspondent, through the area. We discussed how this tragedy presented another opportunity to do things right.

On September 11, 2001, I was in Manhattan, headed downtown to an office building near City Hall, when terrorists piloted airliners into the World Trade Center. I had been in New York a bit more than a year. I was fairly well known by the leadership of the New York Regional Plan Association, so I became vice-chairman of the city's Civic Alliance to Rebuild Downtown.

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Several weeks after Katrina, however, I hadn't gotten enlisted into the disaster. No one in the United States had contacted me, so I assumed that no one would. I was ambivalent about getting involved, in any case. As part of my consulting work, I was happy guiding the Sydney Regional Strategy Plan of 2004 to improve an already fetching city.

New Orleans' trials and tribulations still occupied the international news, however. Not surprisingly, my university colleagues peppered me with questions about what was going on and why the response to Katrina seemed halting and lame.

George Bush and Ray Nagin, odd bedfellows, were both prime targets of the criticism I heard. The U.S. government is bewildering to outsiders, and most of us can't explain it clearly. Remembering when the mayor of New York came on TV after September 11 and acted as though he was responsible for the world, "Sydneseiders" on the street and at the university wondered why Ray Nagin couldn't be like Rudolph Giuliani. In this fashion they criticized, and I fretted, for months.

Then, one morning in mid-September, I received an email from an American Planning Association (APA) official I knew from my work in Oakland and Los Angeles. He asked if he could give my contact information to people looking for help in the continuing Katrina crisis. I replied simply, "Sure."

By the end of the day, I was in the loop for a flurry of emails establishing that the APA would take some kind of action, but no one knew what or when. One of my colleagues in California, Ken Topping, had told the Planning Association that I was interested in getting involved.

Living half a world away, I was answering the whistle like some old quarterback trying to play another season. I was back in the disaster business.

Blakely Disaster Readings

2. GETTING TO NEW ORLEANS

IT WAS NATURAL FOR THE ASSOCIATION TO REACH OUT TO ME. When I moved to Australia, everyone acted as if I'd resigned from the world. But my Stateside credentials remained strong. In addition to being at or near the center of activity after the Oakland fire and earthquake, and after September 11 in New York, I'd written op-eds on disaster planning and an article on natural disasters, and had served on the APA board. So in early October 2005 I booked flights to Los Angeles, Chicago, and finally Shreveport, Louisiana, for a Katrina recovery workshop sponsored jointly by the APA and the Federal Emergency Management Agency, better known as FEMA.

I packed all my old slides and notebooks that contain my reflections on how I handled the Oakland and New York events. I planned to organize this material for my presentation on the plane and during my pre-workshop layovers in Los Angeles and Chicago.

In Chicago, I went by APA headquarters to chat with Association president Paul Farmer and get his impressions of New Orleans and his organization's role in the crisis. The APA has space on Michigan Avenue, in a structure that looks like a great and venerable fort with windows and parapets at the top to impart grandeur and style. It reminded me of the first big building I ever saw in downtown Los Angeles—back when Los Angeles still had a downtown. All the pre-World War II buildings were works of art, with brick facings and small statues arrayed along the façades.

Farmer is a respected and able leader of the APA. He's a tall, handsome man who exudes authority. He greeted me with a warm smile, recalling that, a few years earlier, I had given the keynote speech at the Association's national conference.

Blakely Disaster Readings

Farmer opened our meeting by saying, “Well, Ed, we offered to help the planning department and the mayor early on. We’ve been stymied.” Looking downcast, he continued: “I’m a native Louisianan. I know the history of planning in New Orleans, and it’s not pretty. New Orleans has never had a modern, comprehensive master plan. There were attempts to make the planning commission—not the city council—responsible for planning and zoning, but they failed.” He leaned back in his chair. “So, post-Katrina is a major disaster, and the city needs a clear plan. We simply can’t get any traction.

“There are good people down there—like Karen Fernandez and Steve Villavaso, who are well respected local consultants—but they have not been able to get the city to accept a forward-looking master plan. This is the time to push hard for one. We just asked to have a team of well-known volunteer planners go down there to assess what was needed to get a recovery plan in place.”

My next stop was Shreveport, in the northwest corner of Louisiana. The city was cold and quiet. We passed a military air base that was also quiet—curiously so, because evacuees from the storm presumably would have been housed there. Curious, too, was the choice of the Sheraton Casino-Hotel as the location for the disaster workshop I was there to attend. A gambling casino, a metaphor for risk and chance, seemed either an apt location or an unfortunate pun for the prospects of New Orleans. Were many New Orleanians being housed or bivouacked in trailers or temporary shelters in the city? I took a walk to see for myself.

I saw very few pedestrians, and plenty of vacant hotels and apartment buildings. I was surprised. Why so little activity in a safe “catchment” area not too far from the storm? I remembered reading that New Orleans residents had been transported as far as Boston, while here, in their own state, a military base and vacant buildings could presumably have absorbed more than a few thousand. This would be a question for FEMA about where evacuees were sent and why.

I’ve led many workshops on community crises. It’s my business. Here, however, except for talking about my Oakland experience, I was essentially a listener, a would-be learner. At the workshop, I spotted my friend James Schwab, from the APA head office in Chicago, and Ken Topping, former planning director of Los Angeles, well known for his post-disaster expertise. To my surprise, an insurance expert was present—Laurie Johnson, who usually works with large commercial firms after a disaster. The Louisiana APA delegation consisted of evacuees who were living with relatives or friends in a half-dozen states. But no one from the New Orleans planning department was present.

Blakely Disaster Readings

When I raised that point about no New Orleans planners to a young woman who'd worked at the department before the storm, she just shrugged her shoulders.

"Well," I said, "I bet they are doing the recovery plan."

"I bet they are not," she replied, and walked away.

The workshop crowd wasn't large—forty at most including the facilitators. Anxiety seemed to pervade the room. A simple presentation outlined the damages and issues. Laurie Johnson had the best information on the situation, and she recounted it. Other speakers gave other accounts as we moved through the day, and temporary, on-loan consultants from FEMA explained how the agency's planning process worked.

At lunch, I asked one of the FEMA reps, "Why are people being housed so far away from New Orleans?"

He studied me for a moment and replied, "I'm from Illinois, and I am just here on detail for this workshop. I haven't been to New Orleans." I almost fell out of my chair.

As the day wore on, small discussion groups formed. I joined one to hear some New Orleans Chamber of Commerce people discussing business losses in the city.

On the second day, I presented my Oakland story. I outlined the ways we had developed recovery plans for the earthquake and the fire in the hills. My basic points were that recovery must be based on a clear and coordinated strategy for future improvement, not just a plan to put things back where they were. As one of several illustrations, I cited the relocation of the badly damaged Cypress Freeway. I also discussed September 11 in New York as an example of strong early command and direction.

The workshops that followed focused on options for New Orleans's recovery. Sandra Gunner, a short, light-skinned African American, introduced herself as executive director of the New Orleans Chamber of Commerce. She and a Chamber colleague came over to chat with me. They asked if I might come to New Orleans at some future date. The colleague said, "I think you can be useful to us."

I also met Steve Villavaso, elected leader of the New Orleans APA chapter. Villavaso, a big man with a forceful speaking style, was already passionately engaged in the recovery planning process. He was advocating for a New Orleans master plan "with the force of law." I asked him what that meant, noting that "a master plan is a legal document with the full force of law."

He replied, "Not in New Orleans. The city council is the planning body there." That was news—and far from good news—to me.

Blakely Disaster Readings

I decided that I might be able to help Villavaso and Gunner work on an effective master plan for New Orleans in the wake of the storm. I could do that mostly at a distance, flying in three or four times a year at my own expense. Although the situation appeared grim, I knew that it was also an opportunity for New Orleans, and for me personally, an opportunity to become involved once again in leading a city out of a very difficult and complicated situation.

The workshop proved useful. I'd met some significant players. At this point, however, I needed to catch a plane for an assignment in China. When I arrived there, I was asked by the senior officials who invited me how and why I was not helping out in New Orleans.

And by the time I returned from China to Australia, word was circulating in New Orleans that I was interested in coming there to survey the situation.

Not any time soon, I thought. The city was in too bad a shape to accommodate visitors. The political landscape wasn't much more hospitable. The national press was being mercilessly critical of the Bush administration and questioning every action taken in New Orleans. Why get caught up in a seemingly senseless fight with the federal government involving Louisiana? From my early days in Oakland and my work with the Clinton administration (on the San Francisco Presidio project and as an informal advisor to Housing and Urban Development Department, HUD), I knew that Louisiana was regarded poorly by Washington bureaucrats—and that New Orleans wasn't trusted at all.

Still, opportunity was beckoning. Maybe, down the line, I'd embrace it.

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A few days after I did an interview on Aussie TV about New Orleans, Mtangulizi Sanyika, an old friend who is a veteran community organizer, sent me a short email asking if I would come to New Orleans to examine the dysfunctional recovery with an eye toward providing some informal advice. "MT," as I know him, explained that he had moved back to New Orleans to be with his ailing mother, and he was there when Katrina hit. He and I had a longstanding relationship from our days together at Berkeley, where I met him when I taught community development in one of my field labs. MT is an imposing figure: short, stocky, with a big, open face and a scraggly beard that refuses to become full. He always wears an African robe over his Western clothes and tops it off with a square, Middle Eastern, multicolored cap.

MT explained that before the storm he had formed an organization specifically to awaken New Orleans blacks to their rights and the need to alter

Blakely Disaster Readings

the social and economic equations. We talked briefly on the telephone, and I agreed to make the long trip. I was going to Louisiana for a second time—again, at my own expense—to see what his group was doing, to see what New Orleans looked like a year after Katrina, and just out of curiosity. I recalled my dad’s warning: “Curiosity killed the cat.” Maybe so, I thought. But the temptation was great. And I had an interview about New Orleans coming up on a Sydney radio station, which set me to thinking more seriously about the post-Katrina situation.

I met MT at a New Orleans hotel in mid-November 2006. He took me for a ride around the city. I saw little moving. We went to the Ninth Ward, where houses had literally fallen into the street.

Next we visited Mtumishi St. Julien, director of the city’s Housing Finance Authority, where a group of well-dressed, well-spoken African American men were arrayed around a table. The discussion centered on what these men could bring to the party, that is, the recovery programs to build housing or repair damaged city playgrounds. Together, they represented years of experience and talent, and they had financial resources. But although they were obviously able, there didn’t appear to be a way to mobilize them. Discussions ensued on how to contact the city administration. No one had clear ideas. After the meeting I went to St. Julien’s home, in the suburbs, to see the storm damage there.

I also met city council member Cynthia Willard-Lewis, a former state of Louisiana beauty queen with a strong resemblance to Lena Horne. As part of the recovery, she wanted buildings torn down by mayoral order because they had depressed property values and corroded public safety. I empathized with Willard-Lewis. The neighborhoods she represented had been disfigured by a monster dilapidated apartment building that never should have been built in that residential area. I said to her, “This shoddy high-rise along the freeway is simply poor city planning.” She grunted in agreement and spoke at great length on how competently citizens in New Orleans East had started to re-plan the area before the storm hit.

Next day, we attended a series of forums and meetings on disaster plans. I left without learning either the goals of those organizations or their sponsors.

During the afternoon of my second day in New Orleans, the Rev. Louis Farrakhan, leader of the Nation of Islam, appeared at a church gathering. Several speakers told how most of the Katrina news reporting on looting, rape, and murder was not only erroneous but purposely distorted. Through descriptions of ordinary acts of heroism presented by eyewitnesses, such as individu-

Blakely Disaster Readings

als who took baby formula from stores or rubber swimming pools from hardware emporiums to float people out of harm's way, a truer picture emerged of what had occurred. The Superdome rapes didn't happen, according to several speakers at this forum. Moreover, local gangs in many cases acted as police while the small uniformed force of officers in that massive building were dealing with life and death emergencies. These facts were all news to me.

I met Farrakhan for a brief discussion on recovery approaches. I described the need to create jobs and develop economic resources early in the process. He was sympathetic but noncommittal about contributing to the recovery.

I joined a march through the public housing areas near downtown, which resounded with shouts and demands for social equity in rebuilding. Next day, a Sunday, I wandered the streets by myself and took more photos. I left the city for the airport with questions on my mind. Anticipating my queries, MT presented me with a gift of a load of books on Katrina, hot off the press, for airplane reading.

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A couple of weeks later, I returned for a third time to New Orleans, to get a broader, more nuanced view of the city and its operational problems. My first two visits Stateside had confirmed that the city wasn't mobilizing itself—or perhaps wasn't able to mobilize its resources, both human and material—to move the recovery forward. Pre-Katrina tensions and problems were only exacerbated, and laid bare, after the storm.

On this third visit, I learned for the first time of the deep divisions and crises afflicting the city, especially around its competing plans for recovery. These divisions foreshadowed trouble for any recovery effort. My Urban Land Institute (ULI) colleagues, who had been so helpful in post-Rodney King Los Angeles, had made fissures in New Orleans. The ULI team that visited New Orleans was invited by Joe Canizaro, ULI's New Orleans-based president. A wealthy developer perceived to be a member of the upper elites, he was bringing in outsiders to re-plan the city. The resulting expert team report recommended that frequently flooded areas, mostly black and low-income communities, be abandoned and turned into park lands, as indicated by what would become infamous "green dots" on their map.

Although the report was careful to state that this could be done over time, and with minimum disruption, it provided for no meaningful community consultation. The whole effort was regarded by poor blacks and whites as an-

Blakely Disaster Readings

other attempt to socially engineer them out of the city, a kind of geographic genocide.

The charge of a plot seemed even more plausible because just before Katrina, a large number of blacks had been evicted from their government-subsidized housing for so-called revitalization of those properties. By all accounts, most of the units were in good condition, their only liability being that they were close to downtown. The “green dot plan,” as it came to be known, would be grabbed, black leaders charged, by outside real estate interests. Black renter population would be displaced, and select parts of New Orleans turned into a white, Vegas-style gambling island.

I attended a series of workshops at one of the community centers in the city’s central area. The workshop drew only a small audience, but the people in the room were a solid core of real community leaders. I presented the case for a consolidated plan for recovery with a coordinated approach with someone acting as the driving force—in effect, a recovery czar.

Odd as it may sound, I didn’t have myself in mind for the job. Rather, I was thinking of Lieutenant General Russel Honoré, who had coordinated military relief efforts for Katrina-affected areas across the Gulf Coast. Honoré had already gained considerable recognition and respect for those actions. I hadn’t any idea what a Pandora’s box I was opening when I introduced the notion of a recovery czar.

On this visit I ordered business cards at a downtown printing establishment on St. Charles Avenue. When I went to pick up the cards, I hunted down a small café where I could get a sandwich. A group of white men were at a nearby table, talking loudly enough to be heard everywhere. I would hear the gist of their conversation repeated many times after I became recovery czar: the city was finally being rid of the low-income drag on the economy and would benefit if “they” didn’t return. The group took no notice of me.

Those hostile remarks included a crude denunciation of the mayor that would become a norm. Except in movies, I hadn’t heard anyone talk like that in a long time. I brought the subject up to MT. “Welcome to New Orleans,” he said. “You have a lot to learn.”

During this visit, MT arranged for a meeting with Mayor Nagin. Over breakfast on the morning of my meeting, I quickly sketched on a napkin an organizational chart for a recovery office that would operate under the mayor’s authority.

The meeting began well. After chatting amicably, he asked my opinions of the city and the recovery underway. He also asked about my work in Aus-

Blakely Disaster Readings

tralia and in post-earthquake and post-fire Oakland. Nagin knew something about me. He had done his homework, and his sincerity and integrity impressed me.

The mayor told me he wanted someone who had both experience with FEMA and knowledge of how a city worked to help him guide the complicated FEMA and state processes. He was not satisfied with his support staff, who seemed to him to know little more than he did about what to do and how to do it.

I had anticipated that MT would have turned my hand-drawn organizational chart into a finely typed and expertly drawn product. Instead, he handed me the napkin on which I had drawn the chart. The mayor peered at the napkin in his hand, pondered it, and then quizzed me on the plan and my whole approach to recovery. He stood up, which MT later confessed he took as a signal that the meeting had ended. But no: the mayor was standing to show me a large diagram near his desk. MT took a few photos of it. I told the mayor that I would be happy to help him as a consultant.

“No, I need you to come full time,” he said.

I responded, “I’ll see if that can be arranged.”

Outside the office, I told MT that the mayor impressed me, and that he would be a great person to work with.

I knew then what was going to happen next. I was going to take the job.

But I had to have a good plan. On my visits, I’d already gotten useful intimations of the problems and issues that I knew would emerge and intensify once I was directing the recovery. And I was unsure how I could make things work in an atmosphere where there was so little mutual trust among the locals and, in Washington, so little confidence in the city and state administrations.

Blakely Disaster Readings

3. A HARBINGER OF PROBLEMS TO COME

I WENT BACK TO AUSTRALIA AND RETURNED A FEW WEEKS later, the first week of December 2006. I had asked the mayor to set up a meeting for me with the people I'd be working with, to see if there was some mutual comfort and a general agreement on what my role would be if I took the job.

I had a packed agenda. I met with the police superintendent Warren Riley and chief administrative officer Brenda Hatfield, who said with a warm smile, "I'll be glad to get this recovery off my desk."

Legislative director and mayor's aide de camp Kenya Smith showed me around City Hall, and introduced me to city council members and staffers. I went to meet City Attorney Penya Moses-Fields in her office. She told me that her role was to be the lawyer for the council and the city, and to be the mayor's and the city's conscience. I also met the mayor's communications chief, Ceeon Quiett.

In the evening, mayor Nagin organized a dinner for me with the team. I met all the key people except Donna Addkison, chief of development.

Next day, when I did meet Addkison, it was an uncomfortable encounter. She is a small, energetic brunette, the epitome of professionalism, with bright eyes that beam at you like searchlights. I was taken aback when, throughout our interview, she played a television so loud that I had to ask her over and over again to repeat what she'd said. Even with those hints, she didn't turn off the TV or even lower the volume. She was also jumpy. She asked me my role and then, before I could answer, said that she had much of the recovery underway and that I wasn't needed.

Addkison invited to the meeting a man named she identified only as "Tony,"

Blakely Disaster Readings

one of her staff, a stoop-shouldered creole with curly hair and a solid build. I had no idea who he was or what he did. She didn't mention his title. But when the meeting ended, she said, "I know you want Tony on your staff. You can have him."

Walking me to the elevator, Tony apologized for the tenor of what had just occurred.

For my part, this was another harbinger of a potentially serious problem: I wasn't sure about joining the team if there might be holdouts. In disaster recovery, a senior holdout not only can hurt your program but can poison the work atmosphere. Although I wanted to meet with the mayor to discuss Adkison, I was only able to talk to him by phone just before I took the job. He assured me it would all work out. I had my doubts.

Council member Willard-Lewis was a vocal leader of the black community's recovery effort and set up meetings for me in the wards. I met for the first time with the full United New Orleans Plan (UNOP) senior team. Laurie Johnson and Steven Binger were among its leaders.

As the UNOP team briefed me, it became clear that the city had a number of planning teams that were in competition with each other, including the controversial "green dots" plan I've described. They also gave me a briefing on the pre-Katrina population, which one said was a bit inflated since actual home occupancy levels based on water and gas meter use were much lower than the official census. I asked for their best guesses, which ranged from 385,000 to 454,000 but well short of the official 484,000 census figure of five years earlier. The lowest estimates were based on the dwellings drawing electricity and water regularly. As Greg Rigamer, the New Orleans economist/demographer, said, the number depends on what you want to count, those here all the time or those here some of the time. The city council commissioned neighborhood plans that it intended to present to the Louisiana Recovery Authority (LRA) as the city's recovery plan. In a hostile voice, I asked Laurie and Steve in the council chambers, "Why isn't this being done by the City Planning Office? This is the city's job."

Steve agreed calmly. "But Ed, you don't understand. The city doesn't have the capacity to *do* the job."

I would soon find out that he was right.

On this visit I also met with the New Orleans Redevelopment Authority, NORA. The first time I met the mayor, in early November 2006, I had made a simple request: if I take the job of recovery czar, then make me head of NORA, or at least put it under my direction. So far as I could tell, the agency had dealt

Blakely Disaster Readings

none too successfully with blighted properties, and had no other real mandate.

The mayor liked my proposal, but informed me that NORA was a creature of the state, organized to do business in and for the city. That, I replied, was a strange arrangement, unless the Agency received state money. I argued that he at least ought to have NORA report to me on the organization chart.

Again, Nagin agreed, but said, “Those guys are pretty independent. I’m not sure how they will take this idea.”

“Those guys” meant principally NORA’s board of directors—the president of Tulane University and other distinguished locals—and our problems with them would go beyond what the mayor had suggested in our conversation. In my first meeting with the board, I discovered that New Orleans’s mayor couldn’t and shouldn’t assume he was going to lead the recovery from any disaster. NORA board members were already in the press and on radio and TV, outlining how they had a mandate from the mayor to lead the recovery.

From city government staff members and the few people I knew in New Orleans, I was more than a little concerned by what I was hearing about NORA’s direction. The organization was publicly proclaiming that it was responsible for the recovery and that the mayor should just get out of the way.

How could I plan and carry out this massive reconstruction job if my boss and patron, mayor C. Ray Nagin, was going to be undercut by the very people who should be supporting us?

At my next meeting with Nagin and his policy executive counsel and policy advisor Becca O’Brien, about my proposed organizational structure for the task, I reemphasized my need to control NORA’s strategy and funding program to ensure that the agency’s role meshed efficiently with our recovery plan when we made one.

A significant disconnect in that regard was already clear. I just couldn’t fathom how an independent development authority—called NORA or anything else—could have the power to do what it wanted with no city oversight or guidance. How could it be that a mayor appointed members of such a group to work on city projects, and they wound up acting independently of him?

The answer, it seemed to me, was rooted in political calculations on his part. The mayor wanted a group of stature to give him the capacity to make some fundamental changes in neighborhood commercial districts. He was both surprised and disturbed when NORA laid out an independent agenda not related to his goals. But having appointed them he had few options.

I had good reason for feeling that NORA ought to be under direct mayoral control, and that I was being directly challenged in my new position. I had

Blakely Disaster Readings

written books and won awards for managing these kinds of recovery projects. Why would I now be up against what I considered an irrational organizational structure with the responsibility and power to do whatever it wanted in spite of the mayor, and in spite of me?

The mayor seemed to understand my frustration, and pledged his support to ensure that our operations ran smoothly. He smiled and added, “We got the money.”

Fine, I thought, but who would run the recovery, and what would they be running?

My next encounter with NORA was on a return visit in early December 2006. I wanted to know what the members themselves thought their roles were and why they felt the need to be independent of the mayor and me. Becca arranged for the meeting in the mayor’s office.

I had barely sat down and opened my notebook before invectives started flying at Nagin. Several members called him weak and ineffective, and said that he owed them—NORA—two million dollars. One member, a balding, bespectacled man, reddened and said, “We can get the recovery going if the mayor and city would just get out of the way. We have projects all lined up.” I stayed silent and made notes as the meeting became extremely heated and hostile. More invective was unleashed, aimed generally at the city as well as specifically at Nagin.

Some of the phrasing, I had to admit, was colorful and stunningly direct. An ex-city council member described the mayor as nice but incompetent, a crawfish that promised one thing and then backed away as soon as anyone else objected. Another NORA board member, a short black man with flaring nostrils, called him a liar because he didn’t provide NORA the money he promised. And a middle-aged white member declared that everybody knew “Ray” was a poor manager who didn’t know how City Hall functioned—and even if he *did* know, he couldn’t extract any work out of the civil service employees.

Then the NORA crew turned on me. I wouldn’t get anything done, they said, because the mayor wouldn’t support me, and, anyway, he wasn’t in charge. They added that I didn’t know anything about New Orleans.

I didn’t even get a chance to introduce myself formally before Becca O’Brien adjourned the meeting.

She and I walked out, shaking our heads.

■ ■ ■

Blakely Disaster Readings

Although I had yet to join the Katrina recovery effort in an official, fulltime, paid capacity, I had already assimilated a vast amount of information from my visits to the United States and the city, and had drawn on all my past experience to start thinking about how I would run the operation, and the problems I'd encounter.

Early in this process, the mayor's assistant had sent me the city's priorities by email. The list was too long. I emailed back and said: "*This is not a priority list, this is a Christmas tree. Slim it down. Make it cleaner and more direct.*" So we made a shorter list, giving high priority to police, fire, and public safety projects.

The mayor and I decided to give the recovery more structure based on some principles we developed via email correspondence.

1. *Continue the healing.* Recognize that the underlying trauma of Katrina started well before the disaster, and lay in the deep divisions across race and class. Healing the chasms across the community is an ongoing exercise the Recovery Office has to play a central role in designing and carrying out. This process includes meetings of all city employees and community groups as an ongoing part of the recovery effort.
2. *Provide public safety and security to all neighborhoods.* The depth of fear of crime in the lowest-income communities is impeding the return of residents to them. But because crime is a citywide contagion affecting all areas, both crime prevention and crime stopping have to become critical elements of the recovery. The elements should include a host of programs such as citywide crime cameras and community and neighborhood policing strategies that engage young people in positive social and recreational pursuits.

In addition, the availability of good schools near students' homes is an important security issue for every parent. Schools are now community core facilities. Libraries and community centers near schools increase foot traffic and reduce auto-oriented development, while increasing the viability of neighborhood retail. I felt that as energy became the key issue in the nation, New Orleans would be ideally suited as an attractive city to live and work in, if it could deal with climate change. Finally, good hospitals and clinics are required to deal with both mental and physical health issues. Therefore, a core element of the strategy is to provide every community with access to better health facilities than it had before Katrina.

Blakely Disaster Readings



A ruined house.
Author's photograph

3. *Install infrastructure for the twenty-first and twenty-second centuries.* New Orleans, like many American cities, has underinvested in primary infrastructure such as sewers and water. That is the bedrock for any new industries. It's important to all communities across all income groups, and it answers the needs of emerging enterprises for better, cheaper, and greener technologies.
4. *Diversify the economy.* The largest producers in the New Orleans economy, based as it is on tourism, energy, and retail services, are in low-wage service sectors. To combat crime and generate a healthy social economy, new job bases, related to the city's future, have to be established in areas such as bio-medicine, advanced transportation, and media.
5. *Develop a sustainable settlement pattern.* This is the foundation of all good cities, whose viable neighborhoods attract people and jobs. Urban theorist Richard Florida, a good friend of mine, contends that attracting and retaining or educating highly educated young professionals is a smarter economic development approach than chasing factories. I wrote what some consider a seminal article on this same topic, applying the idea to a city economic development strategy. For me, the aim was to deepen the education and skills base of New

Blakely Disaster Readings

Orleans by working with the new school district to build new environmentally and socially sustainable communities, less segregated by income.

As I went around New Orleans during my four preliminary trips there, I had sensed despair, not hope. The formal and informal interviews I conducted only confirmed that impression.

I realized that New Orleans reminded me a great deal of my visits to some West African countries where I'd worked as a consultant several decades earlier. Although people knew that their countries contained resources, they had lost faith in their governments, and in the leaders who had plundered those resources. In New Orleans, as I listened to residents talk, I formed a picture of the storm ripping open a lot of old wounds—civic in the broad sense, but in many cases personal as well. So I realized that my work there would have to attack the core problems of the people, not just oversee a cosmetic recovery of buildings.

My vision of the situation was that the city was broken *before* the storm.

Those impressions were confirmed over and over again by my conversations with local black leaders who were discouraged, and whites who were distrustful or antagonistic, most often toward each other. Old myths and deep grudges seemed to be thwarting the kind of cooperative behavior I'd experienced in Oakland and post-September 11 New York. In both those situations, I was swept up by an intense spirit of community collaboration and a desire to reaffirm a common destiny.

As a result, my operating philosophy as I contemplated the New Orleans assignment was to view it as akin to my earlier work in developing countries, where the restoration of good government and a clear economic order were more important than either the briefings I received from the World Bank and other agencies or the rhetoric of local community leaders.

New Orleans's economic destiny had to be changed. The city had become entirely dependent on tourism and soft-sector items like the sale of trinkets made overseas; it had few revenue producers except food, and almost no surviving national company headquarters. The oil bust had sent most of the major ones to Houston or Dallas.

So there was a one- (or at best two-) sided economy. I had to try to diversify that economy based on two factors: physical and human resources. New Orleans needed jobs that fit the skill levels of its people, which meant jobs requiring local labor with technical inputs. So driving forklifts and trucks,

Blakely Disaster Readings

welding, and similar blue-collar jobs would be the goal. Expansion of the airport was a natural, especially given the needs of aircraft servicing. Jobs at a large logistics center, where goods were downloaded into containers and reconfigured or transshipped, also made sense.

My core challenge, as I saw it, would be to use the federal funds and private philanthropy that would be coming to New Orleans to build a team and an organizational structure that could reconstitute the city's basic institutions, including its economy and government. As in other disasters, my guiding idea was that the city should use the recovery process to improve its economy, government, housing, schools, and civic life for the future, and not just restore itself to what it was before—which in New Orleans' case, at least, was a dying and deteriorating city.

I'd start by leaning on my Oakland and New York experiences to use Katrina as the mechanism to change the city and give it a solid, new, and long-term direction. Part of that, maybe a large part, would involve major physical changes; in Oakland, we had extended Interstate 880 down to the busy port to move more goods faster as well as to restore the link between downtown and the oldest part of the city. That strategy also dovetailed with my goal of reinventing the downtown as a government, rather than retail, center.

I wanted to be clear about my thinking before I left for New Orleans in January 2007. I took a short vacation in Mexico from December 15, 2006 to January 6, 2007 and arrived with a little rest and lot of experience as well as a game plan based on what I'd seen there, and not with a template or a rigid theory to apply to every problem and situation. It never occurred to me to base the recovery schematically on what I'd done in Oakland, or helped to do in New York. I simply took pieces of my approach in those places, as well as all the other past work I'd done.

In my experience with disaster, it's best not to approach problems with a rigid template or philosophy, but to see what the situations present to you, and improvise. Like a lot of people, especially executives with sports backgrounds, I based my strategic thinking on sports leadership approaches. When I played quarterback in high school and college, I always took what the defense "gave" me, as football coaches put it. My game plan was to play to the opposition's weakness until the defense stopped us. If the other team was big and fast, I slowed the game down and frustrated them with dinky passes and "screen" passes. If they were smart, I let them lead until I saw their strategy—and then countered it. I didn't take plays from coaches or anybody else on the sideline unless I felt I had to.

Blakely Disaster Readings

In New Orleans, I found myself utilizing that quarterbacking philosophy of taking what the defense will give you. I had a general game plan, but I figured on letting it evolve as the political, economic and social situations revealed themselves in more detail. As my UC—Riverside coach, Jim Whittley, drummed into me, study the defense and let the other team make mistakes, and know them on film better than they know you. Don't try to overwhelm them, let them beat themselves.

Although the post-Katrina assignment was inevitably somewhat daunting, I felt that my skills as an economic and international development planner gave me some chance for success. I knew, however, I would need a lot of luck and courage to go the distance.

In post-Katrina New Orleans, I figured getting down the field was the goal. It would take a long time to record victories. We needed to deal with internal strife among members of the community on race, class, and a myriad other agendas before we could move forward anywhere.

Since I had visited New Orleans four times before taking the job of the recovery czar, and each time took back volumes of records about the hurricane and the attempts to resurrect the city, I designed a recovery system based on what I had gleaned and learned from these trips and from previous disasters I'd been involved in. I didn't want—or need—to reinvent the wheel, and I responded to what the situation presented to me. I also had the advantage of advice from university colleagues from Los Angeles; Kobe, Japan; and the World Bank.

■ ■ ■

After the last visit in December 2006, I communicated with Mayor Nagin by email from Australia my home and later on vacation in Mexico. I liked him and wanted to be part of his team. So I told him I was coming to New Orleans, but not when. First I had to disengage from the university and discuss several problematic issues with Maaiké. I was more than a little nervous about being away at that juncture. I was on my way to Australian citizenship, which is stringent with respect to residency. One can lose a permanent visa, much like a U.S. "green card," by staying outside the country too long.

The University of Sydney indicated that it might give me a one-year leave if I could pay for a teaching replacement and for my research staff salaries, and if by using Skype and email I could also continue working on my research grants and doctoral student supervision. The mayor found a formula that

Blakely Disaster Readings

worked for the university and for New Orleans. My wife agreed that I could go if I made it a one-year commitment, subject to her approval for an extended year, and if I could keep my Australian permanent visa. She and had I just purchased a house we liked, and she was staying behind to furnish it.

I finally got everything done with the university and family. Then I pressed the mayor for a title and responsibilities that would give me authority over all recovery operations. My sojourns in New Orleans had convinced me that there were already too many players ready to seize the reins of the recovery, including insiders like Addkison and outsiders like the NORA Board and its new staff members. Furthermore, the city council was developing its own recovery plans, and there were competing plans afoot. So I felt I had to be designated at least deputy mayor or deputy to the mayor for recovery.

Since Nagin and I couldn't agree by way of email, I was hoping that my face-to-face meeting in early December 2006 would get our respective expectations sorted out. The idea of a major domo with power over the rest of the bureaucracy of the type I was proposing clearly troubled him. He wrote to say that the team was set and that he didn't want to upset the current working arrangements by bringing in someone who appeared to have authority superior to that of the other managers.

I agreed to a point. But I told him that my experience in Oakland showed that if people aren't clear on what orders to follow, they'll cling to the old organizational structure, slowing things down. I felt that my experience with Addkison hinted that the same thing might happen in New Orleans.

We left the matter of my specific title for later. Meanwhile, I came up with "Executive Director of Recovery Management" as the proxy title for use in the city council budget, with discussion to follow on what it meant.

We shouldn't have had to discuss this further. We were already nearly 15 months beyond the storm.

Blakely Disaster Readings

4. “FIX IT!”

I WAS ANNOUNCED AS THE RECOVERY “CZAR” IN NEW Orleans on January 7, 2007, 16 months after Katrina. “Dr. Blakely, a globe-trotting academic with a long résumé, has a mandate for renewal from Mayor C. Ray Nagin and a city desperate for leadership,” reported the *New York Times* on my appointment.

Even with my experiences with major disasters in Oakland, Los Angeles and New York; even with my extensive nonacademic resume; even with my successes in the nonprofit sector working with large staffs and budgets; even with my international experiences in unfamiliar cultures ranging from Turkey to the Caribbean to West Africa; and even with a 1988 run for the mayor of Oakland under my belt and plenty of experience working with mayors directly, I realized one thing quickly: New Orleans presented a far greater challenge than anywhere else I’d been.

Rumors of my appointment were already afloat in the media, and in an early December 2006 press gathering at a community center, I had commented on what I might do if appointed. But the mayor and I didn’t reach an agreement on the appointment until mid-December, after I had secured leave from the University of Sydney, and my agreement with New Orleans was verbal, with no written contract, and no job description to speak of. The only thing I had from mayor Nagin was his injunction: “Fix It!”

What the hell did *that* mean? I’d heard “fix it!” before—from mayor Lionel Wilson of Oakland after the 1989 earthquake, and from his successor, Elihu Harris, two years later, after the Oakland Hills fires. Hearing it again set off warnings for me about the kinds of political issues I might face from citizens and the support or lack thereof I might expect from the mayor and his team.

Blakely Disaster Readings

The ride downtown from the airport that January day was like passing through one long, uninterrupted place of mourning. Sand seemed to cover every surface. The skies, along with everything else, were dull gray. I saw no birds flying or roosting. Along the freeway and tucked under the overpasses vehicles lay rusting, right where they had been deposited by the storm or abandoned by their owners. I saw blue roofs and debris stacked in cul-de-sacs that abutted the freeway. Perhaps worst of all, the stench of dead animals, still lying in the open, periodically assaulted my nostrils. The entire scene was almost as nauseating as it was eerie—and this was fully 16 months after Katrina made landfall.

Waiting at the airport for my contact, Becca O'Brien, I was struck by the greetings and reunions I observed around me. As the local folk met travelers, smiles and expressions of pleasure were notably absent. People hugged and cried. They whispered to one another as if at a funeral. The terminal offered no relief. The waiting areas, ticket counters, and baggage claims were dark, drab, and cold. The place looked and smelled like a morgue.

Becca gave me a cordial hello, put me into her city SUV, and we took off. No traffic slowed our journey; indeed, I saw little moving. Downtown wasn't much better. When we passed City Hall, a massive and dismal Soviet-style building, I glanced at the electric sign and saw that it was broken. "C..t Y H..L ...," the sign said. I wondered why no one had turned it off. In front was a park of sorts, an unkempt grassy knoll with few benches or any other gracious touches of a public space.

As we approached the massive Superdome, where reconstruction operations *were* underway, we had to dodge potholes and twisted trees on a sandy Poydras Street, one of the city's main thoroughfares. And Poydras, as a central artery, had been cleared more than other streets. The nearby city library looked grim and unwelcoming. The signs of various service agencies hung from it. In every other respect, it appeared lifeless.

Our vehicle came to a stop at the Pavilion Hotel, a great remnant of a past era of Florentine architecture in New Orleans. I prepared for an early bedtime, to counter the Oakland-to-New Orleans time change, and after a surprisingly sound sleep, I hit the hotel gym. It was 5:30 a.m., so I had the place to myself. Then I walked a couple of blocks in the brightening early morning. At first, I couldn't figure out what was strange before I realized, again, that there were no birds.

Then it was time to meet the mayor and his legislative and intergovernmental affairs assistant, Kenya Smith. We needed to go over the press release that

Blakely Disaster Readings

would announce my appointment as the recovery czar. Donning the red tie my wife thought suitable for this occasion, I descended to the Pavilion's dining room and was ushered to the mayor's reserved table in the far right corner. Mayor C. Ray Nagin came into the room with the smooth gait of a basketball player, and with Kenya at his side. A light-skinned African American with a strong face, Nagin calls to mind a pro athlete you've seen before, but can't match the name with the face. He looked tall and cool, in a well-fitting dark suit. His bald head was gleaming, and he had a smile on his lips. He glided over to his table like he was walking on water. Plain-clothes security men hovered at a respectful but watchful distance.

The three of us chatted a short while before the mayor asked, "You ready?"

I had expected to get a full briefing that would clarify my role and title, which were still under discussion. None of those items were discussed, however, even when I suggested that we do so. I wanted more detail from the mayor, as well as a personal exchange, but that wasn't possible in front of an aide. And now we were taking off for City Hall and the press conference.

Reporters, photographers, and cameramen were gathered in what's today called the City Hall "media room." Nagin called them to attention, smoothed out a long piece of paper, and started to introduce me as the head of the recovery. Almost immediately, the reporters pounced:

Why so long in getting someone to do this? Why do you need anyone?



Mayor announces me.

Author's photograph

Blakely Disaster Readings

Aren't you the mayor? Can't you or your staff do the job? Who will he report to? Why *this* guy? What does he know about New Orleans? How much is he getting paid? What's he going to do, and how fast will he do it?

These were far from friendly, or even neutral, questions. And I was pretty ill-prepared to answer most of them. Although I had an extensive disaster recovery resume and was "in command," at this point I had only a superficial understanding of what being there, or being in command, would mean. I had no real understanding of my job—nor any pre-briefing or script for the interview. In my past positions, in contrast, encounters like this were always rehearsed.

The reporters started in on me. Why were you hired? What staff will you have? What's going to be different with you here? Why do you think you can move this recovery along when no one else has?

Feeling suddenly flushed and combative, I shot back that I would have a plan of action and funding for the plan by the end of the year.

That wasn't good enough. Again the question came—what difference are you going to make?

I responded hotly: "That's not a question. It is a challenge. Come back in a year."

I looked over at the mayor. His ears seemed to shoot up. His media director called the press conference to an end. But, for me, it was a start, and a rough and irritating one, at that.

Nagin, media advisor Ceeon Quiett, Kenya, Becca, and I all walked back to the mayor's office. Nagin took his seat at the head of a long, oval mahogany table with matching black leatherette arm chairs.

"Are they always like that?" I asked.

The mayor's left eyebrow went up in mock horror. "Man," he replied, "have you ever met a press corps like that?"

"No!" I said in a firm radio voice.

"Well, you haven't seen anything yet," the media director said quickly.

Nagin grinned. "You'll learn." He giggled uncontrollably and shook his head from side to side like a schoolboy telling a dirty joke.

The media director said, "We have media lined up for Becca and Blakely today." Then he started speaking in media code about radio and TV stations. I tuned out.

We jumped into another SUV and tore down the street, and Becca again recited the Katrina tragedy for me. She was making sure I was on message.

As I hurriedly rehearsed my list of facts, our SUV came to an abrupt halt.

Blakely Disaster Readings

We jumped out and bounded into the first radio station studio, along with some young and funky rap disc jockeys who were more interested in their street banter with one another than in us.

When we left the third and last radio station I went to find a home at City Hall. I sat down at a small desk in a vacant office, which I simply commandeered. No one offered to help me or show me around. I thought about how I got here, what I was going to do. I wandered around the offices and poked my head into them. One of my first new hires, my environmental specialist, was already at work before I could even get a contract organized for her. What dedication!

I made an arrangement for a city vehicle—simply by taking the first small black or blue car available—and tried to fill in the prescribed paperwork.

Before I knew it, my first day was over.

I walked out of the office and into the hallway. My new police escort and driver, Roland Doucette, or Duce, as he told me he likes to be called, was waiting for me. Duce is my height, weight, and coloring. We wear mustaches—his pencil and mine bushy. He cuts his hair close so it looks almost like a cap on his head. He is well built, and when he stands with his legs out, you know he's a cop. He is surely someone you don't want to mess with.

Duce asked simply, "You ready?" and we walked out the back door and got into his silver Ford Taurus. It looked like a police vehicle without a decal.

I'd rented the apartment of an old friend, in the central area near downtown. When we got to the flat we lugged my suitcases up the steps.

As Duce was going down the stairs, he yelled back, "Doc, you got mail."

I called back, "What? I haven't even told the mayor where I'm living."

As I reached the bottom landing and Duce handed me the parcel, he replied, his eyes wide and piercing, "This is a small town, Doc, don't you forget it."

To be away from the street noise, I took the back bedroom in my two-bedroom flat, arranged my clothes in the closet, and then went into the kitchen to look for food. I hadn't been invited for dinner on my first night by any of my colleagues nor by the mayor. So much for Southern hospitality, I thought. I didn't realize at the time that during my two years in New Orleans I would never get an invitation to dinner because so many people's homes and lives were deeply disrupted.

That struck me as strange, even in a crisis. The mayor and most of his lieutenants had impressed me with their MBAs and professional degrees when I met them. But to my mind, one of the cardinal rules of a manager is to welcome all new staff with dinner or lunch. I'd acted on that rule for more than

Blakely Disaster Readings

forty years and had it drilled home at the Pacific Telephone Company, my first post-college employer, and as an Air Force officer. Yet here, in New Orleans, no one even asked me if I had a place to stay. This was not bad manners, just a very bad situation for everyone.

As I walked down St. Charles Avenue in search of dinner, a large black rat was sauntering across the street and moving toward the downed power lines on my side. I hoped for a second the lines were live, so they would fry the vermin. But the rat eased across them and up some steps toward a house. He'd had the place to himself for so long that I was the interloper.

Back in the apartment, I took off my clothes, put on a sweat suit, and opened a can of beans and a packet of rice. I found suitable kitchen utensils and started the fire. For more than 50 years, I've made evening and weekend field notes. I took out my notebook and small ballpoint pen and began writing:

To Be Fixed

1. Who is responsible for this recovery?
2. What is the recovery plan?
 - Where is the city master plan? Why isn't the planning commission developing and driving the recovery process as part of a long-term master plan?
3. What are the city's recovery priorities?
 - There are no management systems to run the city or manage the recovery.
 - Jails and criminal justice facilities are an admission of failure, not priorities for a better city
 - Infrastructure is a mess—old or broken
 - How can you have a real city without good schools—they are not even mentioned
 - Blight is a visible issue
4. What is the city economic base—oil? tourism?
5. Can we fashion a city bureaucracy to guide the recovery?
6. What is FEMA doing to help restore New Orleans?
7. Race is an apparent issue
8. Can New Orleans fool Mother Nature?

—A beginning list!

Blakely Disaster Readings

Blakely Disaster Readings

PART II

Where to from Here!

Blakely Disaster Readings

Blakely Disaster Readings

5. IMAGINING A FUTURE OUT OF MUD: A RECOVERY PLAN

MAYOR NAGIN WAS ON THE HORNS OF A DILEMMA. HE HAD to decide among at least three competing recovery plans: one promoted by the Bring New Orleans Back (BNOB) commission; the second, a scheme of neighborhood plans put forward by the consulting firm of Lambert and Associates; and the third, an initiative by the Greater New Orleans Foundation to synthesize all the plans from all over the city into one consolidated monster plan covering everything the city ever needed or wanted.

BNOB was developed primarily by the business community with the mayor's agreement. It used soon-to-be-infamous "green dots" to represent vast tracts of land that had been repeatedly flooded. The BNOB and its advisory team, to recall, had proposed that these areas not be rebuilt, but instead should be converted to parks or other uses. The BNOB team recognized that the extreme post-Katrina abandonment would force city residents to move to higher ground and repopulate the central areas. Although that was logical in terms of land use and economic development, the green dot areas targeted for conversion appeared largely on low-income, predominantly black areas of the city where home ownership was high. As a result, a lot of black-owned properties would be sacrificed. The black community thus characterized BNOB as a "whitey land grab," and it seemed that Mayor Nagin's hand-picked group had sanctioned that solution.

The city council, with President Oliver Thomas and other African American members taking the lead, reacted to BNOB. They employed Lambert and Associates to develop a neighborhood-based recovery that preserved the essence of all neighborhoods. Lambert's approach was based on old boundaries

Blakely Disaster Readings

and had been assembled hastily to foil any attempt to use the BNOB plan. I discovered on one of my trips with my friend MT that African American community leaders were nervous about the competing plans because the BNOB group—the “shadows,” as MT and black leaders called the local establishment and its mouthpiece, the *Times-Picayune*—were always inserting themselves into various processes to establish the BNOB approach or some semblance of it as the official plan for New Orleans. The result would be a smaller black population.

To resolve the mounting competition and the escalating racial tensions over plans, the GNOF proposed to use its good offices as a neutral party to merge all the proposals into a unified, overarching document that would serve as the basis for a new, citywide master plan. The Rockefeller Foundation got involved behind the GNOF plan. Searching for a way to serve the city in this crisis, the Foundation discerned enough interest from the mayor and others to try to forge a final, unified effort, and the GNOF’s offer seemed to be the best way to proceed. The vehicle for the plan (in keeping with the alphabet soup of the entire recovery) was the Unified New Orleans Plan, UNOP.

Unfortunately, some black civic leaders viewed this approach as nothing more than a back-door reimposition of the BNOB plan. Some BNOB volunteers were also involved in the UNOP process. Moreover, the mayor, although distancing himself from the green dots and many other aspects of the BNOB plan, said publicly that he wanted parts of BNOB incorporated into UNOP.

In addition to being a plan, UNOP was an enormous project to reach out to the New Orleans diasporas. The Greater New Orleans Foundation spent millions from the Rockefeller grant to hold civic forums, not only at large gatherings around the city but also at key locations around the nation by way of video conferencing and live video casting. Rockefeller had paid America Speaks to help facilitate a similar process for New York’s Ground Zero recovery plans. America Speaks tries to find common themes and threads to help professional planners and decision makers forge a workable agreement.

To increase the chances of success, Rockefeller temporarily posted two of its people to the GNOF staff. The UNOP program was sizable. It went well beyond the physical recovery of the city to embrace social, educational, and other longstanding civic issues, with most of the attention paid to non-city government concerns such as schools. It was a good summary of needs but not really a plan.

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Blakely Disaster Readings

My task was to build something useful and usable from all the plan submissions, and to implement the UNOP goals onto the “map” of New Orleans, based on dynamics of urban growth. This meant finding the good ideas in a crowded, hard-to-navigate field that contained many good approaches but no central theme.

Before I arrived in New Orleans, I'd already started the planning work in earnest. I drew on my earlier disaster experiences to create a recovery blueprint. I had copies of all the plans, and I knew the federal rules governing them. Poring over the documents, I could see remarkable similarities in the places and projects recommended.

I was drawing on my previous experiences as a consultant and key leader on large scale plans in Australia, China, and Korea, as well as, most recently, vice chair of the board of the Presidio in San Francisco, a decommissioned large 1,200 acre former military base, the size and complexity of a city within the City of San Francisco's borders. Essentially, post-storm New Orleans was a large-scale metropolitan planning opportunity. So I approached the effort not as a disaster, but as the redevelopment of a large area much like the Presidio, in fact—and like Pudong (near Shanghai) and Australian projects where we planned or replanned thousands of acres of land with all the components from housing to transportation to economic development.

In this respect, UNOP data were invaluable to me, as the project amounted to background information from which one might set priorities for a recovery. As I read and tried to digest these plans, it became clear that I could actually strike a balance between the social and economic issues and the need to devise a land use plan.

Alongside the documents, I laid the template for regional planning that I'd developed over many years of teaching and included in various forms in my books and articles. This is what I devised as a list of essentials:

1. Establishing natural development patterns so transportation and land uses easily intersect—in essence, going with the land flow to facilitate the intersections between transport, housing, and commercial uses.
2. Identifying magnet infrastructure, meaning a combination of natural and institutional resources that can drive the regional and local economy. My usual metaphor of magnet infrastructure is the San Francisco Bay Area, with its great climate, demographic diversity, cultural richness, and its incomparable scientific research bases with UC-Berkeley, the UC Medical Campus, and Stanford.

Blakely Disaster Readings

3. Developing a clear identity for the place, making sure that the identity is distinctive and not just “me too.” In New Orleans, this would not be easy: the physical identity of a trade and transport hub had eroded, and the popular image of music and creativity was being undercut by Memphis and other music hubs. In addition, New Orleans was becoming known more for sleaze than for good entertainment.
4. Establishing an economic engine that is globally competitive but locally based—much as in Pittsburgh, for example, where the loss of the steel mills was softened by a transition to a globally competitive, export-oriented technology base.
5. Creating the intersection between arts, culture, and education to attract human resources in a combination that few other places possess. Here I usually cite Seattle and Minneapolis as illustrative of deeply creative cultures that, in those cities, support Microsoft and the 3Ms.
6. Establishing a policy body as a collaborative reference group to champion and push forward a regional plan and agenda (in this case the collective city rebuilding plan) separate from government. Examples include the Regional Plan Association in New York, and Joint Venture-Silicon Valley. I had helped form such organizations in several places, most recently on Long Island (the Long Island Index). In New Orleans, it was the Parish Recovery Council.

My approach would be to provide a set of priorities for public buildings, combined with geographically specific and defined economic recovery directions. As such, the approach would meet FEMA's requirements to release federal disaster funds.

Even while still home in Sydney, I had used Google Earth maps to examine the terrain, housing patterns, and commercial areas, along with demographic data my research staff at the University of Sydney developed. I found neighborhoods that, because of their strategic location and elevation, could revive faster than the rest of the city. These recovery areas were identified in various ways by the UNOP and other plans. I called them, in planner-speak, “key nodes.” Playing around with them, I first identified five or six, then ten, and eventually sixteen.

After I was on the job in New Orleans and had selected my new director for planning and infrastructure, Dubravka Gilic, I asked her to give me an

Blakely Disaster Readings

independent assessment of locales in which she would choose to launch a recovery based on the UNOP plan. Gilic had worked for many years on the Planning Commission, so she knew the most logical growth nodes in the city.

She and I agreed that thirteen of the sixteen nodes should be given highest priority in terms of resources and attention. The hurricane had hit the Ninth Ward hardest, so the Ninth became the poster child for Katrina destruction. It made sense to designate more than one target area there—the Holy Cross neighborhood and the *lower* Ninth. Dubravka had left out the Vietnamese section in the far eastern part of the city, and I added that. I also added Bywater. She omitted it because she thought it too small and relatively undamaged. But Bywater is well known for its art institutions, and I felt it was important to get them up and running as soon as possible.

My team took two months to craft the recovery approach that we dubbed the Target Area Plan. I give every project a name or label. In fact, I can't work on an idea until I have a label for communicating it. (For example, in Melbourne I had invented "technology precinct" to describe a scheme for concentrated university technology spinoffs; and in Brisbane I used a "gateway strategy" to describe an economic development program to reinforce the notion that Brisbane is the gateway to Asia.)

The point of the target areas designation was to have a visible operations metaphor that people could understand as the direction for the recovery. I invented this concept to designate areas for priority attention that combined residential improvement and commercial revitalization in the same locations. I presented these areas as the places to start a recovery that could, from there, radiate outward across the city. My rationale was that we didn't have enough money to do everything at once. If we could get started on strategic high ground, then residential development would increase in these areas and this in turn would support local businesses. I was also interested in some of the target areas, such as the Mississippi River areas and central downtown, as places to kick-start the economy.

Getting started early and in tangible ways is also important as a general principle. I knew from my disaster experiences in Oakland that you had to start quickly and with key places and projects as you worked toward the broader goals. People want to see *physical things*, and the things they see early need to be precursors to what comes later, so you can show what you're doing while you're doing it. I reminded mayor Nagin that there *is* no recovery for ordinary people if they don't see stuff happening on or near their street.

With the Target Area Plan, rather than think in terms of reconstruction of

Blakely Disaster Readings

pre-storm conditions, I invented three descriptive categories of work for the target areas: *rebuild*, *redevelop*, and *renew*. Rebuild applied to areas so devastated that you had to start from the bottom and redo everything; redevelop designated important pre-storm sections that suffered medium damage that could be addressed by a traditional redevelopment agency; and renew described areas so lightly touched that a small stimulus on our part would quickly produce private sector investments.

We asked NORA to use these places as its development focus by acquiring the dilapidated residential and commercial properties in the target areas. A matrix on our website described them in more detail; see Table 1.

My office—the Office of Recovery Management (ORM)—was initially strictly designed to plan, with no implementation capacities. So we aimed at the neighborhood level in a recognizable and sustainable pattern that used city resources and community centers as anchors. We knew some areas would come back on their own, because they had suffered almost no storm damage and had considerable wealth and a thriving, prestorm commercial base. Examples included the French Quarter and the Uptown areas close to the Mississippi River’s earthen levees.

The viability of areas slow to recover hinged on a combination of factors: insurance issues, expense and complexity of construction, uncertainty about health care, education, and other services, and lingering concerns about protection from future storms. In all target areas, there was—and remains—a

TABLE 1

Rebuild	An area that has experienced severe destruction of its physical structures and social networks. The area will require major rebuilding and significant public and private investment for its recovery. With investment, it should have a high potential to attract investment and act as a catalyst for further redevelopment and recovery of the affected community.
Redevelop	An area of major redevelopment where key recovery strategies can be demonstrated. Some recovery components and resources are already present. This type of area also has a high potential for attracting investment and for acting as a catalyst for further community redevelopment and recovery.
Renew	An area or a specific project that requires relatively modest public intervention (resources and/or administrative action) that will add to the renewal and supplementary work as well as investment of the private and nonprofit sector already vested in the area. By combining and leveraging multiple resources, these projects provide a great return on public investment.

Blakely Disaster Readings

persistent “first-mover” disadvantage. Few people want to be the first to return to a neighborhood without residents or services. Property owners want to know that an investment in rebuilding will give them a home and help give them a community. However, if everyone waits for someone else to start, neighborhoods will languish and the recovery will stall. So in these areas we initiated small projects—neighborhood markets, community centers, and parks—as soon as we could.

The UNOP planners understood the benefits of focused development, and included the idea in an approach called Neighborhood Stabilization, or “clustering.” The idea of clusters has a long history in urban design. Although first proposed in the 1960s to fight sprawl and protect open space, they are as old as the city itself. In fact, most cities naturally evolve in a cluster pattern, beginning with small, dense areas and growing outward. New Orleans is a classic example. It started in the French Quarter and grew to Tremé, in the heart of the city.

My staff, the UNOP team, and I all agreed that city government was the ideal entity for bringing cluster developments into being, not only as a coordinator but also as a partner in the development process. A city can use its assets (for example, schools, parks, libraries, recreation centers, and police stations) to give each cluster, or target area, the economic and social base it needs to get started.

■ ■ ■

For all its virtues, I knew that our Target Area Plan might tread on many toes. So my staff and I designed a strategy to promote its acceptance. We first vetted it with the city planning notables I’d met in Shreveport to see if they concurred that the idea was politically sound. Then I organized staff in teams of two to call on community-based organizations in the proposed target areas.

Just as with any product, we needed early adopters, or “clients.” We sought them in the places that had the most to gain from our approach. Then I met with the UNOP and Lambert teams, so they could see that their work had become an integral part of our process. I also talked with each council member and his or her staff to get their comments on whether the plan met the spirit and the goals of the recovery program.

The target area approach was well received, and it served as the basis for the recovery effort. “It’s promising to see somebody who is giving us a program that’s based on a realistic assessment of potential resources,” said Janet Howard, president of the Bureau of Governmental Research.

Blakely Disaster Readings

National and local media acknowledged the 17-point plan with the addition of a target area for Algiers) (up from 16 original locations as a good way to articulate the citywide recovery strategy. The keys to its success as a plan were to set and meet criteria for recovery and sustainability, and to bundle projects. National newspapers reported that “[Blakely] has brought a level of realism to rebuilding New Orleans that hasn’t been there,” said Sean Reilly, a member of the Louisiana Recovery Authority. “He’s got a real, concrete plan. At the end of the day, that’s what’s been missing: that clear prioritization, [a conviction that] here’s where we’re going to invest.”

Yet support from the media, council members, and other community leaders as clients wasn’t enough on its own. I also needed to communicate and promote the target area approach with New Orleanians themselves. I knew from the recovery in Oakland that out in the community, as opposed to meetings of professionals, “plans” are not understood unless you explain to ordinary folk how they’re to be implemented. Plans need a face, and tangible explanations. I also knew how essential it was that I be visible and personally deliver my message.

To communicate the basic idea of the recovery plan, I used a bicycle.

In many other places, I’d climbed on my bike and pedaled around town, often with members of my staff. I first got the idea from Allan Jacobs, a famous street planner and a colleague at UC-Berkeley. Allan ran a class on how to read neighborhoods by walking through them. I went on walks with him until I honed the approach for use in my own classes, and in my disaster recovery work. When I was off the bike I was working with some of the many thousands of young and not so young volunteers who came to make a difference in New Orleans and to somehow make a difference in their own lives. Most weekends my volunteer coordinator had something I had to go to and work as well as inspire the people doing the work. Much of the work, like gutting buildings or pulling weeds, was very hard on the people who did it physically, and when they saw so little change in the place it was a bit daunting psychologically. Getting volunteers to do work we needed versus what they wanted to do was difficult. Moreover, the real skills we needed from volunteers to do the leg work of counting houses for our neighborhood house-by-house database and computer analysis to guide our various recovery programs, ranging from deciding on demolitions to targeting lending programs. While I appreciated all the energy, it cost the city a lot of time and money simply to go around and pick up the debris they generated and to insure their safety. City and Sheriff’s Office staff gave up their time on weekends too to assist and protect the volunteers.

Blakely Disaster Readings

Through close observation I can discern a neighborhood's history, social conditions, and economic transformations over fifty years, or longer. I liked to use this method to inform myself on how communities in a city operate socially and economically over time. By looking at trees, porches, and additions to houses, I can tell which ethnic groups occupied an area, from its founding to the present. I also teach this approach to my urban planning students.

For my classes at USC, we used bikes for this close observation, as they were more convenient than walking.

My first significant purchase in New Orleans was a bike. In January 2007, my second week on the job, I started pedaling around my own neighborhood first. I saw that my neighborhood needed street repairs, but instead got curbside attention from the neighbors working to keep their place clean and attractive.

Before long people began to join me on my bike expeditions. In late February, after Mardi Gras, I asked city council members to set up bike tours in their areas on Saturday mornings. I had no idea whether the media would be interested in these forays—or whether residents of neighborhoods other than my own would come along. But after the third excursion, they were a fixture for the media and a device for me to see up close both storm damage and pre-storm problems, and to craft more fine-grained approaches to dealing with them. Serendipitously, the bicycle rides also gave me “street cred” with many communities.

Soon enough I became known as “the Bicycle Guy.” New Orleans is a bike-friendly city. Many people bike to work, and weekends are family cycling days. I tapped into a community culture by doing my bicycling on Saturdays, when parents and kids could come along. Riding on the weekends also allowed council members to join me, which stimulated dialogue with citizens of the neighborhoods they represented. Because not everyone could or would ride a bike, we held large “stationary” meetings at the conclusions of the rides, with a city council member acting as moderator.

I took along not only my staff but also 32 students from MIT and UCLA and some from Harvard. Going house to house and surveying damage, the students created additional visibility for the target area concept.

As I rode through a community, I could observe not only physical characteristics but also how people interacted with one another on the street, what they took care of, and what they allowed to fall into disrepair. I got to know many neighborhoods on my bike tours.

It also became clear to me through these trips that in some areas the damage

Blakely Disaster Readings

happened less from Katrina—water or wind—than from previous neglect. Any urban planner, including me, can quickly distinguish between neglect and water damage. FEMA also appreciated the difference, and the agency heavily discounted projects if evaluations consistently cited a lack of maintenance.

City staff and local residents couldn't understand that approach. They took the position that Corps of Engineer levees, not neglect, had destroyed the city. Everything, they reasoned, could and should be restored to a new, higher quality. Residents told me, "If the thing fell down, they should give us one hundred percent for it."

FEMA, on the other hand, often maintained that before the storm the structure was *already* falling down. The agency said it shouldn't give the city any money for an unusable building or part of one that hadn't been used. While I didn't like the FEMA approach, I understood it. After all, the basic thrust of the FEMA legislation was to repair to the prior condition and no more. That keeps communities from getting newer facilities after a disaster than those they had before it, at taxpayer expense.

I also needed ways to build support and enthusiasm for the Target Area Plan among city employees. To accomplish this goal I drew on my five years as an executive with Pacific Telephone. During that time, I was responsible for installing telephones in one of the fastest-growing regions of the nation, Southern California's San Gabriel Valley, which runs from Pasadena in the east to the San Fernando Valley in the west. My job was to make sure that new wiring and installation equipment were delivered on time and to get our customers in the homes we wired to buy more telephone equipment and use the wiring Pac Bell was putting in. We anticipated the computer revolution and put in far more wiring in every home than a single telephone required.

To make this pay, the company sold customers on the idea of telephone equipment for every room in the house. In 1960, this was novel.

We knew that the best salespeople to sell telephone equipment were our telephone installers themselves. We also knew, from research conducted by our marketing firm, that if the installers didn't like the product, no inducement would get them to sell it. So my job was to get our staff, at every level in my division, to buy new company products ranging from small bedside phones to elaborate multitasking handsets with "hold" features and other conveniences. Pacific Telephone was the biggest private employer in the state of California, so our employee word-of-mouth sales force was a large and powerful one.

When I started working with Lionel Wilson, the three-time mayor of Oak-

Blakely Disaster Readings

land from 1978 to 1990, I applied the same approach to many policy areas. Wilson and I knew that every one of our city employees came in contact with at least ten residents. We therefore aimed materials at them via our internal television and newsletters as one way to promote complex ideas such as new bond issues for city libraries. Oakland's city manager, Henry Gardner, had a master's degree in administration. He was well acquainted with this approach, and he embraced it. After the earthquake and fire, Gardner and I developed a series of strategies to inform city staff and get them on board.

I coupled these approaches with staff development sessions on new city strategies. I led most of these sessions or had a hand in organizing them.

It occurred to me to design this same kind of program to sell the Target Area Plan to our own city employees. I used America Speaks, with its formulas and expertise, to solicit employee input on how they might contribute to the recovery and set priorities for their own agencies, as individuals, and for the city as a whole. The Rockefeller Foundation saw this as a natural follow-up on public needs and aspirations. So I had staff develop the UNOP priorities and compare them with those of the entire community. That allowed me to introduce the target area concept as one way of fitting community needs into a delivery formula that the staff could carry out.

We mixed staff members from various agencies at tables of ten, and gave them imaginary resources and a fictitious target area that would be suitable for one of our three approaches (rebuild, redevelop, or renew). The goal was to see if the resources helped solve the problems and, if not, to devise another solution that would make good use of our resources.

To make the exercise work, and to simulate cross-bureaucracy collaboration, we allowed the tables to trade resources. In the evaluations we received, staff liked the ideas and the goals, but felt that the current bureaucracy couldn't perform to recovery expectations or accommodate such broad collaborations. The evaluators felt there were too many barriers and no incentives to do things a different way. Alas, that judgment was correct.

The Target Area Plan coalesced out of all the processes I've described. It not only built on the work of the community, but also justified that work in concrete terms. The plan went on to become the catalyst for a great deal of civic action in New Orleans during 2007, the first year of my tenure there. Considering the intense controversy, suspicion, and criticism around competing recovery plans before my arrival in New Orleans, it's remarkable that the Target Area Plan generated no notable public complaints or disputes. The target areas have become the new community drivers and rallying points for

Blakely Disaster Readings

the post-Katrina recovery. For all segments of the city, they provided a sense of hope after more than two years of squabbling, dissent, anger, and animosity. The plan led the healing process, and for me, personally, that was a highly gratifying development.

Planning is the hidden face of a recovery, but there's also a public face, and voice. In a situation like that of post-Katrina New Orleans, local government needs to speak with one voice. By default, I became the voice for the recovery plan. Some people thought that was a good thing. Some people didn't, because I have a bad habit of saying what is on my mind. In any case, mayor Nagin had little patience with plans. I had to remind him that when I used the term "plan" I meant a prelude to action with a continuous set of projects that could be implemented.

Blakely Disaster Readings

6. INSIDE THE MAYOR'S "COCOON"

MY FIRST TWO WEEKS IN CITY HALL WERE ILLUMINATING. Although I hadn't expected a big welcoming party, I was surprised at simply being put out to sea with almost no contact with anyone, including the mayor. I spent my first two weeks reviewing resumes, finding office space, and getting an office up and running with the help of the mayor's personnel assistant. But no one called to see what I was doing. No one seemed to want to know.

In January 2007, the city work force was less than half its pre-Katrina size of over 5,000. Mayor Nagin had been forced to cut the city payroll to meet the budget. Except for police and fire, the staff was significantly downsized. This downsizing was a blessing, Nagin told me, because he felt that a smaller, more technically proficient staff was more efficient to manage. But adding technology, he found, didn't generate the organizational efficiency he'd expected, because old staff traditions lingered.

The city was the first organization I'd worked in that had no written staff manual for employees or website of standard operating procedures. I asked for the city operating manuals so I could familiarize myself with systems in case they required modifications for the post-Katrina effort. I requested an early space in the new-employee induction program, so I could fathom how the city was run and who was responsible for the various units. When little resulted, I finally asked Becca O'Brien and others for these basic tools.

Word got back to the mayor about all that. And when I next saw him, he was upset with me for asking for such small things when we had a recovery to run. I knew this wasn't an issue to push.

However, I also knew that the absence of these fundamentals signaled a longer and deeper set of problems. So I set about developing my own ori-

Blakely Disaster Readings

entation for myself. And when I found a dearth of public assets records that would indicate how much property the city owned and where it was, I realized that I had come to a city that was technologically advanced but administratively broken.

The mayor had spent his first term just getting the city computerized and replacing old-fashioned paper processes with digital records. I later discovered that he had been burned by his director of technology Greg Meffert, who used his post not only to modernize the city but also to create an empire for himself within the bureaucracy. It soon appeared, through 63 federal indictments, that Meffert had done well for more than the city. His alleged abuses made the mayor wary of aggressive senior staff, and strengthened his inclination to make loyalty the first test for those working for him.

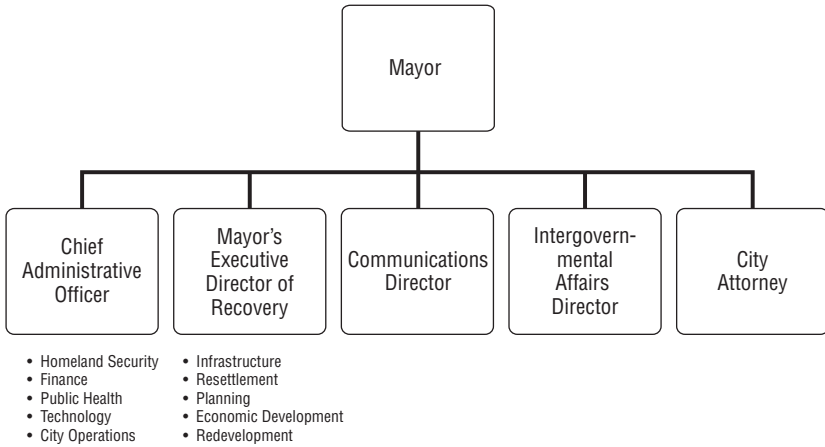
Nagin did have a good, loyal executive cabinet of seven chief executive officers. We worked well for him in many ways. But the group members all felt they could be the supreme leader, much like the cabinet described in Doris Kearns Goodwin's *Team of Rivals: The Political Genius of Abraham Lincoln*. Some of those "rivals," like Salmon P. Chase, worked hard to show why they, not Lincoln, should have been president. In New Orleans, that attitude extended to me as well as the mayor: most of the time, I felt that several of Nagin's executive team thought, and tried to demonstrate, that they could run the recovery better than I could. As a result, teamwork was discussed but not practiced.

Nagin's cabinet had an inside team, or "cocoon," as my deputy Ezra Rapoport called it. I wasn't part of this group of very close personal advisors. They met with the mayor informally and frequently, to steer him in directions they felt were in the best interests of the city. In the group were chief administrative officer (CAO) Brenda Hatfield, city attorney Penya Moses-Fields, right-hand deputy Kenya Smith, and head of communications Ceeon Quiett. It was an invisible, extra decision-making layer that could (and did) undercut or overturn cabinet decisions.

It became clear to me that I needed the cocoon's support for any major step I wanted to take. And I learned to seek its members' endorsements before taking matters to the mayor or making an important presentation to the cabinet.

Each Tuesday at 9 or 10 a.m., our executive team assembled in the mayor's large office around a dark mahogany table. The mayor took his customary seat, and the room came to order. An agenda with a large folio of attachments came with every meeting. The folio contained information on city services

Blakely Disaster Readings



City organization streamlined.

of various types, from fire responses to building permits to pending lawsuits against the city and press reports from around the nation. Each unit provided a short report of the highlights of the previous week. In some cases, the reports included data on specific items the mayor had requested to track crime, technology, and the recovery. The mayor's issues were first on the agenda. Although every executive staff member presented items for discussion, I presented the most. I did that because many issues that involved recovery transcended my own authority and required the support of other departments. In most cases, I included a memo and data or other materials to support my case.

I came to know each of the executive team, and succeeded in working with most of them collegially. I had learned from years as a manager that it's wise to collaborate with other managers you work with at the level that's comfortable for them. The mayor didn't give direct orders to anyone. You had to find your own way. He said more than once that he'd hired me because I wasn't from New Orleans and had worked with other mayors successfully.

He told he wanted me to work with the staff to do the recovery and not to run the recovery as another operation. So in this case, it wasn't smart to try to get other senior staff to do things they could not or did not want to do. In most management situations, and in disaster and recovery, this rule applies.

This was my view of the executive team and the other regularly invited guests as we assembled each week around the mayor's table:

Brenda Hatfield always sat to the mayor's immediate right. As CAO, she was by charter the second in command. Her staff and budget were the largest

Blakely Disaster Readings

in the city. She was charged with all basic city services, from garbage pickup to police, fire, emergency, building, parks, and capital works.

Brenda, who has a Ph.D., is a smart and pert woman who was always immaculately and professionally dressed. She is quiet unless challenged. She presented few items, because most of her responsibilities were predictable and seldom involved other executive staffers.

Brenda welcomed me when I arrived. She provided good counsel and support throughout my tenure. She took the time to introduce me to important and useful people in the city. She was my best ally in the recovery.

We worked together well. Our primary interactions consisted of issuing requests for proposals from contractors. The issue that united us most was modernizing the city budgeting, management, and human resource systems. The mayor came into office with no modern management tools.

Hatfield used the crisis as a device for modernization. She embarked on a program to raise salaries of all staff at least to the median of Southern cities, and she put the city on a performance budget system. That required a clear, orderly organization with agency and unit goals and accountability measures. She forged the first links between budget and performance.

Brenda and I came to the conclusion that we had to outsource project management. Early in my tenure, we worked out an approach to bring in external contractors that she felt comfortable with. We supported one another's agendas. She and I wanted modern, efficient systems to run the city and as a bonus from the recovery.

Becca O'Brien, a Harvard Law School graduate, occupied the next chair and had the title counsel to the mayor. She is a tall, willowy woman with an athletic look who walks and talks fast. Becca told me she'd left a job in the White House a year after the storm, and had camped out in New Orleans for two months to get a job with the mayor. She not only got a job with him, she became one of his early confidants. Her office was only a few feet from his, a proximity that gave her considerable access. She acted as chief of staff, although no one had that official title.

I liked and trusted Becca. She gave me good feedback. She made sure that my views, even when opposed internally by some staff, got a good hearing from the mayor. She didn't take sides, and instead let my issues rise or fall on their merits. We might have disagreed on form but never content. She saw the value of using the UNOP results as support for our action plan. At the mayor's request, she did an audit of the recovery plan.

Becca seemed dedicated to empiricism. Her reports provided the mayor

Blakely Disaster Readings

with added confidence that the Target Area Plan would and could work. She instituted an internal reporting and assessment process of the recovery to measure progress against our internal targets. (I could have argued, but didn't, to have the system located in my office.) We took advantage of her position to help advance and reinforce the recovery goals.

Kenya Smith was a wily young man of small stature with what my uncle Randy characterized as chutzpah. Kenya is talkative, and he speaks in spurts. His passions for the city are deep. Although his job on paper was to work with city council and state legislative representatives, he transformed it into a job of maintaining relations with all city organizations. He is well connected around the city.

In the middle of my first year, Kenya announced his plan to leave the office. I asked him to reconsider and pleaded with the mayor to intervene. He stayed for a few more months. During that period, he orchestrated our State Revolving Fund, which he was able to get from the State Bond Commission through a city-based bond issue backed by the city's future funds from FEMA and federal Community Block Grant funds. Finally, he got the legislation we needed to speed up the recovery process by getting through the Louisiana legislature a "design build" procedure that allows you to enter one contract for building rather than separate contracts for architects, builders, landscaping and the like. Design build was opposed by the state contractors association on the grounds that it prevented small firms from successful bidding.

Kenya ran for William Jefferson's House of Representatives seat. Like many other aspirants, Kenya thought Jefferson would step down before a messy trial over his many federal counts for misuse of his post for financial gain. Kenya lost in the primary to Jefferson, only to see him soundly defeated by a Republican newcomer and later convicted in federal court for bribery.

Cynthia Sylvain-Lear was the saint of the recovery. A middle-aged woman with a quick wit and a great smile, she carried the recovery on her back—or, more precisely, in her voluminous notebooks. As Brenda's deputy, she came to most meetings and sat next to Kenya. She took on any role needed as we mobilized to move the recovery forward. She was the city's public memory.

Cynthia fought FEMA every step of the way until my staff and I took over much of that task. After opposing outsourcing, she championed it. She coordinated the myriad internal processes of the city so that we could move projects through the state, federal, and local bureaucratic systems as smoothly as possible. Because she understood how the city bureaucracy functions, she was able to facilitate difficult issues, ranging from finances to building priori-

Blakely Disaster Readings

ties. I learned to respect Cynthia's institutional knowledge, and together we set priorities and timelines for rebuilding city facilities.

Penya Moses-Fields is an impressive person, an ex-athlete who still moves with an athlete's gait. As city attorney she was the city's conscience. Penya doled out legal advice with precision. Well prepared circumstances, she put me in my place on more than one occasion. She did that to make sure we were all playing by the right rules.

At meetings where we dealt with requests for proposals, Penya made sure the law and policy we were applying met the charter and state legal requirements and protocols. She was an aggressive lawyer, but had a delicate position as both city attorney and counselor to the mayor. She handled that position well, defeating a challenge from the city council over her serving as a mayoral advisor and tried to bring in outside attorneys. Clearly, Penya was a competitor.

We worked together best against common foes. For her part, Penya truly enjoyed vanquishing the opponents. She took on the former owners of a failed shopping center in New Orleans East. Before Katrina, the city had lent the developers money to build the center. It didn't perform well, and almost went bankrupt before the storm. The owners wanted to continue operating with additional city cash. We said no, and prevailed—here and in many other situations—through hard bargaining.

Penya enjoyed playing the bad cop role. More than once she provided legal and policy advice that allowed us to get things done by nimbly maneuvering through state rules. She didn't think we needed to outsource the recovery or use design build. But once the mayor approved both, she started staffing to meet the needs. We differed on using computerized contracting to expedite the processing of construction contracts. When I began my tenure in New Orleans, it took an average of three months to move a simple contract through all the city agencies for signature before the contract reached the mayor's desk. I thought this could and should be put into routine computerized systems that could cut the time to one day.

William M. (Bill) Chrisman was a late 2008 addition to the team as capital projects manager. Bill is a gruff, my way or no way guy. His knowledge of buildings was terrific but he was woefully ill equipped to work in a political bureaucracy that was hostile to new ideas, accountability, and direction. His instinct in meetings was to try to bluff his way rather than to coax others to his views. He didn't see the value in having the Project Development Unit coordinate projects across the bureaucracy or in using MWH, our outside

Blakely Disaster Readings

project management contractor. As a result, he was marginalized early, which slowed the rebuilding process.

Julie Harris, a Sixties person, is a short, energetic, fast-talking, hardworking deputy to Kenya Smith when I first worked with her and she later took on his job when he resigned. She also had a wider role of managing federal grants and relations. Julie is a nonstop activist. I got ten or more emails from her in a day when she got involved in a project. She's dedicated to the city and its government. I spent considerable time in her office gaining insights into the city and its people.

Ceeon Quiett is a small, pert lady with a soft voice. She was the mayor's communications chief, but had decided that her role extended to all city communications. I felt, and still feel, that as important as the mayor's image is, city agencies and departments also need to communicate, to present themselves as civic institutions and authoritative civil servants. People understandably want to talk to the boss. Because Ceeon presented Nagin as the only person who knew what was going on, he became the only source they trusted, and they had less confidence in what other agency heads had to say. I felt the need for more direct media outreach from my office. We never saw eye to eye on whether the Katrina recovery needed its own communications effort as a city function, and our relations were never what either of us had hoped for.

Ceeon did support the major recovery projects coming from my division—when she could get the mayor in them for a picture or press opportunity. We worked well together during and after Hurricane Gustav in 2008, and putting together the recovery websites and community forums.

We worked best on specific programs and projects, so I tried to get programs into her agenda to advance our mutual recovery goals. Once something got into Ceeon's program book, she executed it zealously.

Reginald (Reggie) Zeno, director of finance, is a soft-spoken, well-groomed man who looks like a banker. On our trip to New York to secure funding for recovery, he gained the confidence of the financial community, which would prove crucial to getting funds. He and I liked basketball and attended games together. We became partners in financial innovation, often combining our talents to find new ways to fund recovery operations.

If I ran a city, I would want Reggie as my finance chief and most of his team on my side. He's a light talker but a deep thinker, a role player with considerable skills that a boss needs to know when and how to employ. We found we could use one another in many situations.

Blakely Disaster Readings

Ezra Rapport, chief operating officer, a close friend from my Oakland years, came to New Orleans and became my close confidant in the recovery. He devised the recovery office organization, led our outsourcing efforts, and crafted the program to get projects from our city plan through state and federal approval processes. He is a hard charger with a blunt style, and although the mayor liked him, some people found him abrasive. He's also smart, overpowering most people with his brilliance.

I found that Ezra was especially valuable on tough issues where kid gloves didn't work. I liked to use him where the goals were clear, but the means to reach the goal might be fraught with thorny intergovernmental problems, especially between city and state. He left the city's employment with a long list of accomplishments, from revising the blight codes to getting NORA on the right track. He attracted many friends in the city bureaucracy, but also developed a long list of people who were glad to see him go.

Finally, the mayor. I felt like Mayor Nagin was a prince who conducted meetings much as did President Lincoln. He convened and led discussions, and waited for wisdom to emerge from the room. He didn't push his own ideas. He listened and drew people out. He would warn speakers of the ramifications of various courses of action. He would say things like, "Well, the Council will love that one. They'll have all my authority with that move." Or, "New Orleans East is the toughest place in the world to work. Are you sure of the players?"

Nagin was quick to praise and slow to scold. He liked ideas. He understood the need to get key people to act in a uniform direction. In his view, if he hired you, you should know your job and how to lead your people. He was not a walk-around manager; he brought everyone to his office. He also called large team meetings to push citywide changes in the bureaucracy and urged division heads to find ways to do the job. He didn't tell them how to do it. In my own case, he gave me explicit authority but never precise direction.

Nagin was generous, and he found ways to do nice things for people. In late December 2007, for example, I lay flat on my back in Ochsner Hospital. I was scheduled to go to a Louisiana Recovery Authority meeting in Baton Rouge to get final clearance for the city recovery funds. I was in no shape to travel by conventional means, so I asked Duce to organize an ambulance to take me to Baton Rouge. The mayor heard about my plans. He called me in the hospital to say, "I'm going, Doc. You stay in bed." He changed his entire schedule and went to Baton Rouge in my place.

Nagin took chances on people he trusted. He committed himself to the

Blakely Disaster Readings

right things over intense criticism from within his own cocoon. Nagin is a spiritual person, at home with the scriptures. He's one of the best bosses I ever had, and my list of bosses is long. He gets the best from the team like a professional coach. And like a general manager, he brought in good players and let me as captain meld my team into a productive unit. The mayor and I spent a lot of time together, testifying 31 times to congressional and federal organizations as well as visiting foundations and other cities in the United States such as Philadelphia, as well as Panama and China, to gain knowledge of the kind of projects we might do in New Orleans

As recovery czar, my strategy with the mayor's cocoon was to get one or two of them on my side. If I needed only one, it was Penny, because she had the inside track to the top man. Unfortunately, this particular group of players, led by the mayor, needed a better system with which to manage a massive recovery that was overwhelming the existing bureaucracy. Instead, they were trying to navigate a complex, multifaceted, twenty-first-century recovery effort clinging to a byzantine, outdated, and lumbering administrative process.

Blakely Disaster Readings

7. PUTTING MY TEAM ON THE FIELD: RECOVERY ADMINISTRATION

THE MAYOR STARTED HIS SECOND TERM WITH ROUGHLY twenty senior staff, including those I've just described as his "cocoon," reporting directly to him. When I arrived, there were three direct line officers: myself, as director of recovery management, with a small team of 20; Brenda Hatfield, CAO, with several thousand employees; and Donna Addkison, chief development officer and head of economic development and housing, with about 200.

As I've indicated, Addkison and I couldn't get on the same page from the outset. We had only one meeting during my first six months, and that one at the mayor's insistence. He was apparently frustrated with her, too. After nearly a year, the entire executive team could see that Addkison's days were numbered, and the cocoon seemed to be plotting her demise. After one executive meeting in which the mayor hammered her, I ran into Brenda, his right-hand woman, and Penny, the city attorney, getting on the elevator. They knew Donna was on her way out.

After I arrived in New Orleans, I was ready to interview staff for my new Office of Recovery Management, the title the mayor had put before the city council for approval and funding. The organization chart included a deputy and key staff for four functions:

- Resources—to find additional funding from nongovernmental sources for the recovery and coordinate all forms of outside help and resources, including volunteers;

Blakely Disaster Readings

- Planning—to develop and monitor the recovery plan;
- Infrastructure and environment—to deal with the massive problems of prioritizing water and power restoration, and developing basic infrastructure resilience against future disasters;
- Settlement—to assist in housing, resettlement and community development issues.

Among the first things I had to do as recovery czar was to try to begin re-tooling government, to pare down the number of different municipal operating boards and committees in the city, each with its own authority. We faced an unusual and difficult situation: there was no central governmental apparatus to direct the recovery. That was, and remains, New Orleans, and it was to make my job a lot harder, because the mayor, for whom I was working, did not control all the central institutions of government across the city/parish.

New Orleans is an inordinately complicated bureaucracy. Every new job has to go to the Civil Service Commission for approval. The commissioners want all the jobs to be paid at the salary of current city staff, even though these salaries are too low to attract competent staff. In fact, some positions, like architects, were vacant for years. Not only did they protect outdated salaries, they also had a bizarre practice of setting a single salary based on the last salary paid to the occupant of the post. So, if the last person's salary was high when you took the job, you got a good start. But if you wanted to transfer from another job into a new office, you might be told that the salary for the job was lower than the salary you were leaving, and that it couldn't be changed. I spent far too much time negotiating this system, and that's one of the reasons I wanted to contract out many of the better jobs for the recovery.

The Office of Recovery and Development—my group—had twenty staff, only five of them on the city payroll. I organized my own staff with the youngest qualified people I could find on the city payroll. In case there were any layoffs, I didn't want the young people to suffer. The rest of the staff drew grant salaries from a nonprofit we had to set up to bypass the byzantine city rules that couldn't accommodate new employees unless they were taken from the layoff list, and paid salaries insufficient for the qualified people we needed to attract. As it happened, staff who weren't on the city payroll worked for almost two months with no salaries, until the foundation grants arrived, and we put them on foundation funding that would only last two years. If the city didn't pick up these people's salaries after that, their jobs would disappear.

Among other staff, I brought aboard Jessie Smallwood, a colleague from

Blakely Disaster Readings

my antipoverty days in California. She was close to people at the Ford Foundation. She worked with me to develop our grant proposal to help fund recovery planning and staffing. I had good connections at Ford, too. In the first funding, the Bill and Melinda Gates Foundation joined Ford to provide for an expanded staff for two years.

For example, we needed a deputy director for day-to-day recovery operations. We also required help—a resource position for raising more foundation and government money. We needed a person to coordinate our neighborhood projects; a person with environmental credentials for all the environmental issues associated with the recovery; and a staff person to examine local, state, and national policies that we might be able to use to get more recovery funds for New Orleans.

Staffing decisions and hiring were only the start of building an organization to support the recovery. Although we started putting together a team immediately, it would take two years to get our organization team and structure to the point required to do the job we needed to do.

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Initially, my ORM staff and I had only planning responsibilities, with implementation authority required through the mayor. My staff was to develop project ideas from the UNOP and other plans. We came up with basic priorities for target areas, in consultation with neighborhood organizations, and then estimated funding needs for each project. Our budget guesses were not too far off. I had enough experience in building things to have a fairly good idea of costs and I had run more than one economic development nonprofit, so I had some idea of what social program costs were. Then we turned over the construction to Brenda's Capital Projects operation. This process was developed, under the mayor's direct control, for every part of the city.

I knew that recovery was a temporary process for any city, but I recognized the need to use the process as a catalyst to transform the New Orleans bureaucracy into a new and better institution, by employing many processes used *in* the recovery. One of the goals of recovery is to create new ways of working that break down the usual administrative “silos,” by which each part of a government bureaucracy runs on its own internal rules. In a recovery, however, there are few rules. So while the emergency response is underway, it's important to use the opportunity to show how government can operate better.

Blakely Disaster Readings

I asked the mayor to give my post the designation deputy mayor. I based this request on previous experience in the two Oakland events, combined with observations in Los Angeles, New York, and Kobe. Coordination alone is not enough. Directing a recovery requires line authority with the ability to identify resources and commit them to the established priorities.

In September 2007, we were finally able to fashion a better administrative approach to New Orleans recovery. Donna Addkison had decided to leave, and my first impulse was to find a more cooperative colleague. In Ezra Rapoport, I already had one. Ezra and I knew that a collaborative bureaucracy took several years to develop momentum, even under less pressure than we now faced in New Orleans. From my experience and from many conversations with disaster management colleagues worldwide, after Katrina and again after my appointment, I knew that there were essentially two options to transform this particular bureaucracy.

One approach was to build a separate empire within the existing city government, giving people power to take the initiative where needed. You patch up any holes and smooth out ruffled feathers, but you create a parallel government that operates above and around the bureaucracies to get the recovery done.

The other strategy is to hire a strong individual leader who will push department heads and restructure the government in a modern, professional way. You lead so adroitly that people feel they're dealing with power, and they do what you need them to do.

What *doesn't* work is to appoint somebody like me, give the person few resources, and then rely on him to play the bad guy who beats up on peers to get things done when he has no true authority over them. In 2007, to get things done with my small staff, we started out trying to harass and harangue people who knew the place better than I did. As one said, mimicking black street argot, "We be here when you be gone."

After a few meetings, Mayor Nagin decided over lunch with me on a hybrid approach that merged my Office of Recovery Management and Addkison's former Office of Housing and Economic Development into one operation, the Office of Recovery and Development Administration (ORDA). I liked this solution, presented to the city council on November 27, 2007, and it was a major milestone in the recovery, because with this organization I could control a range of essential activities associated with the recovery, from planning and dispensing permits to blight reduction and economic development. We were transformed from a group that simply made plans to the arm that iden-

Blakely Disaster Readings

tified projects to rebuild and design, and made sure that the projects were in the correct target areas. If messy, the new organization was nonetheless essential. We used it to craft a system for using the Target Area Plan as a template for community-rebuilding processes that ranged from commercial-districts to housing.

The ORDA team grew from my original group of twenty to a staff organization of more than 200 that took on three primary tasks to support *long-term* recovery:

1. Retool the government for the recovery, as part of taking the next step from creating projects to altering the bureaucracies that manage them. For example, the post-Katrina capital works program for recreation facilities had to build safety and sustainability into new or repaired buildings, and align rebuilding with a new cluster concept for putting as many city buildings as possible close to or in target areas' commercial strips.
2. Secure funds. In a recovery, that's not a one-shot job. Priorities change, so you need different sources of money, and, especially, creative blends of public and private funding. We embarked on several state programs like Gulf Opportunity bonds (GO Zone), which amounted to federal underwriting for development projects that assisted directly in the physical and economic recovery of devastated counties. This was debt financing that the local governments could endorse but not pursue on their own. My staff, when they became aware of the significance of these bonds, tried to steer projects into target areas by using the city endorsement as leverage.

We also tapped into new funding sources from the federal departments of Transportation and Agriculture, as well as HUD, to create programs that would augment public, private, and nonprofit projects. Among other examples we bridged economic development programs to bring grocery stores into neighborhoods that hadn't had a store that sold fresh produce for decades.

3. Develop programs and projects for implementation. This meant working inside the city to use our Disaster Community Development Block Grants (DCDBG) resources for various city renewal projects. We were temporarily hamstrung by the complexities of the DCDBG grant administration process, which featured a nine-foot high wall chart checklist of instructions and rules that had to be satisfied in

Blakely Disaster Readings

devising our economic development programs so that we could use city, state, federal, and private sector funds, together.

We combined disaster funds with other city monies to craft new ways to meet community needs such as the restoration of a historic black golf course, and we leveraged new private resources to rebuild libraries as community social and cultural venues.

The linchpin of New Orleans restoration, however, was the project of rebuilding the housing stock. With NORA, we developed creative homeownership programs to raise the ownership percentage in all neighborhoods. NORA finally yielded to our demands because it wanted to be a significant part of the recovery and this was the only route. NORA tried to get funds from foundations and state and federal government. But the requests were turned down because NORA couldn't say this was what the mayor and council wanted. No one wanted to fund competing recovery organizations. The mayor authorized our team to explore options to reach our defined goal of \$300 million in mortgage assistance for home ownership. We reached this goal with the nation's largest assistance program, which we designated primarily for the target areas.

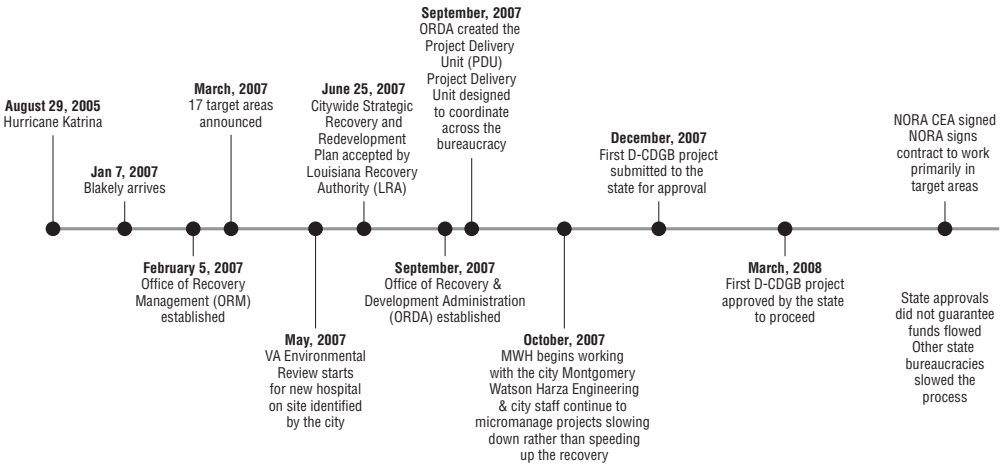
Another program, championed by council member Willard-Lewis, was called the Lot Next Door. It allowed owners to acquire vacated properties next to their own. Willard-Lewis and I got the program going, with the reluctant help of NORA. I asked her to insert a provision to prevent speculators from using owners as pawns to get property cheap and resell it.

It isn't possible to achieve neighborhood improvements in New Orleans without blight reduction. We embarked on the first large-scale comprehensive programs in New Orleans history to reduce blight by combining several offices with varying legal authorities into a single one. For example, we merged the adjudication courts for sanitation and environmental blight into one court. We also introduced neighborhood sweeps that brought police and other enforcement units to bear on dilapidated properties.

Community economic development was as important as large-scale initiatives. Our approach included the establishment of more than a dozen new neighborhood commercial-revitalization programs to make distressed communities more commercially vital than they were before Katrina.

We broadened that focus to include the design of a new public-private partnership championed by council member Arnie Fielkow. It resembled the vehicles we used when I led Oakland Sharing the Vision, and when I served

Blakely Disaster Readings



Recovery timeline.

on the housing board in Oakland and on the New York Partnership. The idea in these cases was to devise a public-private economic development corporation to take the lead in attracting and keeping businesses in the city. New Orleans needed the financial support of local business leaders and the active involvement of minority firms and community groups. When I finally left the city in 2009 the program was stillborn: the mayor had withdrawn support because he sensed big businesses were involving themselves only to get public funds for their own purposes, and had little inclination to work with low-income neighborhoods.

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Administratively, the post-storm recovery was entangled in complicated lines of authority and management. The Parish and City of New Orleans occupy the same space, but are different legal entities whose agencies operate independently or semi-independently. We had to deal with too many of those agencies—more than 60, each with an operating board and committee in the city and a separate jurisdiction. The mayor can appoint members to these boards, but the city charter makes them independent. The Sewerage and Water Board, for example, sets its own policies and direction through a commission, and the City Park Commission, which is impendent of the city government, even collects and uses its own taxes without city oversight.

The administrative problem for the recovery came down to this: all these

Blakely Disaster Readings

entities were submitting independent requests to FEMA. They acted like independent jurisdictions. That put me in an unusual situation, bereft of any central governmental apparatus that the mayor (my boss) controlled.

My take on the situation is that as New Orleans leadership changed from white to black, the need to isolate parts of the city from the central management became paramount for upper class whites and some middle-class blacks. City entities important to white communities were insulated from black rule by separating them from city governance.

But for recovery to work, we'd need to coordinate the building programs so that we didn't waste money putting up a building, only to have to tear up the street to provide the underground utilities for it. And we needed to do all of this in some smooth, sequential, and logical way.

Such a variety of agencies does have advantages. It brings innovation and considerable quality management, and most of the time there was close coordination and cooperation among the parish and city entities. Nonetheless, as my favorite management professor used to say, "Coordination is costly." He was certainly correct as regards my experiences in the administration of the Katrina recovery.

Attempting to move information among city/parish organizations inside city government consumed a lot of my time as executive director of ORDA. Since these organizations didn't report to me or to the mayor, I could control them only if they had to pass through my office for federal funds.

In other words, I would have to use control over outside resources to corral unwieldy and uncontrolled fiefdoms.

In September 2007 I finally got authority from FEMA headquarters in Washington to act as a pass-through for federal funds, along with an executive order from the mayor to do so. With this authority in hand, we formed a parish-wide council of organizations. It became the chief body for the recovery, and met quarterly to assess resources and directions. Thanks to a high degree of voluntary collaboration, the council's efforts worked better than the federal coordinator's interventions.

The parish-wide council first met in early April 2008 to set priorities. I recognized right away that encouraging conversation among all the agencies was more important than exercising power over them. So I hosted meetings with several of them on a variety of topics, such as education and job training, to let Washington know we were collectively on the same page. The local transportation agency and school district, for example, coordinated their efforts to use the same central messages in their requests to Washington and Baton Rouge.

Blakely Disaster Readings

I also set monthly meetings with the FEMA regional team to review how the parish was faring with all agencies and other entities. This approach worked. I initially expected that the parish-wide group would generate considerable clout over major matters like the direction of economic development. That occurred to a degree, though not according to my expectations. The council declined to take formal stands on any issues. But its member organizations adopted support strategies that helped us move forward on major projects. On a wide variety of topics, from environmental hazard reduction to coordinating high school special-emphasis curricula, my staff directors were able to form council working groups that matched the economic directions of the Nagin administration. Thus the parish-wide council became the single entity for coordinating multiple governmental agencies projects like large scale infrastructure.

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The next task in creating an administrative system that could advance the recovery was to streamline the internal disaster projects. These were projects that could be financed by specially authorized federal disaster community development funds from the regular, unexpended block grant and city bond funds. We needed to organize and prioritize these projects. And each fund type had different eligibility requirements and rules for how it could be expended.

The city had limited resources to construct and repair buildings, so in April 2007 I asked Brenda Hatfield if I could put out requests for proposals (RFPs) to bring in architects and a project management firm to manage the several hundred building projects we would have to get underway in the next few months. Administratively, I wanted to outsource this part of the recovery.

Brenda was enthusiastic. The city had only four staff architects, and their salaries were too low to attract the kinds of fulltime professionals we needed for this complex work. We conducted interviews and selected 17 architectural firms to start developing scopes of work for the buildings eligible for FEMA funds. We also interviewed project management firms, and ultimately selected Montgomery Watson Harza (MWH).

MWH was tasked to coordinate the several hundred projects. Based in Denver, its work ranged from supervising the architects' project "scoping" to putting the projects out to bid to making sure they were cost effective and on schedule. Everything from soup to nuts landed in MWH's lap.

Blakely Disaster Readings

The selection of MWH was a matter of expediency. We didn't have in-house the human resources required to design, organize, and contract to reconstruct city buildings and related infrastructure. As I've said, city staff had been downsized to a few key positions. Capital projects had only four or five people, none with the depth of experience required to manage so many projects and put them out to bid or monitor construction.

Also, based on my experience in Oakland, Ezra Rappoport and I concluded that we had to have a professional team with the experience to manage a construction project equivalent in size to rebuilding San Francisco after the 1901 earthquake—and to deal with all the FEMA complexities. Dealing with FEMA was time-consuming and heartbreaking. In other recoveries I've worked on, either the state or FEMA advanced the funds so that vital facilities could be brought up and running. For the first two years of my "czarship," we would receive little from FEMA with which to repair the city's police and fire stations. The agency wound up giving us a comparative pittance—roughly 15 percent of what we required. The city had to take \$30 million from its tight budget to repair vital facilities quickly, with no assurance that this huge amount would ever be reimbursed. FEMA was a slow, bumbling operation that demanded an enormous amount of paperwork. We often discovered that our requests to the agency had been lost or had been changed with no warning.

The city's slow and bureaucratically hobbled hiring process would take too long for us to hire much-needed staff. Moreover, the need for skills to do engineering and project management required very expensive short-term personnel who wouldn't be needed after the first phase of the recovery. It wasn't clear how we could hire and then terminate these people in the existing bureaucracy. Finally, FEMA pays overhead for contractors, but only a limited amount for internal staff. So, it made good sense for all these reasons to use a large firm that had all the specialists we needed for basic project design and to monitor the progress of construction.

Once we developed and implemented a contract with the help of several outside advisors, including the head of the Superdome, who brought a lot of good sense to all this, and after substantial internal debate, we created an internal organization, the Project Development Unit (PDU), to coordinate and set priorities to guide MWH and coordinate all New Orleans bureaucracies and agencies to deliver federal or state funds to projects. In many cases, we had to decide which funding source was best for a particular project, because it is against the law to commingle federal funds. We met every Wednesday to check on such important elements as gas and electrical hook-ups and interior

Blakely Disaster Readings

furnishings. Project “siting,” or in some cases rebuilding at a new site, was also part of the job. So, too, were coordinating all incoming funds and determining how they might be leveraged with available sources.

Project level approvals were made by the PDU, with the mayor giving the final okay. The big problems remained, however. The city staff refused to recognize the work of MWH and redid it for no good reason, slowing the effort almost to a standstill.

After a nationwide search, we hired Bill Chrisman as director of capital projects to supervise and direct the physical rebuilding process. Chrisman became a source of contention. He wanted to run the rebuilding process himself and use MWH as needed. My experience with Ezra Rapport convinced us that a managed external contractor would turn out better than using day-to-day operations staff. Moreover, FEMA would pay for this approach, as part of project management expenses, whereas it would not pay to augment permanent staff.

In short, we tried to outsource project management of the recovery while retaining overall direction for recovery priorities and funding.

For capital projects, I wanted a staff that had its own lawyers and accounting systems but wouldn't have to get involved in routine things that could be outsourced. Here I had only limited success, because city staff and Chrisman weren't familiar with supervising outside project managers. So, we started down the same path, with Chrisman redoing MWH work rather than simply ensuring the outcomes, which delayed the recovery administratively.

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With the parish-wide council, management outsourcing of building projects, and streamlining of city bureaucracy, we had an administrative system in place to move the recovery forward. We were on a tight schedule; however, as we needed to commit all the disaster funds and start all the building projects on our priority list before the mayor left office in May 2010. This was hard to do since, aside from FEMA reimbursements, we received no direct federal funds until a year after the LRA approved the city's recovery budget. The city council kept pushing me to get started, even though, in my November 2008 annual report, I presented a chart showing how long it was taking for money to funnel from the feds to the state and finally to the city.

The schedule was tight for me personally, too. I was on leave from the University of Sydney and had been away from my family for over a year, I'd been

Blakely Disaster Readings

struggling with health problems, and my remaining tenure in New Orleans was shorter than the recovery timetable.

But I recalled the passage in Doris Kearn Goodwin's 2005 *A Team of Rivals: The Political Genius of Abraham Lincoln*, which cites Secretary Seward's diary at the end of one of the great Civil War battles: "if my own anxiety is so great, what must his [the president's or, for me, the mayor's] solicitude be, after waiting three long weary years of doubt and disaster?"

Blakely Disaster Readings

8. POLITICS AND MONEY

THE NEW ORLEANS RECOVERY WAS LARGELY ABOUT THE politics of money and who controlled it: city or state, black or white, rich or poor, downtown or the neighborhoods. In the recovery, there was money on the table. It could be used to determine who came back to New Orleans, and who didn't. Much of the recovery played out at the contentious vector of money, land, housing, and race politics.

Four months after I took over the recovery, we received preliminary approval from the LRA for the \$417 million in recovery Block Grant funds from the federal government. The state viewed that money *state*, not New Orleans, funds. This was unusual. In my earlier experiences with such grants, they went directly to the city, once the city budget had been approved. Instead, in this case, the state preempted our grants by reviewing every project, thus increasing the time spent in processing and slowing down everything.

In the Kathleen Blanco administration, parts of the state bureaucracy, such as the audit department, were hostile in this review. The administration seemed to assume that New Orleans was going to steal the money and that city officials were only there to take the money, not to get anything worthwhile done. Our city council president was under indictment at the time, as were several members of the school board, and a recent member of city council was almost certainly going to be indicted for using zoning as a cash machine. To the state, the idea of local public officials having the opportunity to decide how the money was spent in New Orleans sounded either foolish or outrageous.

New Orleans was subject to ridiculous oversight for the use of federal funds. The city, like all American cities, spent millions of dollars every year of

Blakely Disaster Readings

similar funds with no state involvement. Furthermore, the allocation to the state was viewed by the feds as a mere legal pass-through, not a state device to determine the city's recovery. No other state that had similar funds subjected localities to any standards like the ones Louisiana was imposing.

This struggle to gain leverage and control of the recovery funds, and hence the recovery itself, had started long before I arrived. I walked into it. The infamous green dots were used by the BNOB committee to designate areas, largely black lower- and middle-class neighborhoods, that were to be transformed into wetlands. Post-recovery plans put forward by several groups put strong emphasis on local economic recovery and especially small business and the arts. But the real contest was housing for whom? To reassure blacks who worried that post-storm New Orleans would become majority white after three decades of black demographic and political domination, Mayor Nagin used the term "chocolate city." His language, in turn, kindled fears in whites about a return to the city of low-income, public-housing residents.

In 2002, the Department of Housing and Urban Development (HUD) had taken over management of New Orleans public housing because, as HUD stated, "even before Hurricane Katrina struck, many New Orleanians were ill-served by aging, poorly maintained public units." Damage from the 2005 storms, including mold, further weakened the structures, which led to the final decision not to reoccupy most of the city's public housing, and to tear down most of the units. That threatened not only a substantial part of the housing for blacks, but also black political power.

The political equation was easy to understand. Many of New Orleans's black people lived in public or subsidized low-income accommodations. These accommodations numbered more than 17,000, and they were extraordinarily segregated, with 95 percent occupancy by African Americans, the largest such concentration in the nation. Most black residents were renters. Furthermore, New Orleans had one of the lowest rates of home ownership in the nation, 45 percent, two-thirds of the U.S. average.

HUD's post-storm shuttering of all the largest public housing facilities in the city seriously impaired black political organization. So Nagin's remark about "chocolate city" had a major impact: it energized many New Orleans whites, who realized that, with no "public housing vote" for the first time in decades, they might actually have the numbers to install white political leadership.

The mayor got off to a shaky start after his reelection. It wasn't clear whose side he was on. The BNOB green dots threatened to turn many traditionally African American communities into park land, and the closure of pub-

Blakely Disaster Readings

lic housing and the loss of small pockets of low-income homeowners in the Ninth Ward and similar low-lying areas suggested that black homeowners and renters would have few places to live in New Orleans. The black community started talking of a white conspiracy to retake political control. People love to imagine conspiracies, and that theory swept through the city and beyond: it was repeated in the national media.

The black public housing vote was important, as my activist friend MT and the mayor reveal in this exchange at the time of my appointment:

MT

Thanks for the advice. I have kept this on my top priority list and have been working to reach a win-win. Spoke with Cynthia W yesterday about this subject. I believe we have a good shot at reaching a compromise sooner than you may think. I will, however, discuss your recommendations with Dr. Blakely and advise.

Peace,

C. Ray Nagin - Mayor

Bringing New Orleans Back! -----

Subject: BLAKELY APPOINTMENT, JEFFERSON'S REELECTION AND PUBLIC HOUSING DEMOLITION

GOOD MORNING MR. MAYOR:

Congratulations on the Blakely appointment. History will record this decision as a defining moment in your legacy. I pray that he will do you and we the citizens proud. We in civil society will do everything that we can to assist in the success of [Blakely's] department.

Congratulations for helping to derail the shadow train again. It was especially sweet given all the comparisons to your own reelection. The Jefferson victory was good for the city despite the naysayers. However, it now raises the question of the appropriateness of public housing demolition to a different level, given his opposition. Maxine Waters is also likely to oppose demolition as the only alternative. Given the level of growing local, federal and public opposition, now might be the time to reconsider whether demolition is the only option. There are other models of revitalization that don't result in massive displacement and gentrification, as the present approaches are likely to do. New Orleans has not even explored or discussed such options. That is precisely what makes the HANO [Housing Authority of New Orleans] decision suspect. It was made unilaterally without a critical examination of the variety of options available at a time that we desperately need affordable housing. Everyone including HANO might benefit from open and transparent discourse on this matter.

I humbly suggest and recommend that you request that Dr. Blakely review the basis of the HANO decision, consider the options and develop recommendations to you and the Council within 60 days. Then you, the residents, nonprofit and other interested stakeholders can explore successful alternative models that might uniquely serve New Orleans better than the one dimensional conclusions to demolish the 4 developments completely.

Blakely Disaster Readings

Please give consideration to a review, given the need to integrate all recovery plans into a wholistic framework. That would display another level of your leadership which your base would appreciate and greatly benefit from. Folks on the ground are quite intense in their organized opposition. While they are organizing direct action campaigns, they and are also seeking a creative way out for everyone. Having the Recovery Department conduct a review to examine the state of the art and best practices in revitalizing public housing residents and their living environment is a win win for you, the residents, and the city. A review would also reduce any potential or likely opposition to your emerging Baton Rouge and Wash. DC recovery Agendas if the Agenda includes the proposed HANO demolitions. As we speak, there is evidence that some Congressional and citizen advocates are also reviewing HANO's decisions. You could be ahead of the curve on this one and gain additional status for the justice agenda

Peace,

The mayor didn't consult me very much about the demolition of public housing. But I offered him and his team two ideas. First, since the city had a shortage of affordable housing for laborers, make sure the tear-down is orderly enough to accommodate workers who might want to occupy the units prior to total destruction. Second, keep some of the best buildings for re-use as education or community space, because rebuilding this space entirely would be very expensive. Other than these ideas, and with the wheels already in motion, I kept my distance from the public housing question and concentrated instead on getting HANO to secure or tear down storm-damaged single-family and other small-unit facilities all over the city.

A prevalent ambition for middle-income groups, both black and white, was to rebuild the city by working with people not dependent on welfare. An African American resident of Pontchartrain Park, whose father headed the public housing agency, said to me at a community clean-up: "Those people shouldn't be allowed to come back. They hurt us all"—one of many striking illustrations of the city's "black-black" internal divisions. During my first few months in New Orleans, those sentiments were voiced many times by prominent blacks, who said openly and forthrightly that they didn't want any more public or subsidized housing built in the city, especially in middle-class New Orleans East.

The message was clear: everyone wanted the low-income public housing *votes*, but almost no one supported the notion of bringing back the tenants of public housing who possessed those votes, for fear that problems of poverty and crime would return with them.

Anxiety over the reappearance of low-income blacks was predictably high

Blakely Disaster Readings

on the agenda of white civic leaders. Their deep feelings came home to me when a white businessmen's group asked me to lunch on St. Charles Avenue. I had barely sat down before my head table companions asked me about "crime groups, tax eaters, and property destroyers." After several more provocative remarks, I didn't eat much lunch. I just made a short talk, and left so soon after that Duce was surprised to see me. He asked me if the food was bad.

"Yes, very bad," I replied

In my first few weeks on the job, leaders of white civic groups showed me a plan for where and how they wanted recovery funds to be spent.

The "how" of the plan emerged in meetings with Donald Powell, President George W. Bush's Gulf Coast recovery coordinator. Powell postponed and re-scheduled our first meeting several times, so I was never sure when or even if he would arrive. He didn't attend the press conference to announce the Target Area Plan. But in March 2007, a few days after that event, he came to my office purportedly to discuss post-Katrina progress and to present his views on how the recovery funding might be spent.

"What do you think of using nonprofit entities to carry out your Target Area Plan?" he asked me. My ears shot up. I pointed out that I had run nonprofits, and didn't consider them good vehicles for direct government-to-government business. He smiled, yet nonetheless suggested that such an organization could contribute to recovery funding, and then left into the night.

My profound concern here was that the nonprofit idea was a reversion to the past, when small groups, beyond public scrutiny, used public funds for a variety of purposes. New Orleanians would form an organization with a noble stated purpose and then use it for personal gain. Many nonprofits had misused state and federal funds, and indictments had followed.

I was also alarmed by the notion that I'd be reporting to a board that might direct me to use federal funds in ways inconsistent with the recovery plan, similar to what NORA was proposing. Under those circumstances I could end up the scapegoat for their actions, or responsible for spending federal funds in wrongly prioritized ways, even if they were legal. I really didn't want to associate myself with an organization run by a board that had authority over me and could fire me if I didn't follow their directives.

My short association with Joe Williams, NORA's new executive director, made it clear to me that things would head in that troubling direction, no matter who led NORA or any similar nonprofits. Nonprofits have a habit, I surmised from what heard from local civic leaders and my staff of becoming money shelters in New Orleans, and too many of the people who run them

Blakely Disaster Readings

end up indicted. I would be even more reluctant if an ex-mayoral candidate, whose name came up prominently in this scheme, became the de facto unelected recovery mayor as several insiders in the mayor's team described this person as trying to become mayor through this nonprofit back door.

Several conversations I had with New Orleans-based federal law enforcement people heightened my suspicion and anxiety. They let me know that they were going to "nail anyone" who put their fingers in the cookie jar. A few months later the city hired an independent investigator, who vowed openly that he was going to "get me" for misspending public funds. He thought that I was going to try to shield *myself* from public scrutiny by hiding behind a nonprofit.

Over the next few weeks, Powell became more explicit with his plan to put the money into some form of trust that would distribute it and keep it from what he called "political tinkering."

To be even-handed, the recovery ideas he advanced weren't outlandish. He, and others, wanted investment in areas that they thought would jumpstart the economy and reduce the city's low-income, dependent population. Whereas the Target Area Plan would catalyze investments all over town, and focus on rebuilding neighborhoods, Powell was focusing on ways to bring cash into the city with larger showpiece developments that would, by his reasoning, jumpstart the economy, too. That approach was not explicitly aimed, to be fair, at race or class imbalance, even if it subtly had that effect; it was aimed at remaking the city into a smaller unit in line with a less dependent, smaller population, down from over 600,000 to what appeared to be a new base of just under 400,000.

The core of the new plan, somewhat similar to BNOB's approach, was to revitalize a section of downtown, near the Superdome, which had been so badly damaged that it looked like a war zone. This approach paid scant attention to poor neighborhoods. The reasoning was that middle-class areas above the flood line would come back with only a little help, while less viable poor areas would fail, and should be allowed to fail and wither, thereby shrinking the city's footprint. Versions of this idea resurfaced continuously in the *Times-Picayune*.

On several occasions, I mentioned my conversations with Powell to Mayor Nagin. The mayor was nonplussed. "You hear lots of things around here, man," he said.

I thought the mayor's dismissal of the idea was the end of the Powell et al. initiative. But then matters intensified and became more contentious. I'd asked

Blakely Disaster Readings

the NORA board to give me a plan for using its resources to buy properties and fix up commercial and residential land, with the target areas as top priority. My approach, I thought, would provide a basis for a contract between the city and NORA for the release of funds, because I had no other vehicle with which to revitalize commercial and residential areas of the city, especially the poorest areas.

NORA's board, however, wanted to pick the low-hanging fruit and do business deals with developers in middle-income or gentrifying areas, to create a self-supporting financial structure for the organization that would survive well past the recovery. Low-income property might be a loser for them, and not generate profits for future operations. NORA didn't hide this ambition, and many of the most influential insiders in the business community supported the cause to build a governmental entity outside City Hall's control that could remove blight and rekindle areas for private sector investments. They had in mind areas such as the distressed warehouses and abandoned buildings along the Mississippi waterfront that contamination and structural damage had made too risky for development, even before Katrina. Now, these areas could be a gold mine for local entrepreneur-developers if the risks were reduced for building.

Although operating in the target areas seemed sensible to me, the NORA board balked. Its members declared that they'd put together their own recovery plan and asked the mayor to provide them with the funds to do it. The ensuing argument escalated into public name calling and red meat for the press.

The mayor and I, with the help of a cogent memo by Becca O'Brien in defense of our position, held our ground. I told NORA that the city had every right to dictate how its money should be spent. Moreover, I noted, the approved Citywide Recovery (Target Area) Plan provided the mandate for all public spending—federal, state, and city. As the situation grew tenser, I declined invitations to go to NORA Board meetings and sent my deputy, Jessie Smallwood, in my place.

Finally, after weeks of acrimony, in late spring 2007 I met with NORA and the LRA to work out how the state would transfer the hundreds and perhaps thousands of homes it bought from flood victims back to the city for reuse. The LRA was concerned that if owners sold those houses to the state, as they could do, the city would have to deal with thousands of abandoned and deteriorating dwellings. That blighted housing would retard the recovery, since no one would want to live next to such a building.

The LRA had the duty to solve this problem with state money and state

Blakely Disaster Readings

eminent domain authority to seize abandoned properties. We agreed in a productive meeting that the state would form a trust fund to buy the housing, with NORA acting as the agent to put the properties back on the market or raze them to create new, buildable parcels.

This was a complicated scheme, because the total number and locations of the abandoned dwellings wouldn't be known until Road Home, the state agency responsible for purchasing the homes or lending funds to rehabilitate them, finished its work. Road Home was an enormously cumbersome operation, intended to provide homeowner relief of up to \$150,000 based on the pre-storm value of the property and the extent of its damage. The process became so bogged down with legal bureaucracy that many people with necessary proof of ownership but modest resources simply gave up and never returned home. Even most of those who received the full settlement couldn't rebuild a place of comparable size on Road Home funds alone.

Road Home was a quagmire, and I tried to keep my organization from any direct involvement with it, for fear of sapping our energy. Nonetheless, we received each day at least a handful of complaints from irate citizens who believed that, as director of recovery, I had sole authority over all federal and state funds.

The entire program to decide where we'd focus our vacant housing plan was further stymied by federal and state privacy laws that kept us in the dark about which homeowners had decided to sell their houses to the state. We all agreed, however, that NORA was the best agency to take over the vacant units from the state and condemn those whose owners failed to return. Vacant housing was NORA's pre-storm mandate.

As the housing meeting closed amicably, one of the LRA board members said to me, "Maybe NORA would be a better agency to administer *all* recovery funds."

On the surface, that made sense. Housing was a big issue. But as I pointed out to the board member, the recovery was much bigger than abandoned housing. We also had streets and public buildings to repair; and the city had to kick-start the recovery of large and small businesses alike. Furthermore, my Recovery Management Office was subject to direct public control, and to accountability and oversight by the city council, in a way that NORA wasn't.

Even before this meeting, I was already aware through my various sources, including MT, that some sort of subterfuge was in the air.

Indeed, Powell came back to me a week later and renewed his suggestion that a nonprofit board be formed in a way that would meet my needs to

Blakely Disaster Readings

administer the recovery funds. Powell's persistence raised yet more alarms. Powell was the president's representative. And he was supposed to be our advocate, so why was he suggesting ways to remove federal funds from public oversight? This idea didn't meet the smell test for me.

I went to the mayor again, and found him aware of Powell's insistence that we establish another body to carry the funds. Becca O'Brien, the mayor told me, had a draft memorandum of understanding written by one of the former mayoral candidate which proposed, as I understood the idea, to transfer the federal recovery funds to a new nonprofit corporation under the direction of NORA or another agency.

I was furious. "If that's the decision," I said, "I quit."

The mayor relented. "Doc," he told me, "It is your show. You run the recovery the way you want to. You do what is best."

I smiled and replied, "Mayor, I'm an old quarterback. I'll call my own plays."

The battle went on. Over the next several months, from May to November 2007, NORA board members, out of control, made wild accusations in the press about Mayor Nagin and me withholding funds so they couldn't do the recovery job.

As pressure escalated, the NORA board chairman had the good sense to propose a private, off-the-record meeting to cool things down. It was held in my office as a telephone conference: their board and staff members on one side; Becca and me on the other.

Afterward, one of the NORA representatives told me confidentially, "*You* should be the head of NORA, with Joe [Williams, then its CEO] given some form of operational deputy job. That way, all the recovery funds would be in one place. Besides, you should have been the head of NORA in the first place."

I looked at him and responded disingenuously that I'd think about it. Moving federal funds around was just what my personal attorney in Oakland, Peter Turner, had warned me about. I called Peter. He thought that if I made the wrong move, I might end up accused of conspiracy to divert federal funds without proper city council or governmental oversight.

I realized that I'd better document all this.

The NORA plot thickened. In late February, just a week or so before I was to present the city's consolidate recovery plan to the LRA, two Rockefeller Foundation representatives and an LRA staffer called to arrange a weekend lunch with a highly regarded board chairman, David Voelker. I agreed to the meeting, but took a staff person and Duce with me. Later I put these notes in the file:

Blakely Disaster Readings

11:32 A.M.

At Martin Wine Cellar in Metairie

Meeting with Mr. Voelker was at the instigation of Rockefeller Foundation....I had met him on one other occasions and had seen him as a member of the Louisiana Recovery Authority.

This meeting was apparently organized to set a new direction for the recovery.

As we ordered meals, I explained that I could not accept any food or other freebies from anyone and could not meet with anyone alone—to protect myself from accusations of special deals or even bribes. Thus, my assistant was attending with me and listening to the entire meeting discussion. She would not, however, be participating.

Voelker opened the discussion by noting that he had become a close personal advisor to the governor through means he could not quite understand. He was, he said, also close to the president of the United States and to Chairman Powell. As he characterized it, Powell spends most of his time in the New Orleans region in Voelker's offices.

He laid out a scenario in which NORA would be a conduit for the \$300–\$600 million destined for the City of New Orleans. He stated that he and Chairman Powell had been conversing over the past several weeks on how to divert these funds to another entity and that NORA was ideal for this purpose. He said some other parties were involved and said Scott Cowen, the president of Tulane, might be one of them. He also suggested that others in the city were putting together various ways of ensuring that the federal funds flow to the place they felt was safe from interference—from the city council and others. He suggested this would be good for me since I would have a good board that could act as my shield (he used the word “protection”) in the recovery process, because hard decisions were required.

At this point, I opined that a strong support structure was a good idea but that NORA was not a good vehicle for many reasons. I noted that the structure of the recovery committee formed by the city council was adequate. He replied that the council committee was *not* a good mechanism and that something smaller would work better. He said a meeting was going to be held in the White House, where this would be laid out to the president. In addition, the decisions made would flow back to the governor; he would be having dinner with her on Feb. 25, and all this was to be discussed then. He suggested that if NORA were the chosen instrument, a new board membership would be put in place and the current members save one or two others would remain. Joe Williams would be relegated to some lesser administrative post in this scenario. This was not discussed further beyond my saying Joe was a fine administrator, and this seemed unfair and unlikely.

Voelker felt he had the capacity to make any change in NORA, its board, and its mission that he wanted. He referred to Powell's intimate involvement in this arrangement.

I suggested the goal might be fine, but the means were flawed. First, the current makeup and goals of NORA were not appropriate to achieve the purposes he was outlining at this point. He countered with a reference to Virginia Boulet's drafting an MOU to bypass the city council and place the funds in a different set of accounts; I did not comment on that. He said the White House knew this and supported it.

The meeting ended amicably, with me expressing a wish to see a good mechanism established to do the job of recovery but grave reservations about the use of

Blakely Disaster Readings

NORA as a means to achieve such an end. Voelker suggested that a levee board might be used, but this involved complications which he didn't elaborate on. He was certain that the money was better in the hands of people who could steer it appropriately than in the hands of those who could not—and the latter obviously included the city council's recovery committee. He said that this nonprofit-board approach would only work if I concurred and the mayor and others signed off on it. Voelker assured me that no board I did not like or want would be placed above me. I expressed some doubt about that but said I thought a good board was always a strong idea.

I said, "I will think about this," and the meeting ended.

As I left the restaurant, my ears were burning. Move the federal funds to another organization outside the purview of the city council? Get the White House involved in diverting funds from duly authorized local government entities? I sent the mayor an email outlining the conversation and expressing my dismay.

This wouldn't be the end of NORA's attempts to hijack the recovery.

A few weeks later, in April, I made a presentation to the LRA board, and at its conclusion, one of the members raised the issue of setting up a new vehicle—outside city government—to handle the recovery money. He asked point blank if the recovery might be handled better by such a group.

I replied that there were perhaps five or six people who had experience in running recoveries from disasters such as Katrina. Since I was one of them, I declared that if the intention was to have someone else handle the funds, then I would go home.

The meeting chairman skillfully shut down further discussion. As I walked out, a *Times-Picayune* reporter came up to interview me. I told him firmly that if I wasn't going to run the recovery, there was no reason for me to stay in New Orleans.

On the way back to my house in the car, Duce remarked, "Doc, I heard what you said in there. Turn around. I need to see the back of your suit. People here don't talk back like you did. I think you just put a big bullseye on your back."

I would soon learn that he was right. This was my first bullseye, with more to come.

Charges and countercharges flew back and forth between NORA and other outspoken groups on how to proceed with the recovery money. In early April, I made a statement that became infamous, calling some of those characters "buffoons." My comments, which appeared in a *New York Times* interview, outraged the *Times-Picayune*, which broadened the statement to include all New

Blakely Disaster Readings

Orleanians even though it was clear that I meant only a narrow group that I was battling with, who were more interested in controlling money than spearheading a sound recovery.

Over the next month, May, I worked with my staff to develop a program to devote all *city* funds that legally could be used for the purpose to recovery projects. I needed to do this so no one could claim that we didn't know where the recovery money was going to be spent, as NORA was alleging. This approach formed the backbone of our recovery-financing program. Using it, we tracked progress and spending in each target area. My reasoning was simple: I knew that I had to get the money flowing into the neighborhoods, or continue to face these assaults on the recovery by NORA and others. We devised a six-part budget-tracking program:

1. We refocused federal funds for community recovery. For example, Community Development Block Grants, which amounted to about \$15 million annually for housing and community services, were reoriented to the target areas wherever possible.
2. We redeployed about \$40 million in city funds that came from special taxes and normally would have been spent on economic development.
3. Since we had floated a bond fund, we used these funds to match the recovery areas so that bond-funded street paving and community center improvements would be spent in the same places where FEMA funds were being used for the restoration of fire stations or other public buildings. This amounted to almost \$300 million, part of that money from older bond issues whose proceeds were unspent prior to the storm.
4. We found that the state bond commission had no guidelines for using post-Katrina federal GO Bond funds. As a result, the money was going to oil companies that had suffered no damage, and cities that had experienced only a little. We wrote guidelines and asked the state to allocate a pool of funds solely for New Orleans projects that met our recovery objectives.
5. My staff, led by lead planner Dubravka Gilic, devised a \$417 million LRA City of New Orleans Recovery Community Development plan, broken down as follows: \$200 million-plus to neighborhood recovery; \$100 million to new economic development; and the remainder to arts, culture, and education.

Blakely Disaster Readings

TABLE 2

<i>Funding source amount</i>	<i>Budgeted (\$)</i>
LRA-Obligated Recovery Funds (D-CDBG)	410,720,016*
Traditional CDBG grants	42,925,126
UDAG funds	16,562,252**
HOME investment grants	16,340,133***
FEMA (PA funds)	11,236,931
EDF grants	10,931,124***
Other governmental grants	9,388,962***
NHIF grants	6,804,932***
General fund	4,484,794
BRAC grants	460,258**
Other nongovernmental grants	75,000
<i>Total</i>	529,854,528

Source: ORDA 2008.

*Long-term community development funds.

**City Federal Funds not associated with disaster.

***City funds from taxes or related sources.

6. I identified the federal and state agencies that were operating in New Orleans after the storm, for example: Department of Commerce Small Business Administration; Treasury Department community programs; Department of Housing and Urban Development; and Louisiana's Housing Finance Agency. Then I requested of their local representatives that they allocate the money they were planning to spend in New Orleans primarily to our target areas. The agencies cooperated with us because, in most cases, they had no better way to meet their objectives.

We had a plan, an administrative system, and a budget. But having a plan and a budget would make little difference if we couldn't alter the social and economic conditions for the people most affected by the storm and by prior years of economic and social deprivation. I had to start a process that would alter the economic stakes, too.

I began pondering ideas for rebuilding New Orleans' economy, and a bridge across the economic divide between black and white; downtown and the neighborhoods.

Blakely Disaster Readings

9. REVIVING A DROWNING ECONOMY

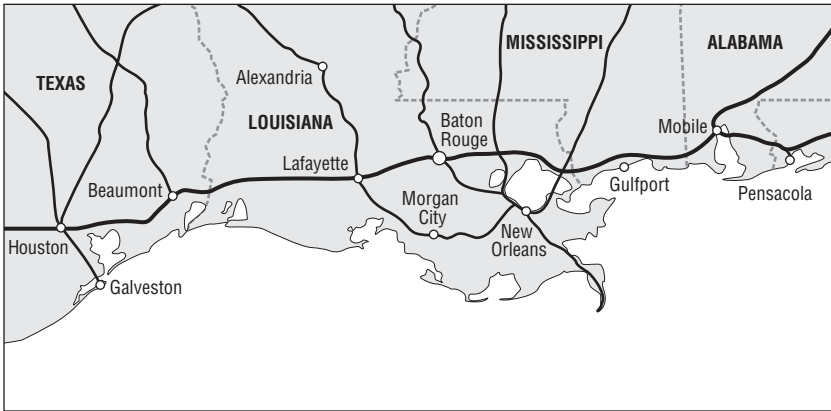
KNOWLEDGEABLE POLICY SCHOLARS ARGUED OPENLY THAT perhaps New Orleans had little economic reason to live.

Leading policy economist Ed Glasser, in a piece he described as a “thought experiment,” which I learned about in my first visit to Harvard in 2007, that with the federal government pledging billions of dollars in aid, most of which never materialized, people would be better off not thinking about a place-based strategy that emphasized cash payments to residents. Instead, they could choose to use the cash to reinvest in whatever living arrangements they had in the city, or to relocate to Atlanta, Houston, or any other place they might want to go.

When I visited Harvard in April 2007 to enlist allies for the recovery effort, several professors and students asked openly if we should perhaps let cities like New Orleans die and move on, given the cost associated with rebuilding a dying city. As one student observed, New Orleans exudes nostalgia but has virtually no economic value to the nation. She noted that towns have come and gone throughout U.S. history. Dodge City was important in the early cattle rush; California, along with much of the West, is littered with places that died or shrank—in California’s case, after the Gold Rush—along with their physical and economic fortunes. Clearly, New Orleans has more attributes than these earlier examples. But they were once important places, too. So why not let New Orleans die?

Arguments over the city’s economic and social value continue. Robert Lang, one of the leading scholars of regional economics, asserts that New Orleans belongs to a larger zone that stretches from Houston to Pensacola, Florida. Within that zone, New Orleans dominated until the 1950s, when the techno-

Blakely Disaster Readings



Houston-New Orleans mega-region

logical innovation of container ships led to the diversion of seagoing traffic to Mobile and Houston, and New Orleans declined as a port city.

In the process, New Orleans began a larger, gradual economic decline from a premier national city to an appendage of Houston. Major firms in the oil and related extraction industries decamped to neighboring cities, lured by their modern ports and superior financial and service infrastructures of lawyers, banks, and accounting firms. Houston used its political clout in the Lyndon Johnson era to garner federal facilities to support its growing labor force. New Orleans slipped economically as major cities around it grew.

Mobile gained seaport business at New Orleans' expense. The city's regional medical preeminence also waned. In the 1940s and 1950s, New Orleans boasted world-class medical facilities, serving not only the South but also the Caribbean, Central America, and the northern coast of South America. The Charity Hospital System guaranteed state dollars to support high-quality medical teaching. (The strength of the Charity System is also its weakness: years of direct support for the hospital from Louisiana allowed the LSU medical teaching faculty to rely on sinecures while nearby states and nations in the Caribbean and elsewhere developed new, competitive medical infrastructures.) Meanwhile, Birmingham was building a solid education-medical economy, destined to propel it past New Orleans as the Southern medical hub.

The last civic insult came in the musical area. The city that from the turn of the twentieth century presented itself to the world as the home of jazz lost its musical production and distribution business to Memphis, Atlanta, and Miami. New Orleans had made almost no investments in modern performance

Blakely Disaster Readings

infrastructure to match those more entrepreneurial rivals. New Orleans instead drifted into a tourism-dominated economy based on low wages, public housing, and public assistance. When Katrina hit, the median income of the New Orleans region was just *half* the national figure. Even lower African American median incomes and occupational profiles had made the city one of the poorest in the nation before Katrina.

As New Orleans lost its economic position locally, regionally, and globally, and nearby rivals took bold actions to secure their own, the city became embroiled in defending its past. Civic groups tried the great leap forward by proposing a 1984 New Orleans World's Fair, but the idea was undermined by the newspapers and civic elites. In any case, the fair would have been an image builder, not a genuine economic development tool. Other endeavors to revitalize the economy emerged in the "model cities" of the 1970s with downtown malls and stadiums. Meanwhile, such central assets as the Mississippi River, educational and medical facilities, and positioning of a high-tech base at the Michoud space complex gained little support. Pre-Katrina New Orleans was simply a tourist town.

When I arrived there, I gave one of my first speeches to a citywide audience after looking at those economic trends and data. I said the city had a tee-shirt economy that purchased the beads for Mardi Gras from China, and virtually all its food, except some fish, from neighboring states, and that Katrina presented the opportunity to rebuild the entire economy, not just houses and city buildings. I explained that major disasters alter local economies forever.

I cited Kobe, Japan, as an illustration. Prior to the 1995 earthquake, Kobe was one of the top three steel-exporting ports in the world. But five years after the quake it was not even among the top 25. In my own hometown, Oakland, the 1989 earthquake presented an opportunity to move the 880 Freeway that ran along the east side of San Francisco Bay toward the Port of Oakland. Doing so eased truck traffic to the port, relocated rail lines, and improved the size of the city's seaport since the city bought army and navy bases to create a larger, intermodal transport system that I'd recommended. (In fact, I'd recommended all those actions to the mayor and the city's port commission before the earthquake.)

I also told the mayor, council, and business leaders at the meeting that the revitalization of post-September 11 Lower Manhattan was proposed by Robert Yaro, president of the Regional Plan Association, and myself soon after the attacks, and that the plan, which included altering the Lower Manhattan

Blakely Disaster Readings

transport links and rebuilding the civic, residential, and “amenities” base on Manhattan’s West side, was already well underway.

In other talks with civic leaders, I advocated that the recovery aim at the city’s economic infrastructure, in order to position the economy nationally and globally. I was openly critical of the existing employment structure, and I also proposed a program of economic and social justice. In addition, I said in various presentations that we shouldn’t create jobs for the future without preparing locals to fill them.

For at least three years before I came to New Orleans, the Regional Planning Organization had been engaged in serious studies to form a biomedical complex in the central city area. This was just the sort of initiative that fit with my ideas for the city’s economic infrastructure. The medical assets were already at hand: the Louisiana State University School of Medicine, Tulane School of Medicine, Veterans Administration (VA) Hospital, Ochsner Health Foundation, Xavier School of Pharmacy, Charity Hospital (the clinical practice hospital for LSU Medicine), and—planned for the same part of the city—a state-of-the-art Louisiana Cancer Center. From Sydney, I reviewed documents sent to me by the Regional Planning staff. An official at the New Orleans Regional Planning Commission invited me on a tour of St. Louis to see how that city’s new VA facility was transforming a community with a demographic like that of New Orleans.

I couldn’t make the tour, but Addkison represented Mayor Nagin, and she returned enthusiastic about New Orleans’ plan for a biomedical complex. Impressed with its potential to boost economic development, she took the lead in promoting the complex. Because I had given biomed a central position in the recovery strategy I was articulating, I was happy to support her efforts.

When I attended a planning meeting, however, it quickly became clear that planning wasn’t progressing well.

As in St. Louis, a VA hospital was scheduled for inclusion in the New Orleans biomedical venture. Representing the VA at our meeting was a smart, articulate woman named Julie Catellier. She pushed for the city to take a proactive and decisive role in assembling the land and infrastructure so that the VA could locate its hospital near the proposed new LSU facility. The new hospital, she pointed out, didn’t have to be *in* New Orleans—a dire statement that drew gasps from the LSU, Tulane, and Regional Planning staff in attendance. Several people asked Addkison what the city could and should do to make sure the VA stayed and got built in downtown New Orleans. Addkison sidestepped this issue by pointing out that the city was engaged in a massive recovery effort with little or no cash to spare.

Blakely Disaster Readings

At that point, council member Stacy Head turned to me and asked, exasperated, “How would you handle this, Dr. Blakely?” I responded by laying out a several-point approach that seemed logical from the documents I’d read. I wanted the city to take the lead by offering to purchase whatever land was required, to provide the infrastructure for the VA, including water and parking, and to secure surrounding areas for future development. At that point, the momentum of the meeting swung to me as the facilitator. Although we worked together and theoretically were on the same team, Addkison told the assembled group that my ideas wouldn’t work because, as she had just said, there was no money and the mayor hadn’t authorized an effort of this size.

The pivotal issue was who would buy the land for the VA hospital to relocate next to LSU. The agency had funds to build the facility but traditionally had asked localities to provide land. Adding to the complication of the project for me was the fact that the old VA storm-damaged hospital occupied a site too small for a new proposed hospital for vets. So the VA had three choices: find a better site in the New Orleans region; leave for Florida, where land was available and free; or pursue an open competition for all areas in the South or near the LSU’s proposed medical research-hospital complex.

I suggested that the state take the lead in assembling the land for the joint LSU-VA campus. Because the state possessed stronger eminent domain authority than the city, it could handle the land acquisition for the VA, making the reimbursements later. I asked, “Why not a joint enterprise—with the state acting as the original purchaser of the needed land, and the city as a partner?”

Addkison opposed this idea on several grounds. For one thing, she argued, the city lacked the funds; for another, the state would never agree to act as a proxy for the city.

Other participants, however, liked the idea. The VA rep reminded us that her agency planned to issue a Request of Interest for parties to bid on locations in the New Orleans area. As she put it, “This is not a done deal for New Orleans.” Those assembled agreed to present my proposal to the mayor and the council.

A week later, I put the idea on the mayor’s executive agenda, after taking the precaution of speaking with the state authorities about the basic concept. (I enlisted their support, but imposed many caveats.) The executive staff meeting didn’t lead to a decision, but it did reveal that the mayor had reservations similar to Addkison’s. I countered with a plea to look at alternative financing for the project, including issuing GO Zone bonds or Community Development Block Grant funds, if we received a larger allocation of the lat-

Blakely Disaster Readings

ter than the feds originally allocated. I argued that there would almost be a second round of CDBG money for the city, and that this project was a logical and ideal way to spend it. We couldn't risk having the VA leave downtown or, worse, go to another state.

Based on my knowledge, research, and writing on economic development, I also put to Nagin and his team an argument for using the VA as the anchor for the city's economic recovery. Hospitals import new capital from other places in the state and nation. The VA hospital serves seven states, bringing in patients for days, weeks, or months. These patients come with families who occupy local hotels and buy local goods and services. In addition, the hospital both buys and sells services across the nation as it develops medical specialties, such as burn therapy. Moreover, with LSU and Tulane's teaching and research hospitals, the new complex planned to specialize in tropical diseases and health, which would bring in millions of dollars in new research funds and attract patients from Latin America and Africa. The mayor, warming to the idea, reminded me that until the 1980s the LSU-Tulane complex was the prime health care venue for well-to-do Latin American and Caribbean patients. When the deal was finally reached, the mayor picked up on the research angle and repeatedly cited the fact that the VA system had spawned three Nobel prizes in medicine. He said that he intended to have the next few prize winners in New Orleans.

Soon afterward, with the city attorney, chief administrative officer, finance director, and others in attendance, I made my case again. This time the mayor liked it. But Addkison had one last card to play. The state, she said, would never agree to what I was proposing. I suggested that Nagin call the Louisiana director of facilities and ask him directly if he would become the city's partner.

With the phone on speaker, Jerry Jones, head of state facilities, came on the line.

The mayor put the proposition to him.

I held my breath, until I heard Jerry drawl, "I think we can do that, Mr. Mayor."

A major battle was at last over, and my side had won.

Now that she'd lost, Addkison got with the program quickly. She and her team fashioned a Memorandum of Understanding (MOU) with the state in record time. The request for interest appeared in the newspaper a few days later. Addkison and the Regional Planning Commissions team put together a response.

We were on good terms with the Ochsner Foundation, one of New Orleans's

Blakely Disaster Readings

major healthcare providers, and we knew that Ochsner had a suitable site for our project right in the area. The head of the hospital informed the mayor that the biggest healthcare provider in New Orleans and maybe the state was determined to put its new facility right on the Ochsner campus to capture the GI patient load and staff. Although that sounded good to my colleagues, I took a contrary view. Siting the new facility at the downtown location proposed by the city would have the highest direct economic impact on the people of New Orleans, and was therefore preferable to what the foundation was offering.

I stood up, thanked the group a second time, and headed for the exit.

Duce was aghast. “Doc,” he said, “you know what you just did?! I told you once already, you don’t do that here. Not to people like that. Now you got *another* target on your back. You don’t have much more room *left* on your back. This is the only hospital in town that’s fully operational.” Then he gave me a big high five, and we drove off.

Less than a week later, I got a telephone call from the office of the secretary of the VA. Andy Love, special assistant to the secretary, said that the city proposal needed clarification, and offered to come to see me. He flew in, and we closeted ourselves for almost a day to go over the city offer. He made clear he was calling on others to clarify their proposals as well.

For the next six weeks, Andy and I engaged in intense negotiations. I was assigned a city attorney, who took the job on as one of his most important legal challenges. He and I stayed in the office until late at night, hammering out the specifics on:

- What land, located where?
- How to deal with historic buildings
- Site clearance responsibilities
- Utilities
- Environmental requirements
- Delivery dates
- Transfer of the storm-damaged VA hospital after building a new VA adjacent to LSU
- Penalties for nonperformance

Thanks to my background in land assembly as a developer with my own firm and my work with the City of Oakland, the city attorney’s skills, and Andy Love’s flexibility, we produced a draft agreement that the mayor and state representatives signed.

Blakely Disaster Readings

Duce was all smiles. “Watch your back, Doc,” he said, “and don’t get sick.”

I was energized by our accomplishments with the state. But I knew this battle wasn’t over. I had to find the money to buy the land and deal with the strong emotional and environmental concerns about the maintenance of Charity Hospital. Charity was the place many New Orleanians were born, and if you were poor the only hospital that would take you.

■ ■ ■

Of course, the city’s economic recovery depended on more than a hospital complex, however important the VA agreement.

With that in mind, I next turned my attention to the reestablishment of New Orleans as an exporter of music and performing arts. That meant establishing the city as a digital performance center with optical and high-bandwidth venues. The backbone of the approach was to make Canal Street what I called in speeches the “Digital Canal.” The important Mahalia Jackson Performance Center was to be transformed into a modern venue to support all forms of live and recorded performance at one end of the downtown. And at the Saenger Theater, anchoring the other end of the downtown, creative city CDBG financing would produce a venue for live drama and music, which would bring back the creative heart of the city—with the large hospital staff, and patients with their families, as year-round patrons.

My rationale was simple. We could have fulltime, not episodic, visitors who would need places to be entertained. But stadiums and similar projects, like the expansion of the Superdome, are not economic generators. They don’t bring in new money, because the people who attend the games are locals, so they’re only transferring their entertainment dollars from a local theater or night club to the stadium, with no net gain of money for the city and region.

We also expanded the Michaud Mars Lander project, the next-generation spacecraft, because making new space rockets requires a whole bunch of sustainable products. New Orleans needed to leapfrog into the future, using solar ventures and related technologies with potential spin-off industries that could contribute to rebuilding our housing and repaving our streets. In addition to the sun, wind, and Mississippi River waters driving new energy sources, I reasoned that all the new firms could be staffed from scientists at Michaud, the city’s seven universities, or elsewhere in the community.

To support a new technology approach, we had to upgrade a city infrastructure that in some cases hadn’t been touched for over fifty years. For

Blakely Disaster Readings

example, road maintenance was poor, because the city is sinking, and there were few records of facility maintenance.

To start the upgrade process, I located a small group of dedicated individuals, including Doug Meffert of Tulane University. He understood that revamping the basic infrastructure—using advanced techniques and materials for a low-carbon future—fit well with the sciences being developed at Tulane and other city universities. So we invested in smart-technology revitalization projects on the New Orleans waterfront, especially in those that would provide energy from the river.

Another tool we used to help modernize the city economically was the GO Zone bond. The GO Zone legislation aimed at getting larger-scale, job-producing businesses back in operation as soon as possible after the storm. GO Zone bonds were provided at low interest rates with long paybacks, and the state had considerable latitude in allocating them. They were not without complications. Rules stipulated that eligible firms had to be located in damaged areas, but not that a particular *firm* had experienced any damage. Moreover, the bonds could only go to large private companies able to sustain the legal and underwriting costs for a bond issue, and to float the issue on public markets. State rules didn't require endorsement from local governments, except for perfunctory acknowledgments by the local business Enterprise Corporation, and large-scale organizations even managed to bypass that modest requirement.

One day in early November 2007, a staff member brought me a document showing applications for GO Zone bonds in New Orleans. Alarms sounded—not for the first time since I'd been the recovery czar. Although we had only a few applicants, the state was approaching the total ceiling for its bond allocations. More disconcertingly, large organizations barely damaged in areas lightly hit by flooding were getting most of them. Meanwhile, in New Orleans, we thought we had to have a recovery plan before we applied for GO Zone bonds.

With Kenya Smith leading the way, we reconsidered the process, and wound up establishing workable bond criteria. Then the mayor called the state treasurer to argue for a fair allocation and a rollback of the projects that didn't meet the criteria and specifically target New Orleans. Within a few weeks, our staff had developed projects for the state bond commission based on our Target Area Plan. The state bond commission modified criteria for proposed projects that looked like ours in New Orleans. One of the new criteria required that organizations proposing projects had actually suffered

Blakely Disaster Readings

storm damage, or were closely tied to the economic recovery of the community where the project would be located.

This commitment and the modified criteria became the template for the bond commission, and the state treasurer gave me time early and often to argue my points before the group. As part of our revolving fund for rebuilding, we negotiated a bond allocation that matched the appraised value of the old VA site. The city would enter a 99-year lease of the old site to pay back the bond.

I had a personal charge: to create a system that would quickly get and spend the money needed to put some cranes on the skyline.

Blakely Disaster Readings

PART III

Elements of the City

Blakely Disaster Readings

Blakely Disaster Readings

10. IN SEARCH OF CIVIC LEADERSHIP

THANKS TO ITS MUSIC, NEW ORLEANS IS JUSTIFIABLY KNOWN as the “soul city.” But if the term “soul” is taken to mean “soul-mate,” as in, the sharing of a common identity and sense of directions and goals, then New Orleans falls far short of the mark. New Orleanians frequently use soul to refer to the collective spirit of the city. The city has a spirit, but it lacks manifestations of it that foster cohesion.

According to research by Lawrence Vale and Thomas Campanella in *The Resilient City*, among the most important tools in a disaster recovery is a city’s cohesiveness, which helps create a purpose and a vision of restoration from the collective trauma. Vale and Campanella show that organizations that are strong before or after the disaster are an essential component for a speedy recovery.

Civic organizations like those the researchers discuss exist in some U.S. cities that have experienced great calamities, such as San Francisco after the 1906 earthquake, and Chicago after the Great Fire of 1871. These events brought both cities new strengths that they used to forge a path to the future. In each case, an organization that transcended local politics was in place to lead the recoveries and to shape the road ahead. Such organizations have a purpose beyond the event. They are civic, not political, institutions, but they are the seed bed of sociopolitical organization. Mayors and council members in many cases have emerged from them, bringing to government a citywide agenda forged over many years.

Although New Orleans has a plethora of organizations, none act as the central resource for carrying a civic vision. By contrast, the San Francisco Planning + Urban Research Association (SPUR) epitomizes the kind of entity

Blakely Disaster Readings

needed for recovery: civic-led and financially independent of government. SPUR played a leading role in reshaping its city after the 1989 earthquake. Across the Bay, a similar group, Oakland Sharing the Vision, arose after the same event to play a similar role for that city.

New Orleans' many civic organizations coalesce along political, church, and ethnic lines, and the krewes that form the backbone of the Mardi Gras parades. But almost none of those groups represent a broad, cross-racial constituency with a common destiny. One of my professor colleagues at Berkeley described a certain dilemma of urban planning as follows: "A person or a group of people can be looking down a street. One focusing north and the other south, they will swear that on the same street, they see different things because they face opposite directions. Both groups believe they are the only ones seeing the truth and they won't accept any other view."

That is New Orleans, in spades. Everybody has his or her own version of truth, but fails to see or respect the other versions, because he's looking in only one direction.

An important, and vexing, actor among the city's fractured associations was the influential Bureau of Governmental Research (BGR), which views itself as the local government watchdog. It selects issues it feels are being inadequately dealt with by the city council, and interviews senior staff about them. My staff did their best to try to correct BGR's misapprehensions, but found they were talking to people whose minds were made up or who simply didn't know how government works.

For their part, many local black leaders, unfortunately, see the BGR as a white organization. No matter who chairs it (and some blacks have done so), the organization, in the African American view, is staffed by whites who consistently criticize a black city government. There's been truth in that perception. The BGR has no representation or standing with the vast number of lower-income blacks, or with the black community in general, on issues such as ending job inequality and combating overt racial discrimination in private clubs. The BGR, I was told more than once by black activists, existed solely to bring down the black city government. In my view, the BGR is a criticizer. It didn't take advantage of its opportunity to also be a healer, which is what's needed in a post-disaster situation.

As recovery director I spent several months trying to find or create some group that might fill the void and carry a long-term civic message, build coalitions, and groom leadership. To be sure, well-intentioned organizations did appear. But each of them carved out a narrow mandate. I asked my friend

Blakely Disaster Readings

Steven Bingler, a well-known and highly regarded architect who crossed racial and political lines, to convene a meeting with community leaders of a kindred spirit to see if we could mold some overarching cross-color civic organization.

I worked with the Horizon Initiative, a middle-income, post-Katrina group that pledged to alter the economic direction of the city with a new public-private partnership. I championed Horizon, even when many thought the organization an interloper on the civic agenda and wanted to take away its access to public funds. Council member Arnie Fielkow's strong support of Horizon became a racial issue, because he's white.

Other grassroots groups arose in communities across the city after the storm, but they had little in common. As a result, such groups seldom had strong, if any, representation in places like the lower Ninth Ward or Central City. New Orleans East built its own coalitions, which suffered many internal conflicts. My remark to the *New York Times* about Sunni- and Shiite-like hostilities among these factions sparked outrage. When I later appeared on the black radio station WBOK to discuss the recovery, call-in listeners agreed with my observations, wholeheartedly thanking me for having the courage to voice them.

For most African Americans, leadership on civic agendas had to come from City Hall's black elected leaders; black *community* leadership was too fragmented or divided to provide it. Consequently, too many African American community leaders' quests for political and economic strength focus their attention on City Hall.

Many residential, community-based groups formed either just before or just after the storm to protect physical and social space. In most cases, they pursued parochial projects. I was impressed by the spirit and dedicated leadership of many of the groups. Nonetheless, most saw their opportunities in reference to others as a zero-sum game. When I mentioned to a white elected official the need to tilt resources to the Ninth Ward, she replied, "I've never been there, so why would we do that?!" She was echoing other whites I spoke to about that neighborhood's plight and its need for citywide attention. One of them, an angry Tulane University student from a town near New Orleans, challenged me in an open forum: "Why should we put the city at risk for those people?"—meaning residents of the Ninth.

This us-against-them attitude left low-income communities feeling that they had to grab and secure resources before any citywide goals could be formulated. Blacks viewed community coalitions such as BNOB as yet more at-

Blakely Disaster Readings

tempts to rid New Orleans of low-income blacks and make it the Las Vegas of the South. Some of the black anger over giving the city master plan the force of law stemmed from the belief that the plan would prove to be what a black former state legislator called the “final solution,” aimed at eliminating or marginalizing his people the way prewar Germany treated Jews in the Warsaw ghetto. He suggested publicly that the white community’s determination to exclude black neighborhoods would be etched into planning law.

The New Orleans post-Katrina landscape, a toxic soup that covered the city for more than two months, spawned environmental and green groups that were a positive force across the city. I supported their agendas to make New Orleans a safer place to live and work. But these groups were composed of true believers. And although they tended to be more racially diverse, they weren’t ideologically varied, and they seldom reached out to support other causes, such as historic preservation, that seemed to be their natural allies.

An organization called Women of the Storm did forge some relationships across the ranks of upper-class blacks and whites who shared an interest in the survival of their city. “Women” didn’t have a race agenda. On its face, that was a good thing; however, without a deliberate agenda that healed the rifts between blacks and whites, they weren’t able to meet their own aspirations. They tried desperately to get the 2008 presidential debates held in New Orleans but lost out to, of all places, the much smaller Oxford, Mississippi. The committee reasoned that New Orleans wasn’t yet ready to host the debates, even after it had already hosted the All-Star basketball game and several football bowl games, and even though the Convention Center was undamaged. Certainly, New Orleans had more hotel beds than Oxford, Mississippi. I suspect that perceptions of crime were the real reasons, and they can’t be swept under the rug, as my grandma liked to say.

The city council saw itself as a community-advocacy organization to make municipal systems work better. But race divided the common agenda, and understandably so: black council members rightly or wrongly saw increased city services to impoverished areas as the way to level the playing field, while whites saw as their mandate the equal *dispersal* of services. Several white members openly expressed their frustration, calling city projects “pork barrels” for black contractors.

Nearly every try at building a civic coalition turned on the simplistic notion that the current mayor needed to improve his performance or a new one had to be elected. I likened this to the “cargo cult” delusion—a reference to Pacific aboriginal tribes that built small runways near their villages, thinking

Blakely Disaster Readings



Building site.
Author's photograph

that that would cause cargo planes with food to land, and end their poverty. So, too, in New Orleans, whatever ailed the city, from bad streets to black poverty, would somehow disappear with a new mayor.

Although good mayors do good things, few can overcome all the problems in their cities. Good mayors even get voted out of office despite doing fine deeds, simply because many problems lie beyond governmental purview or solution. Mayor Rudolph Giuliani is often credited with turning New York City around. But his success owed a considerable amount to actions taken by many civic organizations in the city.

Several meetings I organized to promote a wider civic vision were derailed when Mayor Nagin became the target of scapegoating and vicious attacks, including a charge of corruption. I tended to try to steer these discussions

Blakely Disaster Readings

to what could be achieved, not discussing what the current or future mayor might do.

Trying to combat a semi-messianic notion that the “right” mayor would *make* it all right, I pointed out how few issues that affect daily lives are actually controlled by the mayor. A New Orleans mayor doesn’t deliver water or power or deal with the meager budgets for street repairs or antipoverty initiatives. As in most American cities, 80 to 90 percent of the New Orleans budget goes to fund police and fire and related essential services.

I knew from my experience with two mayors that not much change comes with a new black mayor or a new white mayor. The local institutional direction and budgets are too firmly fixed. Mayors have at most 10 to 15 percent of the city budget as discretionary; the rest is in police and fire and pensions. I finally allowed matters to take their own course and stopped trying to forge new approaches to a civic direction.

Civic associations weren’t easy to forge or find in New Orleans—but in disaster recovery generally, I believe that they are indeed a critical element. As Vale and Campanella write in their *Axioms of Resilience*, “The process of rebuilding is a necessary but, by itself, insufficient condition for enabling recovery....Cities are more than a sum of their buildings. They are also a thick concatenation of social and cultural matter. To enable recovery...networks must be reconnected.”

Blakely Disaster Readings

11. MORE THAN BRICKS AND STICKS: REVIVING NEIGHBORHOODS

ON MY MANY BIKE EXPEDITIONS AROUND NEW ORLEANS AS The Bicycle Guy, I got to see the city's residents as neighbors, and in neighborhoods. Some places suffered little storm damage but had large-scale problems that predated the storm, such as dilapidated houses and neglected streetscapes. I saw that income was and is a dividing factor, but not entirely so: a larger determinant of a neighborhood's viability appeared to be the mix of people who were committed to making the neighborhood a stronger community after Katrina than before.

The residents of Broadmoor and Lakeview, for example, had neighborhood survival characteristics. They asked for little and did a lot for themselves. Interestingly, as a result, these communities became the target of abuse by others who perceived them as getting more than their share of city government attention and assistance. Years of corruption had bred suspicion that if you paid off city officials, your community would receive favored treatment.

Some places, such as the Ninth Ward, whose travails received the most media coverage, got help from church groups nationwide. I observed that the more help they received from the outside in the form of volunteers, the more they expected from both the outside volunteers and the city. For two consecutive weekends, city staff did an energetic sweep in New Orleans East. Working side by side with local volunteers from the area, we fixed up and cleaned up. We removed truckloads of trash and mowed lawns. Three weeks later, I got irate calls from several residents, saying that we needed to come back. The weeds, they complained, were continuing to grow. When I asked the callers if *they* could do some of the work, they responded, "We get around town. We see how you keep up those other neighborhoods!"

Blakely Disaster Readings

My biggest contribution to New Orleans neighborhoods, before we got any money for the communities, was to ride my bike into them and bolster the residents' resolve. Although the trips gave *me* more information, that was little solace for the people who had waited years for any sign of federal help. I took my share of hostile comments for failing to get the money delivered faster. Federal Community Block Grant funds are by law restricted to neighborhood renewal and similar objectives, so any federal recovery funds using community block money had to meet this test.

We received little money from FEMA to repair our neighborhood police and fire stations. The city had to take \$30 million from its tight budget to repair vital facilities quickly—with no assurance that this huge amount would ever be reimbursed. In other recoveries I've worked on, the state or FEMA advanced the funds so that vital facilities could get up and running again.

My observation of the help President Bush sent was that neither Donald Powell, Bush's first Katrina emissary to New Orleans, nor his second one, Donald O'dell, was very interested in representing us to Washington or trying to get things done for the city. Powell spent most of his time meeting with non-city or non-state people on what seemed like local political issues. O'dell considered his mission to be making the city's new requests better organized and articulated, rather than getting the long list of previous requests even looked at by FEMA or other agencies.

Moreover, my colleagues at FEMA who had worked with me earlier in Oakland were very candid and told me it was best to come directly to them because they didn't report to Powell, and they were even more emphatic about that directive after O'dell assumed the same role. It was clear that there was more than a little bureaucratic infighting going on as to who was in charge.

I pushed for an independent assessment of our FEMA claims, and Senator Mary Landrieu got that done, but with no assistance from anyone at the White House.

I found that I had much better results going directly to FEMA, HUD, and the Environmental Protection Agency (EPA), either on my own or with delegates from the other parishes, to get funds for neighborhoods and housing. Senator Landrieu's office was very sympathetic to our plight and worked with us. Curiously, just before I left New Orleans, the senator's office came down hard on the mayor and city for underspending HUD funds, even though that was easily explained and, within a few months, cleared up; it seemed like some kind of political punch at the mayor. I was also targeted, but it was hard to blame me, because the alleged underspending had almost all occurred be-

Blakely Disaster Readings

fore Katrina or before my coming into office. HUD staffers told me that most of Louisiana had similar underspending problems.

The issue of the “right to return” was very heated. Underlying it was the fact that many New Orleans residents who couldn’t return were underinsured or living in public housing or senior citizen facilities. Economic realities and demography made promises to return more than a little shallow. Many Ninth Ward residents were over seventy, and the idea of rebuilding didn’t appeal to them.

Our response was to build good senior housing, using our HUD funds, so that seniors who *could* return had decent places to live. In my two years in office, thanks to the many strong church and nonprofit providers, we opened several hundred new and rebuilt senior facilities.

All the same, the prospects of returning were daunting. A number of factors are important in understanding who could or might return. Seniors and people with low incomes were at an inherent disadvantage in a system that required rebuilding houses. Low-income residents were also dependent on government supports and transfers, and thus not in a position to take out a new mortgage or supervise home rebuilding. This left them vulnerable to exploitation. One of the saddest duties I faced daily was taking calls and reading letters from seniors ripped off by unscrupulous contractors. In addition, seniors with resources might not have felt it worthwhile to embark on a rebuilding project at an advanced age. They might have elected instead to find a smaller place or stay with relatives.

Cheap rental housing was plentiful prior to the storm. Owners who left the city just wanted someone on the property. Before the storm New Orleans had many small-time landlords who bought abandoned or distressed housing as rental units. Post-Katrina, however, the cost of rebuilding these places exceeded the rents owners could command, so they just let the places fall apart. The state had a good small-owner program; but like so many of these efforts, in my view, it was designed to prevent fraud rather than get houses built. The paperwork was too burdensome for small landlords. So the units that were rebuilt were expensive by pre-storm standards, and that, too, had the effect of keeping people from returning.

An investment in rebuilding is a financial and psychological burden. People returned to their neighborhoods much faster than predicted. But with the memories of the devastation still fresh, many just couldn’t face the prospect of rebuilding. Many others simply didn’t get enough from the Road Home program to consider doing so.

Blakely Disaster Readings

There is general agreement that, when I left in 2009, the New Orleans population stood at about 330,000 or a bit more. The official population according to the 2010 Census is 343,829. About 30 percent or more are newcomers or born after the storm, according to reports by the Brookings Institution. That's a strong rebound, considering the depth of the Katrina tragedy and the listless attempts to attract the lowest-income residents back to the city.

Due to the impediments to return, the city's demographic base has changed. The new residents are younger and better educated than the former residential base. New Orleans is now a place for pioneers. Brookings reports found many newcomers cashing in on the tide of new construction and related jobs.

But construction and labor jobs didn't materialize for many unemployed and underemployed blacks. Post-Katrina opportunity structures in construction haven't yielded as many good, new jobs for blacks. Many current residents see Latinos as poachers, since skilled Latinos seeking work came in from Texas and Mexico as soon as the water levels went down. So by the time blacks started pushing for more jobs, they were outnumbered and out-competed by lower cost outside labor. In some cases, lack of skills actually was the problem. But when I asked local black workers about that in community meetings, they'd say the "big boys" were keeping them out of work. Employers preferred Latinos, they contended, because they wouldn't complain about wages or working conditions. At the many sites I visited, few had more than a handful of blacks on the job.

On one hand, therefore, things were looking better for New Orleans. New people tend to attract or create new jobs. The city's burgeoning graphics, media, and information industries illustrate the value of an influx of human skills. On the other hand, the rebound in neighborhoods wasn't shared equally by all New Orleanians.

The arts scene, as well as the cultural one, was always much deeper and stronger in New Orleans than the national press depicted, and an anchor, or potential anchor, for other neighborhoods. Bourbon Street and its environs have created a culturally shallow stereotype of New Orleans debauchery. Image and reality in New Orleans are badly skewed by the constant presentation in the media and tourism materials of youthful wild drinking as the epicenter, the sine qua non, of the city. But this city was the second place in North America to host European opera. The ballet, symphony, and theater, traditionally strong, revived right after the storm, thanks to Tulane University and churches offering the use of their facilities.

It was once reported that I seldom attended New Orleans events and that

Blakely Disaster Readings

I was aloof from goings-on in the city. In fact, I spent many weekends pursuing cultural activities. True, I seldom went to Bourbon Street. But I did attend every major classical artistic performance time permitted. I made the rebuilding of the Mahalia Jackson Performance Center a personal priority. Cynthia Sylvain-Lear, deputy city administrator, led that effort, and I urged our project management contractor MWH to help make it a reality. I found good companionship among local Jackson Theater aficionados, too.

I used City Park Museum to host official events. It's an incredible asset to the entire region. There, I met many people who were volunteering or on the museum staff, and I've kept in touch with several of them.

The social space for artists in New Orleans is much larger and more eclectic than that in many parts of the nation. That said, rivalries among arts groups such as competing jazz organizations, made donations and other support difficult for them collectively.

Cities and neighborhoods need arts and culture, but for me the basic need was the restoration of the health and education systems. No project took more of my energy than Methodist Hospital in New Orleans East. This over-200-bed hospital served its neighborhood and much of the eastern part of the central city. Methodist, a private for-profit health care center, was so badly damaged by the hurricane that the owners decided not to reopen it.

Prior to the storm, the hospital complex had been thriving. But the owners, Universal Health Care of Philadelphia, had to deal with the prospect of reopening in a region with a shrinking overall population and in an environment where all local hospitals were facing difficult financial challenges.

But the hospital was a key economic anchor in the heart of the community. It was adjacent to a subregional shopping center, and the two commercial facilities were synergistic, since the hospital brought doctors and healthcare staff who shopped at the center, and this, in turn, brought local residents as shoppers. So loss of the hospital was more than a healthcare issue: There was a real danger of dragging down the entire New Orleans East neighborhood economy if the hospital wasn't rebuilt.

New Orleans East community groups were outraged by the hospital owners' action, and demanded that the city and the mayor do something about it. I sided with the community, and visited Universal Health Care headquarters to offer a number of alternate proposals. Placing the city at risk in owning and operating a hospital was untenable. The next best option was to find an operator with the money to buy the place and bring it up to the latest health-care standards. My attempts to do that gobbled up an inordinate amount of

Blakely Disaster Readings

personal time and energy. I couldn't easily delegate the task, because the negotiation had to be done privately to prevent even more pressure on the city, which in turn inflated the sales price. The more people yelled, the higher the asking price for the damaged buildings.

The mayor argued that the buildings were an eyesore and that we could and should simply condemn them. But to do so would risk litigation that might take years to resolve. Despite considerable public displeasure about my actions in the affair, I came to a purchase agreement. We reached it under great time pressure, because the mayor wanted to get the matter settled before he left office and I left town. As it was, the deal was none too good: it left us with no operator and inadequate funds to make the whole thing work.

Council member Cynthia Willard-Lewis who later became a state senator in 2010, representing New Orleans East, led the charge to get Methodist reopened. At first, the private operator seemed to take a reasonable view of the city's offer to purchase the site. The dilemma for me was that even though the area needed a hospital, the bed counts at local hospitals were actually falling—and operating costs rising—in post-Katrina New Orleans.

Several hospital providers were on the brink of bankruptcy. They didn't want another competing full hospital that would drain off healthy and insured people from their patient pool in the New Orleans East neighborhood. The mayor insisted on a thorough and detailed study to justify the purchase of Methodist. That looked like a runaround to the people in the East. They knew they needed a hospital, and they'd had one before Katrina.

We needed a strong case to get disaster funds to purchase the hospital, and to find an operator and financing. I worked on these issues night and day, negotiating behind closed doors to make a deal with the hospital ownership.

In the process, I became a target for abuse from people attending council meetings. The more those people screamed, the weaker our bargaining position became.

After long, hard negotiations, with Nagin and myself playing “good cop/bad cop,” we secured the rights to purchase Methodist at a price our budget could handle. I was relieved and very pleased: the hospital is the key to New Orleans East commercially. It was a tough slog, but we got it done. Subsequently, the incoming mayor got a better deal and hopefully the project will move but even at this writing it is not complete.

Creating stronger neighborhood schools was also a critical element of our plan. A new Louisiana superintendent of education, Paul Pastorek, reached out to me early on. Paul is a small, athletic man with broad shoulders and

Blakely Disaster Readings

lots of nervous energy. In the interests of developing a partnership between his agency and the city, we discussed sharing buildings, launching cooperative programs, and creating various funding schemes that would jump-start revitalization of the schools. Paul bought into our target area approach and decided that we should work together to design and build schools as backbones for helping neighborhoods recover. He needed to know which of them rated priority status and how they could be transformed.

As superintendent, Paul was saddled with too many school buildings in the wrong places, a product of racial segregation. Moreover, in New Orleans, he had to cope with a school district composed principally of semi-independent charter institutions with almost no operating capital.

We hit it off from the beginning. To effect a jump-start he wanted to install a new superintendent for the New Orleans area. After a national search, he selected one of my favorite schools people, Paul Vallas. I knew of Vallas's work from contacts in Chicago and Philadelphia.

Paul P. joined Paul V., creating a partnership for school reform aimed at matching curricula with the city's economic development priorities and development plan. We quickly decided on projects that would develop new curricula related to employment needs and opportunities in such fields as biotech, maritime, business/management, international management, creative arts, and community services. Our efforts led to the designation of disaster funds for some of those special high school initiatives as well as collaboration on the reuse of old, abandoned school buildings.

At the other end of the scale, we recommended that the Mahalia Jackson preschool program, in central city, receive disaster funds. Phyllis Landrieu, former chair of the New Orleans school district, led an effort to reestablish the program as a preschool, and it became the first project approved by the state.

Neighborhood recovery and housing are usually the province of a city's redevelopment agency. But in the case of NORA, a state-chartered entity with its own recovery plan, we had to negotiate the direction to take. After many conversations, we found common ground by awarding NORA \$40 million for new projects and operations. We asked NORA to act like a city redevelopment agency within our target areas. The resulting contract commenced a novel process of restoring housing zones *around* the target areas. Small developers were invited to rebuild houses in selected neighborhoods like Pontchartrain Park, a historic African American suburb.

When we created ORDA, I discovered that we were knocking down twice as many houses as were being built. I therefore raised the bar on what could

Blakely Disaster Readings

be torn down, and I got the mayor's support to stop razing houses in the target areas.

We set up a program to ensure more surgical house removals. Classic, traditional housing was preserved if it wasn't falling over. We worked with the Preservation Resource Center of New Orleans to purchase and rehabilitate as many homes of that type as possible. At first, it was difficult to obtain federal funds for housing preservation. My staff therefore reprogrammed the city's budget for low-income and moderate housing so it could support preservation initiatives. In addition, I asked the feds for a waiver to allow their funds to be used for that purpose.

We didn't get as far in that direction as I would have liked, but we did get a lot of preservation done. When I left my position, the Preservation Resource Center of New Orleans presented me with two books in recognition of the work I'd done: *New Orleans' Favorite Shotguns* and *New Orleans: Life in an Epic City*. "Preserving the past in New Orleans homes," I said at the book presentation, "is creating the city's distinctive future."

Blakely Disaster Readings

12. THE RACE CARDS OF RECOVERY

NEW ORLEANS IS ONE OF THE SADDEST RACE STORIES IN THE nation. The cumulative and historic race issues are enormous, and little has been done to change them.

New Orleans may be a glamorous place on its face. But beneath the glitter a devastating poverty festers that Katrina made all too public. The poverty rate in Louisiana is the nation's second worst. In New Orleans itself, 38 percent of all black kids live below the poverty line, and among fourth graders, only 44 and 26 percent read and do math at their grade performance, according to Phyllis Landrieu. As one former New Orleans public school principal and community leader said to me, "You don't need no readin' 'n' 'rithmetic to make a bed." The school dropout rate is higher than 50 percent, and the adult illiteracy rate is 33 percent.

African Americans make up more than a third of the families in the state, and nearly half the people in the poor category live in New Orleans. Of the 245 largest cities in the nation (populations over 100,000), it was the sixth poorest at the time of Katrina and eighth in 2009. More than one-fifth of the city's residents affected by the hurricane lived in poverty. Black incomes are less than half those of whites: the New Orleans Gini coefficient, the measure of income inequality between blacks and whites, is among the highest in the nation. New Orleans is ranked as one of the most violent cities on the planet, with the vast majority of the violence occurring in black communities. The chances of a black male going to prison in New Orleans are 20 times higher than going to college or university. And in Louisiana as a whole, most of the 37,000 men and women behind bars are black, and most are under forty years of age.

Blakely Disaster Readings

I walked regularly in my first neighborhood in Central City. One morning just after I arrived, I was strolling on the wide median strip where the trolleys ran. Post-storm, the area looked like a dust bowl. On this morning, I happened to come up behind two older white males who were walking their dogs and talking in very audible tones. They didn't acknowledge my presence. I listened as they discussed the additional guns and other armaments they planned to stock for the next hurricane.

"We weren't prepared this time," said one, loudly to ensure that I heard. "We shoot niggers on sight." They laughed.

I felt uncomfortable, so I moved off the trolley path to the sidewalk. As I did so, the other man said, also in a loud stage whisper, "Shit, man, you oughta see all the guns, grenades, and stuff we got in Mississippi. People there are prepared."

I stopped listening.

Later in the day, I said to the mayor, "Race relations are rough here."

He smiled and said, "You'll see."

The week I arrived in New Orleans, Tulane president Dr. Scott Cowen told the *Times-Picayune* in response to my appointment that if I couldn't solve the race problem, I couldn't succeed with a city recovery. When reporters asked me about Cowen's statement, I responded simply that I didn't yet know how central race relations would be to the recovery. I asked what other institutions were doing about the problem; after all, the race problems didn't come in with Katrina's waters.

No doubt I was viewed and hired as a potentially nonthreatening agent amid the racial strife. It might have been hoped that I could transcend racial lines or be accepted, as an outsider, as a neutral party. But as it turned out, both sides seemed to use my actions against me and sometimes even against their own aspirations. I found it hard to fathom why collaboration at some level didn't emerge and why, to the people I met and the press, the recovery seemed less important than the personalities involved.

In New Orleans, with its history of creoles and other mixed bloods, the racial-political dynamics are nuanced. The lighter you are and the straighter your hair, the higher you stand on the social and economic pecking orders.

The poorest residents have historically been the least likely to own an automobile, and the most likely to live in the wards most devastated by the hurricane and floods. The victims shown in dramatic photos were nearly all black—simply because many of the city's black residents didn't own cars, and so couldn't escape. Even worse, those who did own autos were stranded be-

Blakely Disaster Readings

cause they didn't have the money to buy gasoline when the storm hit—two days before welfare checks were due in the mail. By contrast, only 15 percent of whites lacked autos; even whites on welfare had networks of more affluent friends and relatives who were able to assist them in dealing with fuel and related emergencies so they could escape the coming disaster. One reporter said that when she interviewed middle-class refugees from the Gulf Coast, they criticized the government and the news media for giving too much attention and money to poor African Americans in New Orleans.

Race, income, and ownership play a large role in who gets what in New Orleans. Many blacks were renters and not owners. And they rented from the notoriously incompetent city housing authority. Even before the hurricane, the agency was trying to displace blacks from housing that it considered too near the city's favored quarters and to sell those properties to private developers for higher-income condos. That's one reason that the "green dot" plan for a privately led recovery was seen plausibly as a "racist plot."

New Orleans was and still is divided across "subracial" lines embodied in the spoils of the city's political structure. Middle-class blacks escaped from the poorest neighborhoods first by establishing Pontchartrain Park and then New Orleans East. That partly explains why the city encompasses so many internal political jurisdictions: each racial caste holds its perch in the political system by maintaining control of a local jurisdiction.

In the aftermath of Katrina, race even affected the degree to which whites outside the South were willing to come to the aid of their fellow Americans. A controlled study carried out by the *Washington Post* concluded that "people were willing to give assistance to a White victim, on average, for about 12 months. But for an African American victim, the average duration was a month shorter, while the amount of aid was nearly the same, meaning that blacks would collect about \$1,000 less than white victims." The *Post* later concluded that "Color is the key in New Orleans. This is even more so the case now that local blacks have seen firsthand how their fates are handled by the plantation aristocracy of New Orleans." Olshansky and Johnson add that in the case of New Orleans, "the biggest historic wrong was racial discrimination, not something that could be easily righted by rebuilding the city."

The data cited are a condemnation of a system. Tellingly, the only march against crime I witnessed in New Orleans came in the aftermath of a white woman's slaying. While I lived there, violent crime involving "black on black" drew condemnations but no public outrage. These data are bad enough; worse is that the victims are routinely blamed.

Blakely Disaster Readings

The 1927 New Orleans flood epitomized, tragically, this still-pervasive “plantation” attitude. Blacks were used as human sandbags and basically reenslaved by whites as the waters rose on the Mississippi. As the river subsided, black leadership reasserted itself in New Orleans. After the flood, Le-Roy Percy, the patrician flood commander, appeared at a large black church gathering in New Orleans, where he accused blacks of not being grateful to the white leadership after he had, as John Barry puts it in *Rising Tide*, “more than acquiesced when the Mississippi National Guard held black refugees in camps, forcing them to work on levees in conditions close to slavery,” and destroying their homes to try to save the city from the floods.

The notion that blacks are responsible for their poverty and mistreatment is endemic among most whites in New Orleans. For example, the state felt it had to take over the financially starved and corrupt New Orleans parish school district run predominantly by a black-led School Board with black administrators.

Similarly, the Housing Authority of New Orleans, the largest public housing agency in the nation, became unmanageable when its properties became de facto warehouses for large numbers of poorly educated, underskilled, and/or low-income blacks. The response was to tear down the housing, not to grapple with these underlying social problems—or the drug use, crime, and poverty accompanying them.

One can detect what could be called social distance, and not just income disparity. Blacks and whites share the same place in New Orleans, but they don’t share the same destinies. Nor do groups within the African American community. Middle-class blacks live in almost exclusively middle-class black areas. Except for a few of the avant garde, the races don’t socialize together. One of the planning commissioners I became friendly with referred to the occasional exception as “crossing the line.”

Mardi Gras is still a segregated celebration. That is glaringly evident in the backbone of the event, the krewes. They sponsor Mardi Gras floats and function as social clubs in the off-season. And with few exceptions, they’re deeply segregated. After I spoke before a “young leaders” group, a male member came up to me to tell me he had quit a krewe. A newcomer to New Orleans, he had worked hard to get into the sponsoring club. Finally, he received an invitation from a new friend to come to a krewe event, with entry into the club a distinct possibility, the kreweman assured. At his first meeting, the racial jokes began to flow thick and fast. The man couldn’t and wouldn’t participate in the joking, so he felt isolated. A few meetings later, he noticed a decidedly cool atmosphere toward him. He quit.

Blakely Disaster Readings

Blacks didn't have permission to march in Mardi Gras blackface parades until the 1970s. That means a good many of the festival's leaders who upheld such segregation are still there today. The civil rights, liberal adaptation is to allow blacks to march with their own floats and, at the conclusion of the parade, to rally at a segregated venue.

In my grandstand visit to the 2009 Mardi Gras, I witnessed the King of Rex (the white king) tethered to his wagon and unable to properly toast the black mayor. That kind of snub is not unusual. Mardi Gras ends with a public ceremony in which the black and white kings of the carnival meet on a barge in the Mississippi, coming from opposite sides of the river. The connotations are easy to see. Blacks, you keep your place, and we whites will keep ours.

I noted to the mayor on more than one occasion that the local newspaper of record had no black reporters working the city beat. This is astounding in a city that is 63 percent black and has several university programs in various media studies that attract large numbers of black students.

I also asked the mayor to explain how in 2007 there could be New Orleans social clubs (for example, the Boston Club) that he couldn't join because he's African American. The Boston Club played a key role in the way the white establishment dealt with the 1927 floods, when the even the white mayor of the city who was not in the elite club was left out of the decision making. Moreover, ideas expressed by the *Times-Picayune* originated largely with Boston Club members. The paper is still owned by a family that consorts with the club's white-only members privately, while saying little about this form of segregation publicly.

Informal social relations were segregated as well. One evening, a fire alarm rang at my house. My housemate set it off by putting the wrong code into my entry system for the front door. By the time the emergency responders left, it was late. I stood bewildered in my front yard. One of my white neighbors came out on her porch and asked if I needed help. I said no, but added, "I don't know a lot of people here." She responded that she assumed some of the black people in town would take care of me. As it turned out, my most adjacent African American neighbor did start looking after me.

My experience with race relations in New Orleans was no aberration. Elijah Anderson, a leading black social anthropologist, tells a story of a black and a white living across a back fence from each other. The white man enjoyed fishing. When he brought home more fish than he could use, he would call his black back-fence neighbor and offer him the surplus. But never in twenty years did the white man ask the black one to come through the gate

Blakely Disaster Readings

in the fence. Anderson goes on to say, “you have to do what you have to do to deal with white people every day, but they are not to be trusted.”

Sadly, some of my own staff expressed those views openly. In an off-the-record interview, I confessed my disenchantment with them to a *New York Times* reporter, who promptly reported it. The *Times-Picayune* expressed outrage in print.

I wondered what alternate universe the *Times-Picayune* lives in. All the post-Katrina ethnographies laid out this continuing saga of black versus white, in and out of city government. As Anderson observed in Birch and Wachter’s book on Katrina, common wisdom among Southern blacks holds that if it had been white people stranded and seeking refuge, the government would have come to their aid. Nagin bluntly said in a California speech to a civil rights group: “Black people...are treated as if they do not belong to the body politic and are dispensable in a disaster. Anderson and others document how the two races coexist with each other, without trust on either side.”

A few weeks after my experience with emergency services, on my Saturday walk with my friend Steve Bingler, we stopped at our usual corner coffee shop. I glanced at the morning headlines. One of the front-page stories concerned the city’s changing racial mix. I bought a newspaper and took it to a table while Steve got the coffee. As I began reading the article, I became aware that a couple of white males nearby were discussing the same story—in relation to the larger white electorate. One pointed at the paper, poking the pages as he talked, “We got rid of Thomas,” he said, referring to Oliver Thomas, former city council president and heir apparent to Mayor Nagin. “We can get the rest of ’em, too. ‘Nig’ Nagon [sic] has to go. We can win the council and get a real mayor. There’s blood in the water; we can take this city back.” Steve rejoined me, and we discussed the article for a few minutes.

As I walked the few hundred yards back to my house, another meeting came to mind, months earlier, when Thomas was still city council president. Thomas had burst into the mayor’s office with no appointment, very agitated. I was just concluding a meeting with the mayor. Nagin is a big handsome man, about 6’2” and wide shouldered, with my skin coloring. Thomas was concerned that the mayor was featured as helpless in hostile articles and editorials in the *Times-Picayune*.

I started to leave the room. Thomas said, “Sit, Doc, this is about you too, all of us. Ray, this ain’t about you. They already got Jeff (referring to Representative William Jefferson, under indictment for graft and corruption). They’re moving on some others on the school board. Somebody is talking. We barely

Blakely Disaster Readings

held the job (mayor), we can't just hand it to them. They got unity. They gonna knock us off one at a time. You gotta get your act together for all of us."

At the end of a regular meeting with the mayor, I mentioned the "blood in the water" comment. He said to me, frowning, "You haven't seen anything yet." A few months later, as speculation increased as to who the mayoral candidates might be, I appeared on WBOK radio. On the air, I wouldn't discuss the array of candidates. But off the air, I mentioned the "blood in the water" comment. One of the hosts immediately replied that everyone knew "they" wanted their city back.

The municipal elections of 2010 seemed to give it to them. Mitch Landrieu, who is white, was elected mayor, and whites emerged with a 5-3 majority on the city council. After this outcome the black-owned *New Orleans Tribune* observed, "the causes and sources of black inequality have not been eliminated, nor have the disparities that negatively impact the quality of life of everyday black Orleanians."

As the president of Tulane observed when I was first appointed, I needed to focus on the right problem—race—and not just on reconstructing buildings. Race was far more important than building, because what Barry describes after the floods of 1927 might apply equally to the hurricane of 2005: "Out on the water there was unimaginable silence. As far as the eye could see was an expanse of brackish chocolate water. There was not the bark of a dog, the lowing of a cow, the neighing of a horse. Even the trees turned dingy, their trunks and leaves caked with dried mud. The silence was complete and suffocating" the will and spirit of the people.

Blakely Disaster Readings

13. A MEDIUM OFF MESSAGE

AS I BEGAN PACKING MY OFFICE FOR MY DEPARTURE FROM New Orleans in May 2009, I came across Marshall McLuhan's pioneering book on one of my shelves. His famous statement about the media being the message I found to be partially correct in New Orleans: there, during the recovery, it seemed that the media *made too many* messages.

In my time as recovery czar, I became an object of print news scorn but received generally good treatment from the major television networks in the city. My overall impression is that the mayor and I too often became scapegoats for a city that was devastated *before* Katrina, and that preferred to blame a slow recovery on Nagin, or my office, and to look for a quick fix in lieu of dealing with those underlying problems.

I may have deserved some of the print media criticism, or brought some of the scorn on myself. My job as I saw it involved getting a recovery done. That meant acting as something of a missionary for a total government overhaul. As one radio show host told me, I just didn't play the print media game. And I occasionally said things that were inappropriate.

Yet those were hardly legitimate reasons for the media to focus on me rather than on the recovery activities. When we made our recovery plan, news reports said it lacked sufficient funding. I explained that for a plan to be implemented, the planners had to *get* funds. Subsequent reports made it look as though I didn't know how to do that. When I did, I pointed out that it would take months to do the required architecture and engineering work before projects could begin. I went on to say there would be some cranes on the skyline by September. When asked what I meant, I looked at the questioner incredulously and explained that the phrase was a common metaphor for get-

Blakely Disaster Readings

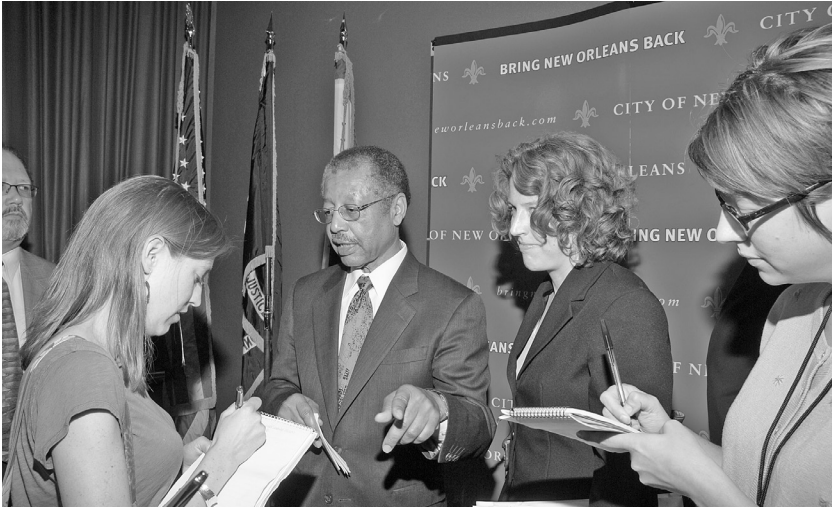
ting projects started, not a literal reference to cranes, pile drivers, or heavy equipment.

The day I made that comment, however, Mayor Nagin took me back to his office and said, “You shouldn’t have said that. If they don’t see a crane on every building in town, they will use it against you.”

He couldn’t have been more right. Well before my self-imposed September “deadline,” cranes—as well as heavy lifts and pile drivers—appeared throughout downtown. With our GO Zone Bonds, we funded commercial structures, most of them hotels and major facilities such as the city’s first Nike store, the first major-chain book store, and the Louisiana Cancer Center, so close to City Hall that you could see the cranes rising. Yet they went unnoted by the print media. Tulane Avenue residential projects, supported with city and state funds, were also sporting cranes. I even distributed maps showing where they were located, and I sent photos of them that appeared on television—but not in print, where the columnists continued with their nonsense.

On my last day, when an AP reporter came to see me, I asked if she had seen the several cranes on the streets she would have had to have traveled to reach my office. She looked stunned. I also pointed out the cranes working on the Superdome. Nonetheless, she led her story with a comment about how few cranes were visible on the skyline!

Making up “gotcha news” became the main media game. A TV investiga-



Me with the Press.
Author's photograph

Blakely Disaster Readings

tive reporter, the only exception to my good treatment from television journalists, spent considerable time and money to find out what I'd done while engaged by the City of Oakland. He found a couple of journalism professors who weren't involved in the recovery, and got them to make comments on air. In addition, a disheveled Oakland city council member couldn't recall what I did, even though the filming for the program appeared to have been done in a building I'd helped to restore. Former mayor Elihu Harris later commented, "What would he know? He was just my driver. You were my leader." The council member who appeared on camera knew that, but chose to ignore it.

Harris strongly endorsed my role. So, apparently, did other key players in the Oakland recovery. I gave the TV reporter all their names, and some said they offered positive comments. But they didn't get return calls after his initial interviews. He managed not to find a single person who had been a participant in the fire or earthquake. I had run for mayor of Oakland in 1998, finishing a weak second to Jerry Brown, ex-governor of California, precisely *on* my record in these disaster recoveries. So the entire city was aware of my role in the fire and earthquakes. Yet to judge from the reporter's interviewing pattern, I was either a stranger or poorly regarded there. Later, Mayor Nagin asked me repeatedly if I had ever experienced a similar media problem. I couldn't recall a single instance.

Some months later, the same TV reporter interviewed me about the city's annual Community Development Block Grant funds. I brought along piles of records on the topic. He showed no interest in any of them.

But just before I gave the interview, one of my staff pulled me aside and said, "Do you know his wife works for the project we discussed earlier? You know, the Crescent/Riverfront proposal that was catching hell from the New Orleans East community because they think the money ought to go to the hospital in their community?" When I looked at him questioningly, he added: "That Riverfront project will never get exposed as a boondoggle for the wealthy river property owners on that television channel, Doc, no matter what they do."

I asked the reporter about this obvious conflict of commitment, if not interest. His reply: "My wife and I keep these things strictly separate."

After the interview, I relayed the TV reporter's comment to the staffer. I added, "This is the same guy who couldn't find the people in Oakland, like the vice mayor and others who had positive things to say about my work there. So I am sure he can't find his wife to talk her about the Riverfront, either."

City-owned public television became my tool for conveying images and

Blakely Disaster Readings

other evidence of the recovery to ordinary people. I'd had a TV show associated with my campaign for mayor in Oakland, and I knew that the city public channel provided an underused communications resource. Websites are fine for reaching people you know or who are looking for you. Television provides an in-home communication that's random. Americans watch over 150 hours of television a month, and in New Orleans after the storm, residents spent much of that time glued to city public television to get updates on the recovery.

Few New Orleans people subscribe to daily newspapers or buy single copies of them, and even fewer, so far, regularly use blogs. Blogs are group reinforcing, in any case: writers talk to other writers like themselves. And most people in New Orleans who have computers don't use them to get the news.

On the city's channel one of my staff organized a series of shows that illustrated and documented the progress of the recovery. The series, called New Orleans on the Move, hit the mark. The aim was to show local residents how the city was working in this post-crisis situation and what we were doing in the recovery. Some of the segment titles:

1. Safety & Permits—how to get a residential permit, post-storm.
2. Affordable Housing—what new affordable housing is being built, and loan programs available for returning and new home buyers.
3. Library System—improvements to provide libraries with food and stationery so they could serve as community resource centers.
4. Riverfront Development—a program to build new commercial, residential, and park space along the Mississippi.
5. Regional Planning/Medical Center Complex—details about the pending new hospital complexes and their economic benefits to the city.
6. NORD (New Orleans Recreation Department)—a new program, and centers being built in the wake of the storm.
7. Economic Development—pending commercial projects the city will be stimulating.
8. Code Enforcement—dealing with blight and vacant properties.
9. Mahalia Jackson Performance Center—the rebirth of a performance-space icon.

Topics of our public service announcements included illegal dumping, abandoned swimming pools, the importance of moving FEMA trailers be-

Blakely Disaster Readings

fore hurricane season, requests to residents to remove harmful items from their properties or make sure these items were properly secured from children or vermin.

I found people to be far less cynical about me and the recovery than the press reports indicated. Moreover, our message was not misinterpreted by its intended audience. The message was working.

That was a valuable lesson about the media for me, and for other disaster recovery managers in the future: if you want to get your message out, use your own media outlets. These public service announcements and programs—as well as my website, blogs, and columns—are now my media presentations. Through them, I had some control over what I wanted to say, and could use it to build my own message and image.

Blakely Disaster Readings

14. LEVEES AND FEMA: THE REAL HAZARDS FOR NEW ORLEANS

IN ONE OF MY VERY FIRST FIELD NOTES IN NEW ORLEANS IN January 2007, I wrote, can the city fool Mother Nature? That question is still relevant, ominous, and unanswered. In some ways, it is a foundational question for the ongoing recovery. The levees render the city a cup with a sinking bottom. The city faces the mighty Mississippi on one side and a big lake on the other. Its unique geo-hazards must be confronted.

Every two weeks, usually on Friday, the New Orleans District of the Corps of Engineers brought a small army of military and civilian experts to discuss how they could make the city safer. Mayor Nagin controlled the flow of discussion. Although he grew a bit irritated with the Corps' voluminous Powerpoint slides, he asked good, often-unnerving questions about the speed and directions of potential hurricanes and their impacts.

The mayor's instincts were good. Not wanting to take chances, he ordered the evacuation of the city in September 2008 as Hurricane Gustav approached. His concern was not the Corps' levee plan but the potential for Gustav to sweep across the Mississippi from the east and destroy many of the city's inadequately protected areas. Protection was poor, at best, for Katrina, and now the Corps would be relying on an updated version of that program. Patching the levees is much like putting a new weld on broken steel structural supports. The welded area doesn't break, but the adjacent areas fail when new forces or stress is put on the adjacent fused components.

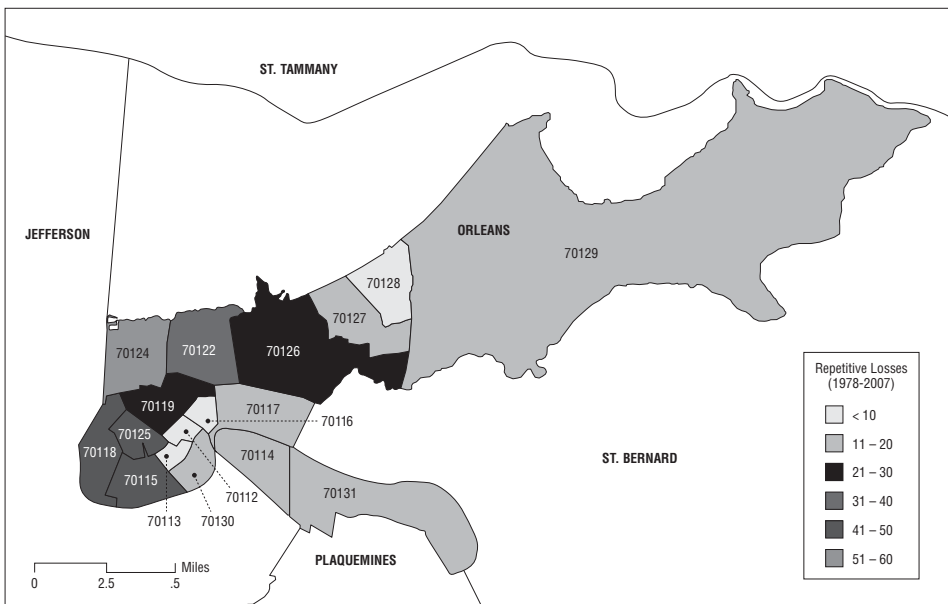
The mayor said, "We can't fight tomorrow's battles with the techniques that lost the last one." He is right.

Blakely Disaster Readings

The mitigation of future disasters depends on luck and science. If New Orleans is lucky, there won't be more Category 5 hurricanes, and seas will rise slowly and modestly. Realistically, however, the latest sea level models don't paint a rosy picture. The earth's oceans are warming fast. The oil spills of 2010 won't help matters, with habitat loss harming the landscape and increasing the potential damage from sea surges. And as sea surface temperatures rise, so do storm intensity and the resulting storm-surge force.

As the number of hurricanes increases, there is new evidence of sea and wind forces of magnitudes larger than those of Katrina. Where those storms will hit is of course unknown. We do know that Katrina breached the levees as only a Category 1 when it hit New Orleans. Professor Ivor van Heerden of Louisiana State University, the most knowledgeable of all Katrina hydrologists, shows clearly in his 2006 book *The Storm* that the levees fell with the storm at Category 1, well before the gales reached Category 5 status. According to van Heerden, the plan the Corps is embarking on will cost \$30 billion, and will be a political solution that offers no new protection for New Orleans.

The Mississippi is rising higher with each flood. Data we put together from the national flood service at the University of Louisville indicate unacceptable future risk for much of the city. These data forecast severe and repetitive



Repetitive and severe flood areas.

Blakely Disaster Readings

flooding from the Mississippi, rain, and tidal surges, so the known risks are complex. The city's geography restricts the practical options available under the levee strategy. If seas rise to only *half* the new projected levels, losses will be catastrophic in an extreme sea, lake, and wind event.

The most reasonable option is to live with more water. Let it run under and through the city. As van Heerden demands, "we must immediately move forward on two fronts: a major barrier and large-scale wetlands creation. No more Band Aids."

Van Heerden's idea is similar to the Dutch approach. They aren't protecting Amsterdam, which lies outside the flood areas. They're protecting farm and industrial areas. Moreover, Dutch investments in anti-flood technology are the only way to secure an entire nation of over 16 million with a GDP of \$654.9 billion (in contrast to Louisiana's shrinking population of four million and the New Orleans metro area's population of just over 1.3 million). The Corps objectives are to improve levee protection to a 1 in 100 event level. That's what the agency has promised will be in place by 2011. It's better than what New Orleans had before Katrina, but much less than what is ideal for long-term planning. And it makes New Orleans more rigid and less able to absorb water as the seas rise with climate change. The Dutch, in contrast, are protecting against events of 1 in 10,000.

As Barry describes, the installation of levees has been a battleground since the 1850s, when they were first proposed. At that time, two great engineers waged a public war on how to control the great river. Andrew Atkinson Humphreys of the Corps of Engineers championed levees along the river, and, on the other side of the epic fight, James Buchanan Eads judged the levees to be useless and proposed that the solution was to sink piers below the surface to deepen the river but let it flow.

I think Eads had what is still the right idea. We should employ a flows strategy that allows more water to run through the city, by reusing the old canals and water paths that the original New Orleans was built around.

We should also explore the option of moving all or part of the Port of New Orleans to the Atchafalaya River Basin—or north toward Baton Rouge. The Native Americans encamped at Baton Rouge viewed the banks of the Mississippi there as a better and safer location than farther downstream near present-day New Orleans.

The notion of moving the city from the bend in the river goes back to another noted pre-Civil War engineer, Charles Ellet, who argued in 1851 that levees increased the danger of flooding. After studying all the means of tam-

Blakely Disaster Readings

ing the Mississippi, Ellet wrote, “I have pretty near come to the conclusion that instead of controlling these floods to maintain New Orleans, it would be a service to sweep away New Orleans with all its boarding houses, grog shops and music to boot.” Ellet was not being petulant but realistic. He reasoned that the force of the river was greater than any manmade corset that could be put on it.

Change that drastic will require a program that gradually moves businesses and other property either north or east to areas less likely to flood regularly—and that also moves the Port of New Orleans to another location entirely on the Atchafalaya River. Such relocation will be cheaper in the long run. But it must be accompanied by a compensation scheme that recognizes current land values for all the movers, so that if they move voluntarily, they will get the same amount or even more, better-situated land, in the new area. Although the cost-benefit analysis is a tricky matter, the concept deserves consideration. If we fail to provide that, we’re merely waiting out the inevitable next disaster.

My knowledge of these dangers was outweighed by the countervailing force set in motion by the political apparatus. I incorporated into the Target Area Plan the notion of a land swap. But to implement a swap would have required enormous collaboration among state bureaucracies, as well as cooperation from the Corps of Engineers. With help from the Corps, one of my staff developed a plan to move people to high ground and provide buyouts similar to those the agency had used in Kentucky and the Missouri Valley.

But one arm of the Corps was not in sync with the other. The builders of dikes didn’t want any portion of the levee money diverted to such a scheme. Nonetheless, my staff, together with the University of New Orleans, developed very plausible albeit unrealized plans for moving homes away from danger.

My best possibility for the movement of people out of harm’s way as recovery czar was my ill-fated blight-bond plan, which I hoped would provide enough money to induce people to swap blighted properties on high ground for those on low-lying land. The closest we came to that was the use of the second-mortgage scheme, tilted so that loans went first to properties in the higher-elevation target areas. Even though this was an indirect approach, the data showed that people were taking advantage of it.

The Road Home program that provided compensation or buyouts of Katrina flood-damaged homes put up the funding for these transactions. “Lowland” owners could buy property on higher ground, using a \$60,000 “soft”

Blakely Disaster Readings

mortgage that ORDA provided and that didn't have to be repaid if it was held for more than three years. This scheme worked. The data developed by Greg Rigamer, head of one of the city's best demographic and economic firms, showed a substantial movement of housing stock and businesses into the target areas, which, to be fair, are only marginally safer places in which to locate.

I've been criticized for not rebuilding the Ninth Ward, the most heavily damaged part of the city. My reasoning was simple: if you rebuild the Ninth, you're only asking for trouble, because it will wash away again in the next big storm.

We have a responsibility to future generations to build on solid ground, away from harm. The pending New Orleans City Master Plan and City Zoning Ordinance adopted in August 2010 has elements in it that can help set the direction by allowing water to move through the city as it once did, reducing the areas of severe flooding. Canals should be reopened to let the water flow through designated river outlets. Anyone visiting New Orleans is struck by the poor road conditions. Some streets have literally sunk below the curb lines, leaving large sinkholes all over the city. Offshore oil extraction is causing compaction of the Delta soil, a phenomenon whose negative impact is aggravated by the local practice of residences and businesses constantly pumping water out of their basements or from under storage areas of buildings.

The New Orleans storm defenses were designed in the 1960s to withstand one storm per century, landing 75 miles from the city. The defenses failed to meet even those modest expectations. Category 5 protections come at a cost of \$30 billion, with no guarantee that they will work. The likelihood of a C5 hurricane is increasing, at the same time that the vulnerability of the land itself is increasing because of the levees' brittle, stationary state. In the event of a real C5 storm that hits the city directly, as Virginia Burkett points out, such a storm in New Orleans "would place [a street intersection in the center of the city] at least 9 meters below storm-surge level." James Hansen, director of the NASA Goddard Institute of Space Studies, describes the increasing dangers of sea rise for New Orleans: "A meter of sea level rise would be enough to turn New Orleans into the new Big Easy Reef."

The bottom line, according to Judith Curry, chair of the School of Earth and Atmospheric Sciences at Georgia Tech, should be daunting to all residents and lovers of New Orleans: "A hundred years from now, there's no way there's going to be a city here This is just the way geology and climate work."

Robert Giegengack and Greg Foster closed their presentation on the futility of the current approach by quoting the Rev. Jesse Jackson's motto, "You

Blakely Disaster Readings

can fight city hall [as New Orleanians like to do] if you choose, but you might lose. You can fight gravity if you choose, but you're sure to lose.

Work done by local architects is similar to the work of Anuradha Mathur and Dilip da Cunha, experts who reviewed the Katrina disaster, who point out, in Birch and Wachter, *Rebuilding Urban Places*, "This may be a useful moment to seed an appreciation of a world of flow... [for the Mississippi River]... by seeding new infrastructure that...respond to a fluid, perhaps living terrain rather than assume the strength and security of enclosures."

There are signs that New Orleans and other cities recognize the dangers and the need to alleviate them. To restore the old Mississippi flows, New Orleans is building the Lafitte Greenway, which reconnects nine neighborhoods with a grassy spine that will allow water to move freely. Segments of Grand Forks, North Dakota, and several other cities along the banks of the Mississippi—including, in Louisiana, from Isle de Jean Charles to Houma—were moved to provide for greater safety for the larger communities downstream or upstream. As argued above, consideration must be given to moving some parts of New Orleans as well.

What about FEMA?

I testified before Congress on several occasions, saying that we can and should fix that agency to equip it to deal effectively with catastrophes like Katrina. In my view, FEMA should be part of the Department of Homeland Security. But the rebuilding of devastated communities, rural or urban, requires more than the current rules and roles provided for FEMA under the Stafford Disaster Relief and Emergency Assistance Act.

As officials in New Orleans and now other cities are learning, it takes a range of agencies to restore the commercial life—as well as the health, security, and vitality—of a severely damaged city: for example, Health and Human Services, together with Justice, for community health and physical and social security; Housing and Urban Development for housing; the Environmental Protection Agency for water and sewers; and the Small Business Administration and Commerce for businesses small or large. The Stafford Act and FEMA are inherently too limited to play all those roles effectively.

President Obama demonstrated that he recognizes those limitations when he required that all his Cabinet offices develop better strategies to aid communities in the aftermath of a disaster. I therefore used my congressional testimony to suggest steps that might stimulate a productive discussion on the entire subject. The steps:

Blakely Disaster Readings

1. *Create a new national disaster-recovery organization to coordinate federal agency activity.* Although FEMA has improved its post-disaster capacities, its major mission emergency evacuation and response, the government needs a new coordinating entity that has the capacity to work with all federal agencies to establish and maintain a reliable federal response—a one-stop shop. No community, no matter how large, is in a position to figure out how to access the bewildering array of federal programs. The single, coordinating office should be located in the White House, and should have senior liaison personnel in all Cabinet-level departments and other major agencies.
2. *Establish a new federal disaster-recovery office in each region of the country* that would work under the new national coordinating agency, with the purpose of marshaling regional-level recovery resources, such as academic staff, major consulting organizations, and regional transportation. Those and other entities can offer expertise to cities as they begin the process of planning, organizing, and staffing to rebuild. This is important because few communities can afford such expertise beyond first responders and emergency teams. The regional teams would assist policymakers in assessing the damages and the options for repairing it.
3. *Establish a new National Recovery Fund.* Attempts to jury-rig community block grants for disasters have never been satisfactory. A single disaster fund, appropriated by Congress and administered by the coordinating agency or the Treasury Department, would be a far better approach. Since disaster relief is an off-budget item, that would require fiscal analysis to determine the size and use of the fund.
4. *Require states and localities to set aside their own disaster funding.* Many states have started and stopped so-called rainy day funds. It's time to rethink the need for a mandated percentage—2 or 3 percent—of each state and local governmental agency's funds to be placed in a "disaster account." That can be incentivized in several ways, including the provision of increased post-disaster assistance to communities that have already taken the precaution of establishing funds for their own protection.
5. *Build for the future, don't recreate the past.* Current FEMA formulas are based on rebuilding existing structures, which is seldom wise. A new approach would be to fund a recovery plan that takes into account not only a calculation of damage but also a broader assess-

Blakely Disaster Readings

ment of community needs for the future. The federal government would monitor such rebuilding to assure that it is consistent with the plan, but would not require the current building-by-building approach to determine funding. Once a plan and budget were in place, recovery would start without the present approach of getting money only after you've incurred the debts.

As the Stafford Act has been debated, we need a fresh view of where we are headed and a realistic understanding that the best preparation for dealing with future disasters involves twin initiatives: to plan *for them*; and then to rebuild to *avoid others*.

PART IV

Assessing the Recovery

Blakely Disaster Readings

Blakely Disaster Readings

15. CHANCE TO ASSESS THE RECOVERY

IN LATE NOVEMBER 2008, AS MY APPOINTMENT AND THE second term were coming to an end, Mayor Nagin and I met over lunch to take the next steps and begin changing the city's message from "recovery" to "normalcy." Continuous stories of struggle at some point wear out. There was talk in Congress of Katrina fatigue.

I discussed options with the mayor. We agreed that the recovery phase for the city needed to move on. At a budget hearing for 2009, the mayor and I put in place a new organizational approach that featured an office of community development. For me, that felt like coming full circle: community development is the idea to which I'd devoted my career.

After almost two years as executive director of ORDA, I was exhausted. My professional challenges and my tenure as recovery czar needed to be framed so that I could tell my story. I wanted to let my colleagues and others know what I'd done, and to take stock of the recovery myself. In addition, I felt the need to escape the pressure cooker of post-Katrina New Orleans politics, and to bounce my ideas off an intelligent, dispassionate audience.

The opportunity came in early 2009, when I was invited to Harvard to talk about New Orleans' recovery. I couldn't go until May, just prior to my departure from my post. I would be addressing students and faculty at the university's well known Kennedy School of Government. During my first year in New Orleans, I had visited Harvard to present the recovery from the inside and to correct some of the misinformation and perceptions about it that were floating around the country. At that time, my work was just beginning, and I was hoping for good press and help with my work from Harvard colleagues

Blakely Disaster Readings

Now, I was looking back at the experience, curious to hear what others had to say—and ask—about it.

Duce and I had left for the airport late, and were soon racing down the same streets that I'd first come to know two years earlier. But this time they were alive. The trolley was rolling down the St. Charles Avenue median strip, with its green grass on each side. People were smiling and talking animatedly, as New Orleans folk do, with their hands moving as fast as their lips. The sky was not gray, as on my first day in January 2007, but a beautiful blue.

Duce was a master of reckless yet purposeful driving. He whipped around the dense commuter traffic—notably denser than when I had arrived in 2007—rode the shoulder of the road reserved for disabled cars, and honked at anything in the way. When we almost ran up the rear of a sheriff's vehicle from another parish, the deputy cleared a path for us, his sirens blaring, too. I worried about leaving New Orleans in a casket.

This time, however, speed didn't kill; it paid off. Bolting into the airport with five minutes to spare before my gate closed, I hit the security checkpoint at a full sprint. A TSA man on duty spotted me and waved me past the crowd.

"C'mon, Doc," he called. "We know who you are. Go get us some more money." I smiled, electing not to admit that I was going in search of intellectual approval rather than funding.

I took out my ballpoint pen, opened my notebook, and collected my jangled thoughts, based on the challenges I'd listed that first evening in New Orleans. It now seemed so long ago.

I outlined my entire experience as czar of the city's ungainly, halting, and confused reconstruction job—the high points, the many low points, the challenges, the lessons, the good, the bad, the ugly. If the Harvard community wanted to know what this czar business was like in New Orleans, how frustrating and in the end difficult it turned out to be, I would tell them, straight out....

My Harvard appearance covered two days. The morning after the harrowing departure from New Orleans, I left my hotel and made the short walk to the Littauer Building, where most of the Kennedy School classrooms and offices are located. This is my favorite academic building in the world. When I was at the University of Southern California as dean of urban planning in 1995-2000, I used the Littauer Building as my model for a new academic structure to house USC's urban planning and public policy programs. At Littauer, students sit on steps and in little bullpens on the landings, talking and studying together. I like that. I felt as comfortable there as in an old shoe.

Blakely Disaster Readings

On the third floor, I was met by several members of the group that would join me in putting together the Harvard JFK case study. Introductions were perfunctory; I knew a few of these people, so we didn't dwell on formalities. There were three men and two women: a middle-aged fellow called D, athletic looking but overall more like an accountant than a professor, the leader of the school's crisis-management program; Arn, a fellow in his fifties; a guy on the phone named Doug, who seemed polite and turned out to say little; a female academic from my home area of Berkeley; and another woman professor, J. In all, the assembled group appeared to be comfortable in the Harvard surroundings.

Sitting down at the head of a light-colored oak table, I grinned and said, "This isn't the State Department exam room." D, the leader of the team, didn't get the joke. So I added, "The room arrangement, the table, and the looks on your faces bring back some old memories." D, a grad-school study in polo shirt and Dockers, relaxed and smiled. "Tell the New Orleans story the way you feel comfortable telling it," he said.

"Okay," I replied. "But interrupt me when I'm not being clear or you want more elaboration. I don't want to give you a blow-by-blow treatment."

The professor who'd been on the phone said, "I have a question about Mayor Nagin. He was originally elected with a large majority, so he had considerable support from the community, right?"

The mayor enjoyed a strong support in his first term, I am told, from a broad cross section of blacks and progressive whites. This was not true for his reelection. His base was almost entirely whites who didn't like his white opponent and blacks voting for the black against a white candidate. It was a different and fickle constituency. So this issue of political distrust and hostility toward the mayor forms an important part of the background of my experience story.

I looked around. D was poised to write notes. Arn was stroking his chin. The Berkeley professor looked a bit bewildered.

D: How did you get started doing this job? For instance, who did you hire to help you?

In the first wave, I hired a staff of five through the city budget, and a total of 17. I brought aboard Jessie Smallwood, an old colleague from my antipoverty days in California. She was close to people at the Ford Foundation. She worked with me to develop our grant proposal to help fund recovery planning and staffing. I had good connections at Ford, too. In the first funding, Bill Gates's foundation joined Ford to provide an expanded staff for two years.

Arn: Gates?

Blakely Disaster Readings

Yes, the foundation's officials said they wanted to do something. So I hired a bunch of people at first with no budget at all until the foundation funds arrived. We needed, for example, a deputy director for day-to-day recovery operations. We also required help—a resource position for raising more foundation and government money. We needed a person to coordinate our neighborhood projects; a person with environmental credentials for all the environmental issues associated with the recovery; and a staff person was hired to examine local, state, and national policies that we might be able to use to get more recovery funds for New Orleans.

I organized my own staff with the youngest qualified people I could find on the city's payroll; in case there were any city layoffs, I didn't want the young people to suffer.

Berkeley professor: So you had more staff than you planned for originally.

Yes, and we could not have developed the recovery plan without more, because I needed an intimate knowledge of the city's communities—along with the commitment and energy these people brought. They went into every neighborhood in the area we chose to focus the recovery on and conducted house-by-house assessments.

Berkeley professor: What did you do next?

We took the next two months to create our recovery plan. We dubbed it the Target Area Plan, because we needed to see the city through these small “target areas” of two to four square blocks as windows on the recovery.

Let me turn to what was for me the big issue: the economy. New Orleans is a great tourism-based economy. But tourism makes a notoriously insecure base, because it is affected by weather—especially disasters like Katrina—as well as sickness like swine flu and changes in oil prices or travel fads. And tourism is notorious for not generating a lot of good-paying jobs.

So we forged a strategy to rebuild the economy, not just the structures. That dovetails with one of your earlier questions about New Orleans politics. When we came up with this strategy, the mayor was supportive. Although the city council members nodded their heads in agreement, they didn't seem to understand what we wanted to do. However, they knew we needed a different economic direction, so they felt they should say okay to help get the recovery underway.

D: Did everybody go along with this approach?

Well, no. Cynthia Willard-Lewis, the most outspoken of the council members, said that the bulk of the money should go to the heavily devastated areas. I responded that most of the money would go to distressed areas, but pointed out that we had to put money into projects that would make a big difference in the economy so the city would have a future.

Blakely Disaster Readings

Federal funds can go to public infrastructure like street and city buildings. But in the Ninth Ward and New Orleans East, the biggest issues were individual houses, not public works. In addition, with the city's housing starting to deteriorate, the Ninth Ward and some places in the East didn't have a lot of people coming back to live in them. So, we were facing a Catch 22: if we repaired homes and people didn't return, we would be creating a new problem of unused and potentially vandalized housing.

Professor J: How did the state and the feds respond?

Four months after I took over, we received preliminary approval from the Louisiana Recovery Authority for the \$417 million; that's when I said that by September there would be cranes in the sky—meaning recovery projects underway. Projects did start in September, but we had not counted on several things.

One was that the state viewed the \$417 million from the federal government in community block funds as state, not New Orleans funds. In my earlier experiences with community development, block grants went directly to the city, once its budget had been approved. But in this case the state preempted our grants by reviewing every project, thus increasing the time spent in processing and slowing down everything.

D: This review, was it hostile or reasonably friendly?

In Governor Blanco's administration, parts of the state bureaucracy, like the audit department, were hostile. The administration seemed to assume that New Orleans was going to steal the money and that the city's officials were only there to take the money, not to get anything worthwhile done. They knew that our city council president was under indictment.

Professor J: Weren't several members of the school board also under indictment at the time? So you're saying that the idea of local public officials having the opportunity to decide how the money was spent in New Orleans sounded either foolish or just outrageous.

I nodded yes.

D: The city bureaucracy, were they helpful?

They couldn't be helpful. The City of New Orleans bureaucracy was still designed to deal with one case at a time. There was a massive refusal to accommodate what I call batch process. So when you approached them with eight or ten buildings to do, they said, "No, we don't do it that way." They took a de novo approach to every contract involving any agency we were going to give money to—even though the contracts looked exactly alike except that the name was changed. In short, getting the money and getting going was not easy.

Blakely Disaster Readings

Arn: Given the politics, the learning curve, all the distrust, and the historic record of corruption, you must have been worried about investing your own reputation.

Yes, but after the first full year I had crafted a totally new organization within the public bureaucracy called the Office of Recovery Development Administration, or ORDA as we called it. When I arrived, the intention was that my role would be to develop plans for the recovery and guide the line agencies in their implementation. I had no line authority, even though my office was called the Office of Recovery Management. Management in this respect meant managing plans and not staff or budgets of the line agencies like Capital Projects for buildings, Public Works for streets, Park and Recreation for parks and civic services.

As it turned out, the chief development officer and head of the line agency in charge of mayor's office of economic development and housing, Donna Addison, resigned under pressure from the mayor. Initially, I wanted to find a sympathetic replacement who would carry out the building of a new VA hospital and other large-scale development projects. But after a few weeks I was convinced that I needed a line agency to have equal footing with other bureaucrats in City Hall. No one respected an advisory role like the one I had in Oakland.

So, I took on the job of planning the recovery, advising the agencies, and running the economic development portfolio, which included key links such as city planning and permits as well as overall economic development and housing programs. With this organization, I suddenly had the opportunity to implement the Target Area housing initiatives, community planning projects like neighborhood services programs, and almost \$60 million in HUD Community Block Grant funds that had not been spent because of the three years of not having projects while the city recovered. I therefore had the seed money to start neighborhood and housing recovery projects, and the leverage with this money and planning and permits to make NORA, the redevelopment agency, come to me for housing funds and community development dollars.

I also had complete control of the economic development program to guide the VA-LSU project I just described.

Arn: Were there some nervous nights when you'd lie awake?

Well, FEMA kept me awake. The top brass at FEMA were always polite and generous. But then, as you went down the line, people got out the pencil sharpeners

But ORDA gave me no major problems. All in all, ORDA was a successful operation. We moved from 17 people to over 200 with the budget that could

Blakely Disaster Readings

shape the recovery and staff who were able to implement many of the Target Area projects using the portfolios they already had.

Some of the mayor's key staff were hostile to this larger bureaucracy, because they saw in it the power I could exercise on my own. But the mayor himself was very supportive. By the time I signaled my departure, we were able to reshape the city administration into an ongoing operation based on the priorities set through ORDA. Our ORDA team was among the most respected in City Hall.

At that point, I checked the time and told the group, "I'm afraid that's it. I need to get ready to give my talk to students and the public."

I walked down a short hallway to a small, horseshoe-shaped auditorium. It was a pleasant place. The back of the room faced the street, so you could look out onto the courtyard.

There was one person in the room, my thirty-four-year-old daughter Pieta, a Harvard student. She came to me. She was sitting in the front row reading a magazine. When I said, "Well, you see I can draw a crowd," she started giggling. But people drifted in, and after about ten minutes the room was nearly full: young men wearing loafers and scraggy beards and frizzled long hair; a multiracial and multinational-looking group of women, wearing thong sandals and serious looks. A large man with a laptop and a big tape recorder was setting up, so he could record my every word. "That," I whispered to my daughter, "is the *Times-Picayune* 'truth squad.'"

At the end of my talk, I held up my hands. "It's time for me to go," I said. "Thanks for having me." The audience applauded warmly.

Pieta came up to the platform. She had a pleasant surprise for me, light years from what I'd been talking about. "Dad," she said, "great talk! Evan and I are getting married. Naturally, we want you to be at the wedding! I hope you can get some rest now." She grinned. "We need you."

Blakely Disaster Readings

16. IN THE “BIG EASY,” NOTHING COMES EASY, NOT EVEN LEAVING

I LEFT NEW ORLEANS AT THE END OF MAY 2009, WITH A GREAT send-off party given by Mayor Nagin and attended by about 150 guests. I received many accolades: for example, the proverbial “key to the city” and the designation of my date of departure as Edward J. Blakely Day. The city council were unanimously generous in their praise of my service.

At an event organized by my staff, I read from one of the many letters I’d received from returned residents, thanking me and urging me to “stay and finish the job.” I did the media rounds and radio talk shows.

Everyone in the electronic media, and even many in print, seemed grateful that I had stayed as long as I did.

I left New Orleans when I could and should have left. The template for recovery was in place. I had recruited a successor along with a total new city organization approach to postrecovery managing. I put in motion the development of a city master plan that incorporated all the recovery goals and locations as well as the VA Hospital land purchases for a multibillion-dollar investment with thousands of new good paying jobs. I signed off on hundreds of projects that when approved would put cranes on the skyline for the next two or three years with more than half of all the streets in the city repaved, many with streetscaping, combined with a host of environmental programs designed to prevent or mitigate storm and flood damages across the city.

I had one last duty to perform, unofficially, as recovery czar: I was to accompany Mayor Nagin to China for a two-day visit. He would be going from there to Australia, where he’d been invited by my new academic unit—the

Blakely Disaster Readings

United States Studies Centre at the University of Sydney—to make a presentation on Katrina. The date for the visit was set before I decided to leave the city, but it was propitious for me. Nagin could see me in action on my home turf—in a sense, take me back home. I considered that a good omen.

A week after I returned home to Sydney, I boarded a plane for Shanghai. No longer an employee of the city, I was going to China at my own expense and as the mayor's colleague. One of our senior economic development specialists, Ernest Gethers, traveled with us.

I had made contacts earlier in the year, in Dubai, with officials of a Chinese sovereign wealth fund (a government entity to buy assets overseas). They described their particular fund as composed of all the U.S. dollars and foreign currency reserves they held and wanted to invest in real estate and real assets, not in more U.S. bonds and debt.

The officials were therefore interested in New Orleans; partly, too, to help me out, since I had worked with them for many years on development in China. They expressed strong interest in helping the Methodist Hospital cover the gap between government funding and the total cost of rebuilding the facility.

I wanted to see that project through. The mayor had negotiated a good deal to secure the site; I felt responsible to find the money to make sure the plan became a reality.

In Shanghai, familiar territory, I took the bullet train into the city. The mayor's staff had arranged rooms for the group at a central hotel. I took a room there, too, to be close to his team. I arrived a half day before they did, and set up dinner with an Oakland Chinese American colleague who had strong Shanghai contacts. My Chinese American friends knew the group with the money better than I did, and in a business transaction in that country, it is always best to have at your side someone you know who has a Chinese background.

The Chinese Americans had come to New Orleans three or four times. They knew the city's needs, and they wanted to secure some kind of agreement involving China. They felt that if they could generate Chinese interest in New Orleans, money would be no object. After all, Chinese firms were reaching out across the world to make deals with all their newfound U.S. dollars.

My Chinese American friends and I had a quiet meal with several key Shanghai businessmen and -women. I knew the professor from the local Chinese Planning Institute. He acted as intermediary for the Chinese sovereign funds in any mainland Chinese investment outside the country. He runs a

Blakely Disaster Readings

university-based consulting firm that works with Chinese interested in using their country's sovereign funds for international construction. Such firms, part of all Chinese deals, are designed to ensure a transfer of technology, not just cash, when foreign firms do business in China or outside the country.

When I asked how serious the Shanghai development group was regarding this New Orleans opportunity, I received strong assurances from the professor that a deal could be brokered involving the Chinese investment firm co-venturing with a New Orleans-based construction comhave possess the resources to make the deal work.

Sticking points remained. The Chinese firm needed a New Orleans partner, and an operator would have to be found. Even with a partner and an operator, local laws would require that the venture be put out for competitive bidding. The Chinese didn't understand that at all, and we couldn't get the point across to them. Their government had the power simply to award the contract, so why didn't ours? Furthermore, nobody in China had a certificate to work in the United States, and that, too, would be necessary.

The professor explained that the Chinese sovereign fund would like to build the hospital since they had considerable construction expertise. He showed me a list, with photos, of office buildings and apartment complexes the Chinese had built all over Asia and Africa. He said, "As you know, no one can build as fast as we can." The professor took me over to a big bay window in the restaurant, pointed to a massive 50- to 70-story structure, and said, "That building was not here when you came here in 2005." He talked more about the high quality of Chinese construction. Finally, after tea late in the evening, we adjourned.

I got up early the next day to rendezvous for breakfast with the mayor, his wife, a security person, and the New Orleans development team. We caught a bus to Wuxi, a mid-sized city a little over an hour from Shanghai on the Yangtze River. Our schedule included visiting a factory that made home building products. The firm expressed interest in opening a factory in New Orleans to capture a portion of the building-services market there. The products in question are simple to manufacture: the equipment isn't complicated to operate, and the potential for hiring local staff made it ideal for New Orleans. En route, the mayor and I discussed alternative locations for the factory. We had not discussed the project in detail, as we usually did on economic development issues, before we were both in China, because our did not mesh. We looked at the employment and overall economic potentials. It seemed like a good deal.

Blakely Disaster Readings

At the factory, we received the usual ultra-polite reception. English-language speakers were scant, but a Powerpoint presentation offered background on the firm along with all the requirements for inputs. We all left impressed.

As a visiting mayor, Nagin called on the local government leadership. Then we left for Shanghai. He needed to be there to address participants in a potential “investor-residency program.” It awards visas that can lead to permanent residency to foreign nationals who invest more than a half-million job-producing dollars in the United States. The team that runs the program in China for the New Orleans region set up meetings at which the mayor could give presentations to participants.

Back at my hotel, I was making some notes when the phone rang, with a call bearing a big and unwelcome surprise. On the line was the mayor’s international relations person, Lisa Ponce de Leon. Lisa asked me to come to the mayor’s suite as soon as possible. When I replied, “Okay, but what’s up?” she said only, “Please come now.”

I arrived at the mayor’s suite to find him in casual clothes pacing around the room. A Chinese official was present, along with several senior hotel staff. Lisa informed me that Mayor and Mrs. Nagin had been seated near a pair of H1N1 flu carriers on the plane from the United States. Initially, I felt no alarm. I had heard about quarantines for school kids and a few people from Mexico. I said, “The mayor is here on official business and should not be subject to this procedure. Surely a simple physical check will be sufficient for a public official.”

Then I learned additional details: two passengers, a French couple, had tested positive for H1N1 when they got off the plane, and the incident had drawn the attention of senior Chinese health officials. A group of health officials were waiting downstairs in a conference room. Lisa kept addressing me as “Dr. Blakely.” Picking up on her implication, I asked a few questions that a physician might ask, and went downstairs to meet the public health team.

I needed to get my Chinese American colleagues to the hotel as soon as possible. They could assist me with translations as well as make high-level contacts. My head was spinning. At the meeting, I tried to make my greetings in feeble Chinese and establish my position with the health officials. It quickly became clear, however, that this problem exceeded the rank and authority of the health officers in the room.

We had an international diplomatic incident on our hands.

I exchanged a few words with four or five of the Chinese officials. They looked and acted serious. It was already clear that the mayor could not ful-

Blakely Disaster Readings

fill the rest of his scheduled obligations. Lisa started making a new schedule, in case he was quarantined. Sooner or later—probably sooner—this incident might be international news.

Our New Orleans team huddled to consider the options. Could we get the mayor on a return flight to the United States? If we did, the Chinese could wash their hands of the affair. That solution didn't appeal to me. The mayor had a full schedule in Sydney, at "my" institution, including a speech at a major conference. We had arranged a "City Talk," one of Sydney's most prestigious events, in a large auditorium in the center of town. City Talks are big and open to the public, sponsored and hosted by the mayor of Sydney. In this instance, Mayor Clover Moore planned to exchange ideas with her New Orleans counterpart on the subject of sustainable city building.

Nagin's travel team went over every possibility. We worked on getting the U.S. embassy to take charge of the problems or get the Australians to intervene. The mayor, his wife, and the security staffer were isolated from the rest of us on the upper floors of the hotel. I expressed the hope that the Chinese authorities would respect the mayor's stature and simply let him go after additional health checks. That, the authorities replied, would not be possible.

I scrambled back to the conference room, where the Chinese officials were camping out. A more senior official now headed their public health team. She expressed sympathy for the mayor's case. I suggested intense medical exams, perhaps by the U.S. consulate in Shanghai or with its support. Although she seemed to see the value of that approach, she let me know that normal procedures involved at least five days of quarantine. I almost fell off my chair: if that rule were enforced, there would be no Sydney trip.

At that point, with my mobile phone out of juice, I borrowed one from a Chinese official and made calls to my Sydney and Washington contacts. I also called the professor I had dined with the night before. All expressed surprise that matters had taken this course.

Contacts are built up over years of world travel, and they make a difference. My mobile contains only a small portion of my thousands of contacts, which I carry with me in a large folio and use regularly. That list includes a lot of very senior retirees who can still make things happen in their old places of work.

I had started calling contacts when the hotel staff informed me that the mayor would be transferred to a quarantine site. We didn't know and couldn't find out the site's location. It was a state secret. The mayor, his wife, and the security officer were taken out of the building and placed in an ambulance under guard. I felt sick.

Blakely Disaster Readings

My contacts started returning my calls. They told me what I already knew: the mayor and his wife were infected Americans and had to be quarantined. The mood was growing increasingly pessimistic. I met with my Chinese American counterparts, and we set up a plan. I would call my colleagues in the United States and Australia to request that those countries intervene. Lisa would work with the U.S. consulate staff in Shanghai. We knew that the only thing we could do or hope to do was to get the mayor out of China—to the United States or Australia. I had some reservations about the latter, because few countries take disease, germs, or any bugs more seriously than does Australia.

But when I reached staff at the Department of Foreign Affairs in Canberra, they expressed sympathy. I convinced them that the mayor and his wife were healthy and not risks for the transmission of disease in Australia. I offered to add a precautionary step: a physical exam, if we could get the Nagins to a place that would administer one.

As I worked the phones, I faced another issue. Someone needed to represent Mayor Nagin if he couldn't make the meetings posted on the Australian schedule. Australian embassy officials wanted that someone to be me. Given my exposure and name recognition in China, they felt they could "sell" me to their country's immigration people if the latter proved difficult. So we proceeded with that plan.

At that point, getting out of Shanghai became important to me. I wanted to be in Sydney in case the mayor was late arriving. Meanwhile, I had business to attend to where I was. I represented the mayor to the first group of would-be Chinese-New Orleans investor-residents. Although distracted, I completed that task and then got on the phone to get a flight. (It occurred to me that these zealous health officials might ask if I myself had been in close contact with the mayor and his wife, who were now in quarantine.)

I found that I could exchange my ticket for a flight the following day—after meeting with the potential Chinese hospital-development team. That session proved disappointing. The Chinese investor group were very haughty and only wanted to build a hospital on their terms. After our unproductive meeting I went to the airlines ticket center and got a ticket endorsed to leave in a few hours.

On the flight to Sydney, I started making alternative arrangements in case the mayor *didn't* arrive. I kept in touch via Blackberry and telephone about what we were doing as long as I could in the lounge and on the plane. My spirits were dropping, but his remained high. If he could get out of China, he would come to Sydney as planned.

Blakely Disaster Readings

Buoyed by the mayor's enthusiasm, I again worked my contacts in China, the United States, and Australia to try to spring him from quarantine. Suddenly, the situation loosened up. I'm not sure how, but the mayor secured a release date. I called Qantas. The agent there assured me that if he got to the airport he would be able to board the next flight to Sydney. The U.S. Studies Centre team started putting things in place. Interviews were reorganized, and talks slightly altered in time and format.

The morning of Mayor Nagin's arrival, I was back where I started. I was wearing an official badge, courtesy of the Australian Office of Foreign Affairs, as an escort for a mayor and his party. I was traveling back through forty years of memories, recalling the many times I'd worn such a badge as a U.S. Foreign Service officer in the 1970s, walking down back hallways to greet a dignitary. I felt at home.

The visit went well. The mayor presented the rationale for, and challenges of, rebuilding a *better* city, not just restoring it. He described the difficulties of dealing with the U.S. federal administration and how often he had to appeal to Congress to get what he needed. Nagin impressed people throughout the city, and his comments drew strongly positive comments from the national media. He took Sydney like a storm.

The head of the U.S. Studies Centre, my colleague, told me emphatically, "He's a real prince."

I replied, "You just don't know. He's a great man."

After a day of seeing Sydney, including a visit to the world-famous opera house, the mayor joined me at my home and beach club. We met for the final time at his hotel.

We parted as we started—good friends and mutual admirers.

As I strolled from the hotel toward the harbor, I thought, "Here we are Ray Nagin and I, both headed for uncertain futures. He won't be mayor much longer. And what will I do next?"

My Blackberry beeped. My friends wanted to know if I could join them for tennis in the morning. I said yes and put the Blackberry back in its holster. I asked the driver to take me home by way of the spectacular Sydney Harbour Bridge rather than by the alternate route, a tunnel.

My Blackberry beeped again. I asked the driver to take the next right turn. "Nice day for baseball," I mused aloud, not thinking I was in Australia, where baseball is not a big sport. The driver turned to me and asked, in heavily accented English, if I had learned to play baseball in America. "Yes, of course," I replied.

Blakely Disaster Readings

“Sir,” he said, “you are having just slight American accent. You are not from America. Maybe you are from my country, sir.”

“I’m American,” I responded.

“What is your work, sir?”

“Well, I...” My Blackberry beeped. Two text messages had arrived.

The first one said:

You are the winner of the 2009 Chatterjee award from the Collegiate School of Planning for public and community service for your work in New Orleans and previous service to the profession

—Charlie [Charles Connerly]

The second one read simply:

Can you come back to Pudong?

Your friend, the Professor [chairman of the Pudong Development Corporation]

I turned to the driver and said, with a sigh, “I do whatever comes next.”

Blakely Disaster Readings

Blakely Disaster Readings

NOTES

Introduction

I start with Tennessee Williams (1911–1983), who moved to New Orleans in 1939, and saw the community as a fascinating backdrop for plays that depict the death of the old South and the emergence of a troubled people and place. There were litanies of famous and infamous people born and raised in New Orleans from musicians to artists. As the crucible of so much talent the city has sadly not been able to hold or build fortunes on that talent. Huey Long was at constant war with the *Times Picayune*. In November 1933, he warned the daily newspapers in a speech in Marksville, "Take those lying *Times-Picayune*, *Shreveport Times*, and *Alexandria Town Talk*. We are going to sock a tax on those damned rascals"; see Richard White, *Kingfish: The Reign of Huey P. Long* (Random House, 2006). The tragic history and results of the hurricanes that have struck the New Orleans area are documented in "Hurricanes in Louisiana History," <http://www.thecajuns.com/lahurricanes.htm>. The decline of the New Orleans economy has been repeatedly and well documented. The poor structural characters of the levees protecting New Orleans have been explored in numerous books and reports. The most authoritative work here is Anuradha Mathur and Dilip da Cunha, "Negotiating a Fluid Terrain," in Eugenie L. Birch and Susan M. Wachter, eds., *Rebuilding Urban Places After Disaster: Lessons from Hurricane Katrina* (University of Pennsylvania, Press, 2006), 34-45.

Oliver Houck, a Tulane University student, is cited from Joel K. Bourne, Jr., "New Orleans: A Perilous Future," *National Geographic* 212, 2 (August 2007): 43, a very compelling examination of the fragile state of the levee sys-

Blakely Disaster Readings

tem which the *National Geographic* editor says “was a man made disaster that began with the founding of New Orleans in 1718.” One of the best accounts of the drama and trauma of the flood period is contained in Dave Eggers, *Zeitoun* (Vintage, 2010), where the tale of confusion and disarray of public institutions in and outside the city is laid bare.

This book is intended to be a sequel to the great work by Jeffrey Pressman and Aaron Wildavsky, *Implementation: How Great Expectations in Washington Are Dashed in Oakland or Why It's Amazing That Federal Programs Work at All* (University of California Press, 1973 and updated). It tells a familiar story of differing expectations dashing hope and creating confusion.

The book picks up from where Robert Olshansky and Laurie Johnson leave off in *Clear as Mud: Planning for the Rebuilding of New Orleans* (American Planning Association, 2010). Nicole Gelinias pulls together post-Katrina in “Will New Orleans Recover? Weak and Struggling Before Katrina, the Good-Time City Now Teeters on the Brink,” *City Journal*, August 31, 2005.

Chapter 1: An Alarming View from Down Under

Lionel Wilson was the first African American mayor of Oakland, California, and a legend in his own time for his work with the poor and his love and contributions to sports. His life story is best viewed in the University of California oral history *Attorney, Judge, and Oakland Mayor: Oral History Transcript/Lionel Wilson; with an Introduction by Professor Edward J. Blakely; Interviews conducted by Gabrielle Morris in 1985, 1990* (Regional Oral History Office, Bancroft Library, University of California, Berkeley, 1992). Information on the Oakland Earthquake can be found in Jane Gross, “Oakland’s Dowdy Image Is Shattered,” Special to the *New York Times*, November 7, 1989; my role with Elihu Harris is in Gross, “Oakland Struggles to Restore Hill and Faith,” *New York Times*, October 26, 1991.

Chapter 2: Getting to New Orleans

This chapter, like a Russian novel, introduces most of the players in the narrative. Each of them has information on the web that provides context as to what they do and who they are. This note provides the reader with a guide to the parts they played in my narrative.

The American Planning Association (APA) is the peak body for professionals who practice land use and urban design and related government regulated planning and zoning in the United States. I have been a member for four decades and it is my professional home organization. Its primary office, un-

Blakely Disaster Readings

like those of many professional organizations, is in Chicago, not Washington. The location is a bit symbolic of the origins of the profession in the American heartland. APA puts out a scholarly journal and newsletter and I have contributed to both as well as using its resources for much of my daily work. Paul Farmer, executive director, is highly regarded and very hard working. He personally led the efforts to get the APA engaged in New Orleans after Katrina

The Federal Emergency Management Agency (FEMA), as everyone in America knows, is the organization responsible for meeting community needs when a disaster strikes. It was reorganized under President Bush and merged with Homeland Security. While this is a logical fit, in an emergency this structure needlessly complicates decision making and delivery of services to needy communities.

Marvin Olasky, *The Politics of Disaster: Katrina, Big Government and a New Strategy for Future Crises* (W Publishing, 2006) is a useful description of the political paralysis of Katrina. Olasky provides good evidence that the tales of rape and mayhem in the Superdome and the city were greatly exaggerated by the press. One might not agree with Olasky's politics, but his reporting is well done. Jed Horne, *Breach of Faith: Hurricane Katrina and New Orleans* (Random House, 2008) (by the former editor of the *Times Picayune*) is a useful source. There are a myriad other eye-catching works on the storm and its aftermath, including Spike Lee's documentary *When the Levees Broke: A Requiem in Four Acts*.

Chapter 3: A Harbinger of Problems to Come

The history of the New Orleans Redevelopment Authority (NORA) history is on its website. As to its role when I was there, the only source that makes reference to it is Robert B. Olshanky and Laurie Johnson, *Clear as Mud: Planning for the Rebuilding of New Orleans* (APA, 2010). NORA's primary role to process vacant properties. But New Orleans bureaucracy and Louisiana law made this an almost impossible task since each vacant abandoned property had to be purchased at a "fair market" value and funds out in a trust.

The Unified New Orleans Plan (UNOP) and the Lambert planning effort is documented very extensively by Olshansky and Johnson. I used much of their data to develop the final target area plans, and used the population information provided by Greg Rigamer, who reinforced the information provided by the UNOP team. Some flap erupted in Sydney when I mentioned these numbers that showed actual resident population below the official cen-

Blakely Disaster Readings

sus and pointed out that higher numbers are always best in the U.S. to protect revenue sharing. Rigamer and later the local community census organization used mail drops to augment their totals, which remained low until well into 2009. The following NPR report provides a very good picture of what was and what is likely to come:<http://marketplace.publicradio.org/display/web/2010/08/30/pm-building-new-orleans-longterm-future-still-a-struggle/>. One of the best places to look at the population past, present and future is Greg Rigamer, GCR population estimates at www.gcrconsulting.com.

Chapter 4: “Fix It!”

The Battle of New Orleans was fought during the War of 1812 against the British Army to control New Orleans to secure the Louisiana Purchase of 1804. This battle is often regarded as the greatest American land victory of the war. Recovery from Katrina would represent a very similar effort. The scale of the disaster is well documented in numerous works. My own background as a recovery expert can be viewed on the University of California at Riverside website for the Blakely Center for Sustainable Suburban Development and elsewhere. A great deal has been recorded about the Katrina flood tragedy. Among the best work is Jed Horne’s *Breach of Faith*.

Chapter 5: Imagining a Future Out of Mud: A Recovery Plan

The two best works on pre- and immediately post-Katrina politics and planning challenges are Chapters 6–12 in Birch and Wachter, *Rebuilding Urban Places* and Olshanky and Johnson, *Clear as Mud*.

Chapter 6: Inside the Mayor’s “Cocoon”

Leaders and leadership are changing. I tried to use “soft power,” the style advocated by Joseph Nye of the Harvard JFK School of Government in the *The Powers to Lead* (Oxford University Press, 2008). Leadership through persuasion and influence is the path favored by leaders who use soft power to manage. I am a long-standing advocate of soft power, but it is just one way to manage. Success is obtained with smart power by combining hard and soft power skills in varying proportions, depending on the situation. Leadership with soft power transforms group members through the use of attraction, inspiration, persuasion, and charisma. Leaders who are better at using smart power have contextual intelligence. They know when to use soft or hard power to inspire their followers since they are aware of the distribution of power in their organization, its cultural values, and changes in their followers’ needs.

Blakely Disaster Readings

Hard power is more appropriate when there is a need to appeal to tangible interests; whereas, soft power is effective when a leader can appeal to higher order values and noble purposes.

The most important and influential work for this chapter came from Doris Kearn Goodwin, *A Team of Rivals: The Political Genius of Abraham Lincoln* (Simon and Schuster, 2005)

Chapter 7: Putting My Team on the Field: Recovery Administration

Pressman and Wildavsky's *Implementations* is the book I referred to most as I crafted an organization to meet the local needs and to battle with the Washington bureaucracy.

Chapter 8: Politics and Money

HUD's role in first taking over and later deciding to raze public housing in New Orleans has been chronicled in many places. One good article is Lewis Wallace, "First Came Katrina, Then Came HUD: Activists Battle to Save New Orleans Public Housing," *These Times*, January 16, 2008, http://www.inthesetimes.com/article/3504/first_came_katrina_then_came_hud/. The Louisiana Recovery Authority, my role and presentations to it for funds, and the other funding sources I sought are documented in Olshanky and Johnson, *Clear as Mud*. Note should be taken of the description of the relationship between Powell and Volker: "so in effect, Volker—in pressing for a unified, citywide plan—was actually representing Powell," 266. In essence from the White House to New Orleans there was a game plan to use the funds (nonprofit) to allocate them thus bypassing the elected leadership of the city.

I have documented all communications regarding the attempt to move funds to nonprofit including emails, notes, and telephone logs.

Chapter 9: Reviving a Drowning Economy

The New Orleans economy and its opportunities and deficits are the subject of very little scholarly or policy research. What research there is tends to focus on tourism or the decline of the regional economy. This is surprising, given the number of universities in the city with strong regional economics departments. For my work I was forced to use reports from the regional economic organization Greater New Orleans Inc. Data on employment from 1960–2000 are drawn from the U.S. Census.

Susan L. Cutter and Christopher T. Emrich, "Moral Hazard, Social Catastrophe: The Changing Face of Vulnerability Along the Hurricane Coasts,"

Blakely Disaster Readings

ANNALS of the American Academy of Political and Social Science 604 (2006): 102. Isabel V. Sawhill, vice president and director of economic studies at the Brookings Institution, provides a sobering reflection on the state of and potential for the New Orleans economy, http://dir.salon.com/story/news/feature/2005/09/30/rebuild_reaction/index2.html. *Newsweek*, January 21, 2011, ranked New Orleans as one of America's Dying Cities, <http://www.newsweek.com/2011/01/21/americas-dying-cities.html>

The MOU with the VA is included as the Appendix .

Chapter 10: In Search of Civic Leadership

This chapter draws heavily on the work in Lawrence Vale and Thomas J. Campanella, *The Resilient City: How Modern Cities Recover from Disaster* (Oxford University Press, 2005). My colleague Robert Putnam's powerful work on civic engagement that transforms communities, *Bowling Alone: The Collapse and Revival of American Social Capital* (Simon & Schuster, 2000) is particularly applicable to New Orleans, and his *Democracies in Flux: The Evolution of Social Capital* (Oxford University Press, 2002) makes the point for all communities, since every city faces new natural and potential man made catastrophe.

SPUR, the San Francisco Planning and Urban Research Association, is one of many suggested models of civic leadership organizations that bind communities together to seek common goals. SPUR's history and current program can be found on its website www.spur.org/.

Chapter 11: More Than Bricks and Sticks: Reviving Neighborhoods

Information on all the organizations cited in this chapter can be found on the Web. The Brookings New Orleans Index is an excellent resource on the internal rebuilding of the city: New Orleans, Natural Disasters, Cities, Community Development, <http://www.brookings.edu/topics/new-orleans.aspx>. See Thomas J. Campanella, "Urban Resilience and the Recovery of New Orleans," *Journal of the American Planning Association* 72, 2 (Spring 2006): 142. See Olshanky and Johnson, 284 n 62, for discussion of population return. Even as late as February 2011, Michele Krupa of the *Times-Picayune* was using this illogical argument to suggest I had underestimated the city's return of residents when I simply used the arithmetic Olshanky laid out.

Chapter 12: The Race Cards of Recovery

Data on black-white differences are taken from a variety of sources, including U.S. Census, *Nation's Richest and Poorest Cities*, 2009. William Frey and

Blakely Disaster Readings

Dowell Myers, among the nation's leading demographers, place New Orleans among the most social/racially segregated cities in the nation; see Social Data Analysis Network (SSDAN); Center on Budget and Policy Priorities September 19, 2005; Earl Hutchinson, "The Real Reasons New Orleans Is so Poor" for racism and the continuing local and state policies, <http://www.alternet.org/katrina/25277/>. Phyllis Landrieu, former chair of the New Orleans School board, adds the dismal statistics on black youth outcomes.

Rep. Jefferson's troubles with an indictment for corruption and bribery are well documented in many sources, particularly in the *Times Picayune* throughout 2008 and 2009. See Richard Morin, "Study Participants Favor Whites over Blacks for Katrina Relief Aid," *Washington Post*, Saturday, June 10, 2006, A-5; John Berry, *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America* (Simon and Schuster, 1997); William Goldsmith and Edward Blakely, *Separate Societies: Poverty and Inequality in U.S. Cities* (Temple University Press, 2010), 110; Eijah Anderson, "Inadequate Responses, Limited Expectations," in Birch and Wachter, 199; Olshansky and Johnson, 219; Berry, 279.

Chapter 13: A Medium Off Message

"The medium is the message" is a phrase coined by Marshall McLuhan meaning that the form of a medium embeds itself in the message, creating a symbiotic relationship. The phrase was introduced in his most widely known book, *Understanding Media: The Extension of Man* (originally published in 1964 by Mentor, reissued by MIT Press, 1994, with an introduction by Lewis Lapham). McLuhan proposes that a medium itself, not the content it carries, should be the focus of study, that a medium affects the society in which it plays a role not only by the content delivered but also by the characteristics of the medium itself (Wikipedia, 2010)

Chapter 14: Levees and FEMA: The Real Hazards for New Orleans

This chapter draws on two sources: Vale and Campanella, *Resilient Cities*, and the National Academy of Sciences report by Robert W. Kates, C. E. Colten, Shirley B. Laska, and S. P. Leatherman, *Reconstruction of New Orleans After Hurricane Katrina: A Research Perspective*, an Internet resource, doi:10.1073/pnas.0605726103, September 26, 2006, on New Orleans and other disasters (information current as of September 2006), and data I found at the Disaster Prevention Research Institute, Kyoto University, Japan.

This chapter also draws on the work of Ivor van Heerden, *The Storm: What*

Blakely Disaster Readings

Went Wrong and Why During Hurricane Katrina: The Inside Story from One Louisiana Scientist (Viking, 2006). Van Heerden has clung to the fact that the levees were breached because of incompetent construction, and that the Corps program to rectify this failure is equally wrongheaded and doomed to fail. I draw heavily on the epic battle over the use of levees as the preferred technique for corralling the Mississippi from Berry's *Rising Tide* and several scientists' work that appears in Birch and Wachter, *Rebuilding Urban Places*.

To make sure my conclusions made scientific sense I ran them by Doug Meffert, Tulane University Xavier Center for Bioenvironmental Research, who lives and works on the issues discussed, and Tim McDaniels, University of British Columbia School of Community and Regional Planning, who studies risk management for disasters and knows the issues of the Mississippi. In addition my colleagues in Japan at the Disaster Prevention Institute have data and GIS resources as sophisticated as the Corps of Engineers. They endorsed my proposals conceptually but some had a hard time with the politics of implementation, given the entrenched interests that got van Heerden fired from a tenured post at Louisiana State University.

Chapter 15: Assessing the Recovery

Harvard has a long tradition of inviting active professionals to give talks and using these talks as the basis (with other materials) for the Harvard Case Studies. My work was featured in at least one case study and I have been interviewed for others. My talk at Harvard JFK was given on May 9, 2009; the data were featured by the Office of Recovery and Development Administration in 2009.

Chapter 16: In the "Big Easy," Nothing Comes Easy, Not Even Leaving

The majority of the material for this chapter can be found on the United States Centre website at the University of Sydney. My own background with the U.S. Foreign Service included a stint as senior reserve foreign service officer in 1967–70 and short-term assignments in 1978–2003 on diplomatic missions with USAID, State Department, and other international agencies.

The Master of Disaster: Lessons from Katrina to Japan

Edward J Blakely

Blakely Disaster Readings

Book for Practitioners

Book for Practitioners, 2

Introduction, 2

Chapter 1: Dealing with Disasters, 6

Chapter 2: Where are we: dealing with the old problems or preparing for the new ones?, 9

Chapter 3: “To get started you must start” (Paraphrase-Gandhi), 14

Chapter 4: What’s the Problem?, 21

Chapter 5: Communication in the recovery process, 26

Chapter 6 Getting Rebuilding Priorities Right, 32

Chapter 7: Priorities, 33

Chapter 8: The Rebuilding Steps, 40

Chapter 9: Taking Advantage of the Disaster to make fundamental change, 42

Chapter 10: Who can and should build, 50

**Chapter 11: Building Where—A Dilemma Based on an Interview with Paul Barkley ABC
Radio National, 53**

Chapter 12: Principles for Recovery Managers, 60

Chapter 13: Long Road to Recovery, 77

Chapter 14: What can design/engineering and planning professionals give to recovery?, 81

Chapter 15: Defining a University roles Pre and Post Disaster, 84

Chapter 16: Where to-Australia??, 107

Blakely Disaster Readings

Blakely Disaster Readings

INTRODUCTION

This book is a compilation of interviews, speeches, essays, op-ed and articles (published and unpublished) completed between 2009-2011. Composed of various scales and formats it was originally developed for a variety of different purposes. It's perishable in as much as each piece comments on a particular disaster situation and aims at a specific audience. However, the principles included in these pieces have a life of their own that is longer than the time for which they were prepared. I was and am in Australia the work has an Australian tilt. Moreover, many of the disasters I talk about were in or near Australia which created the impetus for me to write or be interviewed.

Yet despite, the geographic loci and foci the principles here are universal and have a life longer than the periods in which the particular pieces of work were done.

Book for Practitioners

As a practitioner of disaster recovery, I know how hard it is to get information in a useful form when you need it. At the height of a disaster, a book is too dense for the policymaker or the disaster coordinators. But during the periods just after the disaster is recognized, and policymakers want to show they are in charge and the "homilies" of people like me are useful. What did a person who did this before do and what went right and wrong and how can I get started are the questions that come to mind. Unfortunately, in too many instances the

Blakely Disaster Readings

disaster recovery—that is the period—after rescue and clean up are done is an orphan. It is not heroic and there is little political mileage in rebuilding post disaster facilities.

Replacing old city buildings lack dash. Heroes save people off roofs and help the wounded. Putting back telephones on the other hand is not heroic; it merely satisfies complaints until it is done and then no one says—great. So, this manuscript attempts to provide the post disaster policymaker and implementers with a set of recipes from my experience. Like any recipes or guides these ingredients need to be modified for the local (diet)/situation to be useful. No one can say exactly what to do in every post disaster scenario. Japan's nuclear issues are far different than a bush fire in the Melbourne hills but both posed dangers to large populations. Similarly the floods in Brisbane looked like those in New Orleans but the underlying structures for the cities are different so some aspects of repair and rebuilding were similar. In all cases, like a good cooking one has to have the right equipment and know how to apply the ingredients to get a good result no matter how the kitchen is arranged.

This work therefore aims to engage the people in the *Very Hot Kitchen* of disaster recovery and what they need to do. It is for the politician who need a quick study guide and their aides who have to prepare a “briefing note” and for the directors of emergency services and the follow on directors of recovery operations---no matter what titles are being used.

Organization

This work is organized into three sections which are the basic themes of post disaster recovery. The first section, *Too Many Places*, is a straightforward argument that these disasters are not just random events but ties to both the changing global natural climate (natural and man induced) along with major adjustments to the earth's crust and atmosphere that leads to long term transformations of the physical environment. Moreover, in the last 600 years we have had a very benign climate and new technologies like air conditioning allow us to move to areas that were formerly off limits to settlement. In the second section *Steps in Recovery* I lean on my experiences as so called “recovery czar” to list the actions need to deliver in post disaster environments. The lessons here are from both my experiences and observations in doing recoveries from various roles over 30 years. There are books like Lawrence Vail and Thomas J. Campanella *Resilient Cities* (MIT Press, 2005) provide longer and more complete digest of many recoveries. Recent work by Robert Olshansky and Laurie Johnson *Clear as Mud* (2010) offers a strong recap on New Orleans recovery.

Blakely Disaster Readings

But this is my take on recent events. Few of the books cited above are written from the view of the person doing the job. This is much condensed version of my experiences. Longer versions are coming out in book form by me and other colleagues.¹ Books are for use when there is time to read and reflect. This is a snapshot. Some people take exception to my views and how I did my work. But I will let the record speak for itself in that regard. Last, in section three *Recovery Management Lessons for Civic Leaders* I try to offer tips and guidance for the leaders of recovery organizations on how to do the job and what Australia should do as we move into a more dangerous world dependent on coals and other natural resources with a single large buyer at a time when the earth is changing beneath us—literally.

Section 1

Tales from Too Many Places

Blakely Disaster Readings

Chapter 1: Dealing with Disasters

I've been involved with five major disasters, first with an earthquake in Oakland in 1989 where I had the responsibility of helping, frame the recovery plan, and rebuild the economy in the downtown, then a fire two years later in 1991 where I had the responsibilities for rebuilding the area and coming up with the policy response to that. I was subsequently involved in Los Angeles in two things, one of the most devastating riots after the Rodney King verdict in 1992 and subsequently the earthquake in San Fernando Valley in 1994. Finally, I was involved in New York in 2001 with the recovery there on the Citizens Commission, and then equally important Katrina in New Orleans as Recovery Director from 2007-2009. Here are several principles that come from those experiences.

I think the most important thing that people need to understand is the emergency is not the recovery, stabilizing the place, rescuing people from the tops of buildings, organizing and cleaning up is not a recovery. It's much like stabilizing the patient. The patient still needs a major operation before they start the recovery process. So it's very important early on that a recovery plan be organized. That recovery plan has at least five features.

The first thing you have to do is understand that this is going to be a long-term venture.

Again using the patient analogy after the operation, you're not recovered until you can manage entirely on your own. You're recovering and so you have to have a prescription for that recovery, and this plan is that prescription for recovery.

The second thing is you have to have the capacity to deal with all the elements of recovery even though your leg was hurt, your head and everything else has to be worked with and coordinated, so you have to a coordinated functioning apparatus. You need an authority or some organization that has the responsibility to coordinate and to actually implement the recovery process. And in Queensland, there was a task force that has been established. They have come up with a very good outline of the things they need to do, but the task force nor the General I believe has the total authority to mount a recovery in the way I see it and the role that I played in Katrina.

Blakely Disaster Readings

Third, you have to have an infrastructure plan that prepares you for the next disaster. You can't wait for the next disaster. You can't simply clean up and fix up and hope for the best. As you are doing your plan, you incorporate with E-Net the next disaster or likely disasters, because that means you have to move land, you may have to move buildings, you may have to come with new standard for building in Queensland, for example, along the river, all the buildings on the river are going to have to be steel molded before they're allowed to be on the river.



Figure 1 Me in New Orleans (Courtesy Rob Olshansky)

The fourth thing you have to do is come up with a land-use plan that allows a river to have its space, allows the ecology to come back, and creates the opportunity for you to live with nature rather than fight nature.

And the fifth thing you have to come up with is an economic development plan. People think bringing businesses back is where you start. It is not where you start. Many of the businesses will not come back. If you're in a business that is business just moves, uses major

Blakely Disaster Readings

technologies, you'll operate as an emergency out of another city, the chances of your coming back are 50:50. Because once your people are relocated in the other city, they are not coming back. Once the business moves out, it's not coming back. So, you have to reposition your economy. The best example of that is what happened in Japan. In Japan, the major earthquakes dislocated ports. And when those ports were dislocated, they did not come back.

In Oakland when the ports were dislocated, the trade did not come back. So, you have to have a plan to reconfigure your economy and deepen it. Immediately, the economy looks great, because you have all this construction work, but the base of that economy could disappear. And that economy could disappear in the case of Queensland, because the Brisbane is a gateway for tourism for a lot of the country. And when people get this news, they may not come. So, you have to reposition that tourism industry may be to an event based industry or something that's related. So I think those are the keys to drafting a recovery plan.

Based on Australian Broadcasting Canberra News Interview January 5, 2011

Blakely Disaster Readings

Chapter 2: Where are we: dealing with the old problems or preparing for the new ones?

The reason I am writing this is in part for my own benefit, that is, to provide professionals and layperson interested in the rising number of disaster and some insights I have I gained over 30 years doing urban disasters. I have experience in dealing with post recovery disasters. I always joke that I have not been able to hold a job, but the truth of the matter is that I was at Berkeley for 26 years where I honed my skills as an urban planner and where I first learned how to handle disasters. I want to go through what occurred in New Orleans and other cities that I have worked in or consulted with to show how I think disaster planning, mitigation and post disaster management. The observations here come from the press, op-eds and interviews for radio and television along with contributions I have in articles about disaster management.

Coping with Disaster

We have had several large-scale natural disasters in heavily populated urban areas on the Pacific Rim between 1989 and 2011. The ones that have attracted the most attention are the earthquakes in San Francisco/Oakland in 1989 and floods in New Orleans 2005 and cyclones in Queensland, the earthquakes in New Zealand and Chile and more recently the tsunami in Japan in 2010-2010. Emergency efforts are now underway on Christchurch, Queensland and Chile while rescue efforts will continue in Sendai, Japan as I write. Since these efforts are fresh it is a good time to summarize the basis of recovery for those who are involved in them and for those who are living through them. There are three phases of disaster recovery:

- **Rescue**--in this phase the emphasis is on saving lives and stabilizing property to prevent more death and destruction. During this phase, the military usually plays a key role along with first responders. We try to make sure that the scene is isolated so that rescuers can find any signs of life or bodies can be removed. In addition, we make the area safe for movement so that vital supplies can come in and basic services can be organized. However, even in this phase, the right processes have to be put in place so that options for the future are not forestalled. For example, which roads are restored in what order can play a key role in subsequent re-construction.

Blakely Disaster Readings

- Emergency--this phase puts people and buildings under care. In this phase, temporary housing is arranged and other forms of shelter along with water and power are restored. It is during this phase the initial plans for recovery must be communicated about to what is going to happen next and how.
- Recovery--is the final and most important phase when the plan for the re-building or re-positioning of the people and places has to be thought through deeply and carefully and the rebuilding commences with real targets with recovery objectives in place.

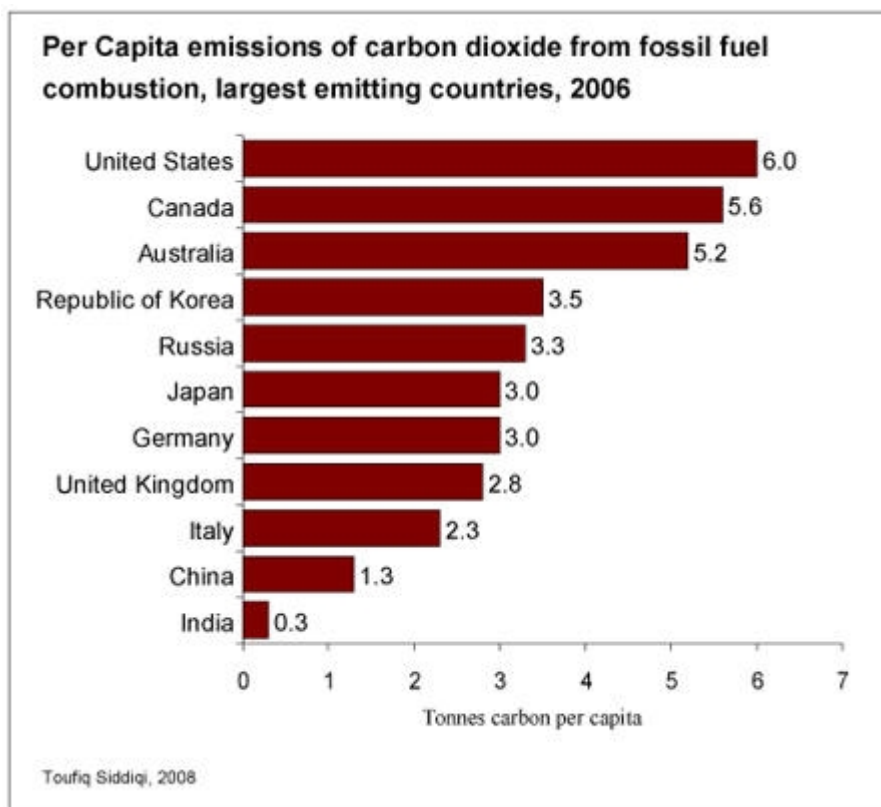
Looking at Two Places for lessons

So, let's just get into that the tale of two places that form the backdrop for this soliloquy. New Awlins (Orleans) for those of you who keep mispronouncing it and Brisbane not Brisbain are my immediate metaphors. We are having a lot of new trouble brewing on out in our great oceans as the sea warms and rises; we can't easily see it but increasingly, the oceans are being polluted and depleted. So this is not the story of just these two places. This is the story of what we have to handle in water's edge urban world. Most of the urban world inhabits coastlines, so much of the urban world like New Orleans and Brisbane are either at sea level or below sea level; in fact, 70% of the world lives in areas that are in danger of sea rise. Queensland has an affected by flooding that is as the area is large is the east coast of the United Statesⁱⁱ. This is only one-state Queensland. Australia has six states but they cover a huge area. And so the people who are affected in Queensland occupied a much larger area than one imagines from a small global map. The US had a five-state disaster with Katrina; I don't want to take away from that. However, the area that was affected in Queensland is much bigger and much more severe in that. Because these areas were somewhat unpopulated the damage of repairing will be much slower.

"As I said to the Age Newspaper of Melbourne, "the pattern of flooding that has always been a part of Queensland life is set to intensify in the future, causing me to warn against an unthinking rush to rebuild. ...flooding will worsen under climate change, " areas subject to multiple flooding will have to be bought out and the people compensated. The worst thing you can do is to just say, 'we are going to rebuild like it was.

Blakely Disaster Readings

If you dig a hole through the Earth, I learned recently from Professor Gary Hack of the University of Pennsylvania, you don't hit China, you hit Australia. And interestingly enough Brisbane is at 28 degrees south and New Orleans is at 39 degrees north. So there may be some connection these places share with opposite seasons but the same steamy weather patterns. Right now this is what they share. Australia has one of the largest CO₂ footprints in the world. Australia sends out more dirty coal than any place on the planet per capita. That is our Aussie economy. We have no other economy unfortunately; our Australian economy is almost entirely sending coal and other natural resources to China. So, Australia is selling energy and the US is buying energy and both are creating enormous pollution for the world that has an impact on the natural systems generating these mega disasters. So, we have an alternative in both nations, we can use atomic energy that is not the alternative most of us are looking for as the best way to curb carbon emissions.



Source: Toufiq Siddiggi, 2008

Blakely Disaster Readings

So, the emissions keep going up and the clouds of CO₂ are getting thicker and more dangerous, and they're changing nature itself. And now these emissions are doing real visible damage causing islands are disappearing in the Pacific. We have new economic immigrants coming to us in Australia because people who are leaving islands because they can be no longer live on them. So, we are destroying both animal habitat and human habitat in the Pacific, by the way, we are living. And this explosion of water, the tsunami of water from earthquakes and from other related phenomena are causing enormous damage on the ocean edge, especially to river and harbor cities. Many of our great cities are on rivers around the world. London which is on a river city as is Paris. And these river cities are in grave danger and that danger is increasing not just because of location but because the way we are building in these cities with more impervious surfaces so even rains cause disastrous floods when the overwhelm storm drains.

I have been working with professionals and laypersons for over a decade suggesting different building approaches with far less environmental impact so we can militate against dangers we face on waterways. As we build our cities in the same manner we have in the recent past, we are building into greater and greater danger because if we put that hard-scape of impervious surfaces that does not allow the ground to retain water and thus when rain runs off from storms. As a result, we generate trouble building harder infrastructures like dams to prevent the catastrophes which leads as we saw in Brisbane to even greater devastation.

Based on Speech at University of Pennsylvania, February, 2011

Blakely Disaster Readings

Chapter 2: "To get started you must start" (Paraphrase-Gandhi)

Where do we start? In New Orleans, this is what we had to start with; 80% of the city covered with water. The levies did fail but the larger failure was the oil drilling that was being done in the gulf that was eroding the marshlands to the extent that probably. What's that kid's nursery rhyme, you know, huff, puff, and I'll blow your house (city) down? Well, every 10 feet of cypress swamp will slow winds down 10 miles an hour. As I understand it, since oil has been extracted from the gulf along with constant dredging of the Mississippi destroyed marshlands as larger than the state of Rhode Island. So, the consequences of our actions in mining, and oil extraction and dredging the Mississippi lead us to the destruction of the environmental safety belts nature has built to protect man and animals. Brisbane's storm was very much like the one experienced in 1974 on the same river system. And what do we learned from that storm in 1974. We didn't build buildings higher as the people who used to live in Brisbane built. We didn't build buildings farther away from the river, no, because there was enormous political pressure. We built houses and buildings in the flood plains. One could say this is not going to happen for 50 years, but 1974 to 2011 is short of 50 years. There is no such thing as the 50-year floodplain. The actual metric is a 1 in 50 chances. You've got a better chance of crossing the subway line and not get hit by a train you can see than escaping that kind of flood. Even 1 in a 100 is like walking across the street with cars coming.

Here are my *myths about disasters*

1. Put it all back together an' she'll be right, mate! -- It is tempting to think that if we just do what we have been doing and leave people to their own devices, everything will work out well. We feel the only thing government can do is get in the way. We want to get back to normal with everything in the same place. In fact, this idea is reinforced by government leaders saying after the disaster:: "We are going to put it all back just like it was and soon."
2. Just fix what's broken -- Putting in another dam and cleaning up will not be enough, no matter how tempting such ideas are. New Orleans had many levee failures pre-Katrina. If the levees don't work in one time, more of them will not serve in another disaster. It is time to look at the fundamentals of what is causing and what will cause

Blakely Disaster Readings

new disasters and make fundamental changes, as the Dutch have done, to deal with the problem or to recognize it can't be dealt with.

3. We can do it alone - we had the disaster, and we don't need anyone from another place telling us how to handle our problems. We have plenty of smart people. It is true local people have a lot of good local knowledge but other experts may have more information and more experience - borrow it.
4. Property rights are first - our nation is built on the fundamental right to own and dispose of property as one sees fit - with a few rules. However, how do we deal with property that exposes everyone to danger? Who pays for rescuers and what is the role of government when the property rights conflict with the safety of the total community? We have to tackle this issue by making sure that everyone is re-settled in ways that benefit the entire community and without financial loss or too great a personal sacrifice.
5. Better warning system is all we need - warnings are good but the new storms are coming faster and hitting harder than our systems can cope with. Since we know the primary cause of the problems, we need to use the first warning by making sure natural systems flow properly and that new building in the hills or on flat land do not disrupt natural systems to the point greater dangers are created.

In essence, the truth is always the best antidote to any myths. So we need to get as much information as we can before we act.

The infrastructure damage to underground utilities like water, power and sewers after every disaster underground is hard to see but the most critical to repair. So when that kind of infrastructure damage occurs that has a marked impact on the economy meaning that you can't get goods in and out. And I mentioned earlier we live on coal, so you can get the coal out but you can't move it to the shipping ports. Now this has a tremendous impact, the loss of roads and destruction. In most of the recent disasters from 2005 Katrina to Sendai, we lost a lot of roads and rail, which mean that essential goods and services such as hospital supplies and fresh food can't come into the affected area. So when you lose that entire infrastructure, what do you turn, lose entire crops, construction damaged, debris, massive debris, ten superdomes worth of debris, where do you put it because wherever you put it,

Blakely Disaster Readings

you've created a new problem? So New Orleans had many new problems trying to regenerate its supply system while debris was removed. In Brisbane, similar issues were faced. As we try to move this debris out of the city, we've got to put it at some place. We put it in the ocean. We've got a problem. We've made landfills. We've got a problem. If we put it back where it came from in a sense, we've created a new problem.

Based on article on *Online Opinion* January 2011

Downtown Christchurch damage



Figure 2 Christchurch Downtown Damage (Author photo)

Blakely Disaster Readings

Old Infrastructure and New People

As we rebuild, we generate new problems that the city or community's current infrastructure was not built to cope with. Moreover, civic facilities have been lost. We lost schools, civic buildings in New Orleans; and in Brisbane such as high schools, hospitals and essential facilities. So initially, I was asked what we should do, I said we should rethink where we put our civic buildings and we should make our civic buildings multipurpose buildings, not just schools but school library, police station, all that put together, and use a lot less land. And we've lost our basic retail services. And not to say the loss of this large department store for customers but loss for those of you who do not frequent but when you have an economy that is almost entirely stripped of small retailers, the loss of these kinds of retailers, and this happened in New Orleans as well, is devastating because we have no place to go. So, the financial impacts are huge; \$13 billion from the recent catastrophe in Brisbane, probably \$2 or \$3 billion more in Cairns and Brisbane are two large-scale tourism destinations for Australia multiplying the national damage. And then the loss of all the wisdom that occurs in situations like this from elders who know how to solve the problems. A clear illustration of how communities tie their hope to the past is Japan where the old structures failed but the drive is to restore what was lost and not to think about what might need to be done. For example, one of the saddest recent events is the inability of Japan a nation that is envied for its preparation, couldn't cope with the events that occurred.

Most Japanese towns, including Ishinomaki, were planned and built based on the idea of combating threats from nature with technology. In this case it was to establish a solid embankment that could withstand a tsunami, but at Ishinomaki the embankment was destroyed because the tsunami was much bigger than people using modern technology had predicted. What do we need to do now? Is a more fortified and higher embankment the solution?

...There is a stone tsunami marker erected on a mountain path about 500 meters away from the shore, on which warnings are inscribed to be passed on to descendants to remember the importance of having houses on a hill. People from the region have kept in their mind the warning on the marker: "The tsunami reached here." "Do not build houses below this point." "Be cautious even after years have passed." Every house in the region is built on sites above the marker, so no damage to people and houses was reported here. (Junko Eda, 2011, *Coexisting with Nature: Reflections after the Devastating 2011 Earthquake in Japan* **JFS Newsletter No.105 (May 2011)**)

Blakely Disaster Readings

The Japanese experience cited here should be clear warning to all of us in Australia. We shouldn't try new fortifications but look for new solutions to obvious threats. We, Aussie, have a lot of seniors moving to Cairns, moving to the Gold Coast of Australia and other coastal havens called sea changers. And these sea changers sold their homes in the big cities, Melbourne and Sydney and moved right into the flood areas. So they've had a tremendous asset loss, and they can't go back to where they came from. There was social damage too. In New Orleans, we suffered some looting and other things. So, the social repair has to happen, and the church isn't the only place it can begin. It has to begin within all the communities. Insurers have responded to this. It is very difficult to get insurance in New Orleans. It will be increasingly difficult to get any kind of insurance in Brisbane. Now insurers wrote very interesting policies in Queensland, and I don't know what the legal ramifications will be, but apparently many insurance policies said, if the flood doesn't do a lot of damage you're covered, but if it does a lot of damage then it's an act of God so you are not covered. So, asks God about that policy apparently he or she is the only one that can interpret it.

The US had \$60 billion worth of damage in 2005 to 2010. This is escalating and recently tornadoes along with a rising Mississippi are adding billions more to the damage total costs. We continue to have the damage we don't seem to learn. So, we've got to understand that this is a warning, and we have to start thinking about how we're going to inhabit the planet given what we know. There is no such thing as building a safe building; we have to build entire safe communities. And I am coming to the conviction that the notion of building safe communities makes a lot of sense. That means decentralizing electricity, power, water, and all these things. In Japanese community, you can maintain a community there for 5 days the communities revisited without any external sources. We need to start thinking in that way here, building stronger communities that are quick to deal with the problems. So, what's left in Haiti or elsewhere was left is home? And there is a lot of hope that we can rethink where we're going home, what does home going to be in the future? As the map below shows the north coast of Australia shares the volcanic fatal shores that form a ring around the Pacific ocean basin. So, land and undersea volcanic disruption can and do wreak havoc thousands of kilometers around the Pacific. These volcanoes combined with and sometimes causing severe weather events are a force we must prepare for and not merely dread. Even if earthquakes and volcanoes were predictable and the forces known, this might save lives but not property and infrastructure damage that threatened community livelihoods.

Pacific Ring of Fire

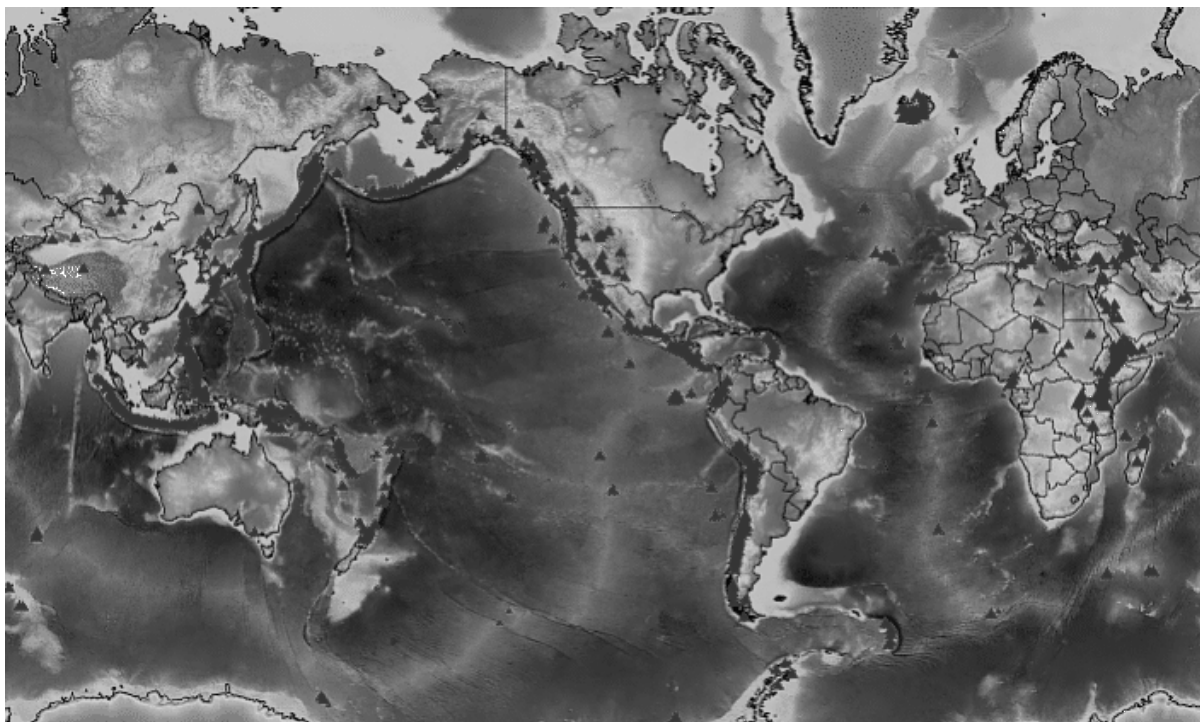


Figure 3 Earthquake and Volcano Ring in the Pacific Ocean (CSIRO, 2008)

We must rebuild, but where?

Our penchant to rebuild rather than re-think is very deep as I have said several times before in this and other work. In both Victoria after the fires and in Brisbane politicians—indeed, *everyone*-- I have been around says the first word from their lips is ‘we will rebuild here, just like it was before’. As I said before this single of hope is the wrong thing to say. What they should be saying is we’re going to rebuild where nature allows us to build, and we’re going to do it together. Because building back to the past, we face even worse threats for the future. Animal life in Australia is sensitive to changing climate. We’ve got a lot of snakes. Well, I think all but one spider in Australia is poisonous and every snake is deadly. So these creatures are reclaiming their territory, some of our creatures aren’t going to make it because they have been displaced of the areas where our kangaroos are living now are not their native habitats. So, kangaroo loss has been pretty severe so the loss of flora or fauna. However, the way we build is being tested is this frame stick build a house that is on the ground probably. If you had a cup of water you’d flood it, is this the way to the future. We’ve got some other people who will challenge that in Australia like all crocodiles. We also have to worry now

Blakely Disaster Readings

particularly in Cairns about disease dengue fever. We're going to have mosquitoes, very big mosquitoes, vicious mosquitoes as we have in New Orleans where an outbreak of disease. And we will have an outbreak of very serious diseases in Australia, and we have to prepare for that.



Figure 4 Meeting the Press (Author photo)

Blakely Disaster Readings

Chapter 4: What's the Problem?

Our desire to rebuild as things were rooted in our psychology that another large-scale disaster like the one 20 or 30 years ago will not happen in my community. It's not going to happen in my lifetime or it (a disaster of the same size) certainly won't happen again.

So, what we have to start thinking about is that weather which is very different from climate, weather is what happens kind of everyday. Climate changes are gradual and alter the way in which the earth operates.

Global Heat Wave

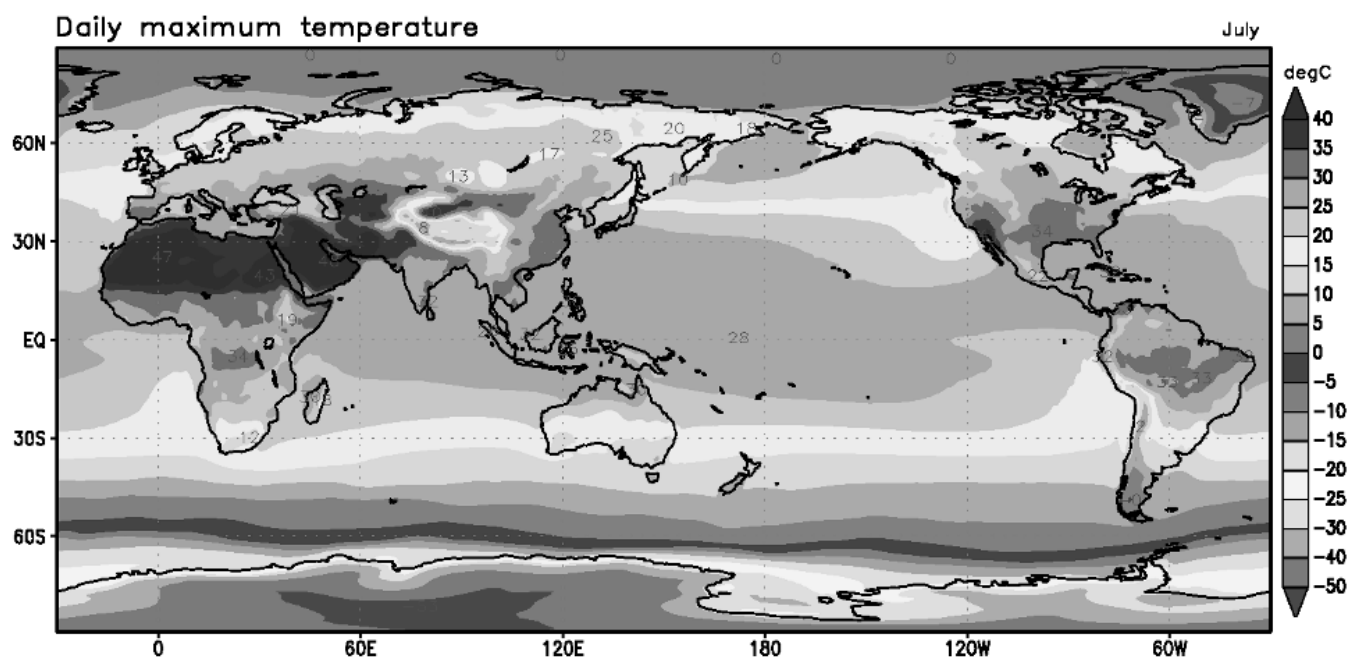


Figure 5 Dark areas heat (CSIRO, 2009)

And, we've got some climate changes as well volcanoes, earthquakes.

Furthermore, all these climate shifts occur over long periods, and they have long-term consequences. From the 16th century until well into 21st centuries, we have had very mild weather conditions, and so we built beach houses and other built form like hotels in areas that you'll notice our forefathers did not. Our ancestors were pretty smart about building because they knew these things could happen and the Native Americans and Aboriginals were

Blakely Disaster Readings

particularly smart about where they built because their Dream Time or Ancient legends were repeated warnings about nature's dangers.

They carried on those traditions, so they wouldn't settle where the white man settled because they knew these are dangerous places. Now, we are moving back in that shadow danger.

Part of our new movement is because we have air conditioners and tools that make it possible to build in almost heroic circumstances to perch that house on the cliff or to live that close to the equator so, we are messing with Mother Nature. Moreover, there are consequences. These consequences have happened in years gone by all the way going back to the earliest seafaring discoverers until today we've had some very big, horrendous events. a list of natural disasters – so-called natural events of the 20th century. However, in the 21st century, we notice new weather patterns and climate changes, things that have had profound impacts on cities. With the Kobe earthquake at the close of the last century was our big disaster testing the new building form and old at the same time. So, all of our disaster technology is based on the last 600 years of mild weather than allowed the explorers to colonize much of the so-called new world and deep Africa.



Figure 6 Debris post tsunami, Sendai, Japan, 2011(Photo by Junko Edahiro)

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The new environment is suggesting our 20th and 21st century technologies may be inadequate to floods that are in places where we should not build and we may not know how to build better withstand the new types of water damages. Yet in Italy, we had a big eruption in 1980s where thousands of people were killed, enormous amount of damage was done. And, people were rebuilding back in the same area. Certainly in Oregon they are rebuilding very close around the Mount St. Helen. So, I don't know what the learning curve is here. It's certainly not like the natives speak. One has to ask some questions – is the answer here?

Certainly the dangers or putting levees on the world's fastest and deepest river the Mississippi at New Orleans is a tragedy waiting to happen. At some point, the big river will flood its entire length as snows melt in Canada and push more water south. Minot, North Dakota floods in mid -2011 are just the early warning of what may be torrents of water flowing toward the Gulf of Mexico. So, disaster in this case is inevitable unless drastic actions are taken to move the communities under threat out of harms way. The native people who inhabited this land understood the menace of the river and lived in portable dwellings teepees to keep away from the river and to follow their food supplies. The Bedouin people in the upper Nile (toward Sudan) had a similar life now disrupted by the Aswan Dam. You cannot force a river to go the direction you want it to go. Native people of the Americas recognize the dangers this interruption of nature can have on them and their habitat moving their villages to stay in tune with natural rhythms. They are fighting back to protect their land and ancient ways and as they do so they are doing a service to all humanity

We have got typhoons as well on the list from 1990 in India. That was a big one and I think people still remember that the huge typhoon with nineteen billion dollars in losses destroying a lot of the subcontinent and then of course at the end of the last century we had another one that destroyed large parts of the subcontinent. But, the difference there is the structures are lighter for the most part and people rebuild in areas that are dangerous but they know they are dangerous. But they don't have a lot of choice. They've no other place to live. Well, the flooding on the Yamuna River in Delhi, people just moved right back into the river bed when the flooding is over. Bangladesh, of course, is the classic of this where it floods almost every year and thousands of people die. And, we have had recent floods in Pakistan in 2009 that came as a surprise as if Pakistan was immune to flooding during the monsoon season it shouldn't have come as a surprise. In 2011 the United States experienced the largest tornadoes on record over a very short period throughout the mid and southwestern states.

Blakely Disaster Readings

These aren't accidents. These strong weather events are part of a wider pattern that is intensifying the usual rains, floods, fires and winds into unusual and unprecedented events.

The British Scientific Journal *Nature* reports,

Climate change may be hitting home. Rises in global average temperature are remote from most people's experience, but two studies conclude that climate warming is already causing extreme weather events that affect the lives of millions. The research directly links rising greenhouse-gas levels with the growing intensity of rain and snow in the Northern Hemisphere, and the increased risk of flooding in the United Kingdom (Nature, *Quirin Schiermeier Nature* **470**, 316, 2011)

Well, what should have come as a surprise, if you put that much concrete and other building stock in the way of rivers and choke them up then there is no surprise when the river over runs and takes that building stock down the course, destroys property, and takes lives.

It's pretty daunting. But, some of the natural disasters have had some benefits. At the end of the disasters besides learning where not to build in the path of a river or in the floodplain, people have had innovations in building techniques.

Hurricane Tracy that hit Darwin is a very good example of that where building techniques and strategies all of over Australia have been affected by stronger and better building codes to deal with high winds. So, there are benefits and I think floods, areas particularly along the Mississippi and Snake Rivers in the United States people moved out of harm's way. So, people learned from those disasters. But, we are slow to learn.

Well, I know after the earthquakes in China there was a lot of criticism of the government and of corruption for allowing shoddy buildings to go up and not checking them to make sure they were safe enough for people to be in and resettle. China is moving over 1 million people out of those earthquake prone areas into safer areas and clearly this is something people don't want to do.

Many people feel it is my home you are disrupting. And now, China has come to different conclusions than some other places in the world. But, the government has decided enough is enough. Three or four earthquakes in the same area in less than 50 years killing millions of people, we just can't let that happen again.

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There is also – going to reinforce buildings with steel rather than just un-reinforced concrete walls that crumble when shaken by an earthquake and buckle in cyclones. Some of the building improvements are moving back up in the list in priorities so there is some opportunity after a disaster to learn from.

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Chapter 5: Communication in the recovery process

I think communication is very important. Communications must be organized and a multi-direction and many layers. While government must provide community up to date, government is not always the best source. In cases like Haiti, the government outlets were not viewed as reliable. In an age of rapid social media government has to partner with social media to provide timely information but also to allow sources other than the local or other government outlets to dominate this information space don't come just from the government, but come from experts. And almost immediately I think it would be very intelligent for the federal government to set up a social media platform that has channels for government and others to share information so moderately screened information can be seen by all the community sides. There are places where rebuilding should be prohibited. And I think I know Brisbane, pretty well. I helped with the earliest versions of the South East Queensland Strategic Plan, so I know the ecology there, I know the environmental information there. I know the economy there and the rest. And there are places where people took big chances. They said these are a 100-year flood area. Well, these are not a 100-year. It's 1 in 100 chances. There is 1 in 100 chances of you being hit by a car walking across the street against the light. Are you going to take that chance? I don't think so. The same thing is true here that we have to come up with a 1 in 10,000 chance. That is the chance that you should operationalize, so there're some areas that should be rebuilt. And the Dutch technique of rebuilding should be used where you build canals and walkways and things that the water comes through the city regularly, so it doesn't build up and when you have large-scale rains like this, you're still free of having a major catastrophe, but this does not account for cyclones and hurricanes. They are going to strike Queensland at some time soon. We've been just missing them, but at some point we will be hit. And we should start insulating against those now by moving some structures what I call strategic retreat away from the most dangerous places.

Well, everyone has seen all those piers and things wash down the river. They are going to have to be steel bolted in, but not just steel bolted in, those piers are going to have to be able to move up and down on hinges, so that when the water rises the pier rises, and it has to be able to swivel and so forth to take it account on the occurrence. That is a rebuilding strategy. But in addition, some buildings are going to have to be elevated. They're going to have to be

Blakely Disaster Readings

put on steel. I would insist on steel building frames even for some housing, not wood. I would insist on some housing being built in a very different way than it's built today where you collect more the water and so forth on your own roof and insist that so many neighborhoods like in Japan would have their own 5-day power systems, so you would not be out of power as Queensland is now with 70,000 or 80,000 homes out of power. In Japan, that couldn't happen, because many neighborhoods will be generating their own power. And I think it comes to moving. We've moved towns here in Australia in the past. In the United States, whole towns have been moved. So there would be some towns in Queensland, they would have to consider moving the town to higher and safer ground.

The first thing starts with Emergency status. Within a year, people will forget this event, and the candles that they put aside, the food supplies that they put aside for the event like this will be eaten. They will not have that bag that they can put their precious belongings in. They won't have the jewelry case and so on. So I think we need to move to a situation like California does where they have an annual day for practice. I think there should be a Queensland practice day, and people should bring out all their preparations. They should move out in their cars and so forth in an oddly fashion. We should practice disaster and disaster movement before it happens. That's a very practical. California is a state of 36 million people. If they can do it, we can do it here. The second thing is I think we should move to neighborhood-based recovery. Putting in the kind of infrastructure in every neighborhood, so it can operate on its own, and you can basically run your program where people don't move out, but they move in. So they move to higher ground in the neighborhood. Rebuild school buildings and so forth, they all have to be built several stories off the ground with steel piers, stored beneath these buildings would be food supplies and other things, but we have to build the school grounds as rescue centers in every neighborhood. We should start now adding maybe 2% to the GST in an infrastructure fund, so that every city, every community, and every piece of major infrastructure in the country is rebuilt that we know now there're going to be these disasters that are going to come more frequently. We had one afire only two years ago. This disaster is now. We'll have another one next year, and presume there'll be six months apart. If we don't prepare now, we won't be able to handle anything in the future.

Blakely Disaster Readings

Responding to Crisis



Figure 7 At the Scene of Crisis Photo Courtesy Michael Lindeman

Blakely Disaster Readings

Floods impacted townships in Queensland and northern NSW in early 2011, catching many businesses off guard, and forcing closures in some situations. How do you plan for acts of nature?

Eward Blakely (EB): Every business is close to disaster in many ways - customers can stop coming, seasonal sales may be low and the like. Businesses need to prepare to minimize losses and each business needs a continuity plan for every contingency, including disasters. Natural disaster planning should include what you can offer in the event of a serious event as well as what you might lose. All staff must have plans for their homes and loved ones too. Otherwise they won't think clearly and may not come to work.

BC: Planning can lead to opportunity?

EB: Yes, business should look at getting ready for disasters as a business opportunity. A smart business operator needs to think about what their products are, and how to use them in case of an emergency. This may be tough if the business has a low capital base, but if it has a product or set of products that can be used it should get them registered with the emergency agencies and be ready to provide goods and services with full invoicing systems in place during and after the emergency. In essence, the best thing to do is be ready and then to be able to act.

BC: When the greater community suffers, businesses have to contend with the drop in local trade and revenue. Can that be avoided?

EB: All businesses have to look at drops in trade for various reasons. The cyclical nature of business can hurt. The best thing to do is to have good contact with customers through

Blakely Disaster Readings

internet and online communications, so you can reach them wherever they are located. And if they are not in town, workers will be, so there are still potential customers. But to be honest, nothing can really replace walk-by and walk-in traffic for many businesses.

BC: Are there lessons from Hurricane Katrina and the recovery of New Orleans that Australia should heed?

EB: Australia needs to look at my seven considerations of disaster planning seriously. My plan calls for pre-positioning supplies; identifying areas where disaster is likely; fortifying essential infrastructure and developing a national disaster response team.

BC : What constitutes a crisis?

A crisis typically belongs to one of four categories: Natural, Technological, Confrontation and Malevolence. The Natural crisis is an ‘act of God’, and is the primary context of this article. The Technological crisis occurs when human control of man-made systems breakdown, resulting in software failures, industrial accidents, and oil spills, to name just a few. The Confrontation crisis is orchestrated by individuals or groups who cause mass disruptions through boycotts, blockades, picketing and so on. Last but not least, the Malevolent crisis is explicitly criminal, with opponents seeking to destroy or harm a system, company or country through tampering, kidnapping, malicious rumors, terrorism, and especially acts of terrorism that can harm water supplies and the like.

Based on Business Connect Magazine Interview April 2011

Blakely Disaster Readings

Chapter 6 Getting Rebuilding Priorities Right

There're a lot of lessons. The first lesson is this is a long-term issue.

The issue is not just rebuilding. The issue is where to rebuild. The water is taking its natural course. And so we have to recognize that and we have to do with the Dutch or do in reconstruction and that is the water has to go in its natural course, and so we let it go on its natural course and relieve it, so it doesn't flood us in the future. That means political leaders have thought about this, a recovery authority. Recovery authority, they would have the power to work with people for resettlement into areas that less dangerous.

That sounds like it could be controversial or difficult for people to have to move to areas that they haven't been living in.

Grand Forks in North Dakota recovery in 1997 required a quarter of the city being removed. The mayor lost her job. But the next time, the place flooded, people thought she was a hero. So politics is a tough business and it takes tough people to do it. People still be in slavery if they hadn't been. For a tough politician, we were never could defeat our enemies in past wars. Had it not been for Churchill and FDR? They took tough decisions and they're going to have to be tough decisions made. I worry about people moving back immediately for several reasons. One, we didn't allow that in Katrina, the house had to be fully inspected, because you could go and turn on your gas, and blow up the whole neighborhood.

I think you should not move into your property until it's fully inspected. There could be snakes in the property. There could be anything in the property. Those are public liabilities if safe actions are not taken. Mold detected post floods in Queensland which is leading to severe health problems is an example of allowing individual actions where risk are unknown.

Blakely Disaster Readings

Chapter 7: Priorities

The immediate priority is the restoration of infrastructure. The roads have to be cleared. The power has to go back on. Power is the most essential thing, because power controls the water. You can't pump water without power. You can't move sewage without power. So that's very, very important. And these priorities have to be laid out, and you have to have priority areas that people go to. I would establish what I call emergency zones that people would not move back in their homes necessary. Some school grounds have been damaged would be turned into temporary settlement areas, not with caravans as we did in Katrina, that was a mistake. However, there are some very good portable housing construction techniques and that was done in Victoria, and I think very successfully by putting those things in. People can then work on their home from that location versus going back into their homes.

What's the difference between a caravan and a portable house, I mean? How significant is the difference? it can determine life and death as we found out in New Orleans.



Figure 8 Community Engagement in New Orleans (author photo, 2008)

Blakely Disaster Readings

Well, for one thing the caravans that are easily portable generally are not for full-time living. And the consequence is that is that they have materials in them. They're harmful to human health if you stay in them for the extended period.

The question for everyone is where you actually bring in new construction or new ground that is safer than the old ground. How do you reinforce bridges? How do you future proof the city? All nation need to prepare for climate change and rebuilding infrastructure for severe weather events. Hindsight, you know calling the game after it's over, but there are some things you can do well ahead of time. We knew in Brisbane from 1974, there'd been serious flooding. A dam was put in. But the river gets to run its course. And so you have to have outlets for it. And the best strategy is the Dutch strategy where you have outlets for waters, the pressure doesn't build up and you can let that water flow more freely. The other thing is that over time when there aren't any floods and people talk about this 100-year flood is not 100 years.

So the Dutch had 1 in 10,000 chances. That is a kind of chance you want.

So you run scenarios about where the river is going to run, when it peaks, where it might run when there is a serious tornado or other event. And you have cordons of no build zones where the water can be let through. Those cordons don't have to be ugly. They can be great parks. Big parks can run through the city with little canals and so forth. And those of you've been able to change direction by the use of dams canals are not there just for look, they have a very good purpose.

Fort Wayne, Indiana and Los Angeles are example of transforming waterways that come into the heart of the city there. Rivers that now flood and destroy portion of cities are the reason for building a city there in the first place. But they knew that they had this flood risk and they converted the areas around the rivers into parks and that gave the river space to go when it flooded rather went into somebody's house or into the essential business district.

Blakely Disaster Readings

Well and you don't just have to build parks, you could build certain kinds of storage facilities or facilities occupied very much by people. Those kinds of things can be put in there, may be even made of some light manufacturing, and similar activities. You then have a lot of green space, because you have to observe the water. And you don't want to be putting in more concrete and hard surfaces and this is the lesson for all of us. We have too many hard surfaces. Those hard surfaces by convenience are close to waterways, because waterways are at level of ground.

So that's where we put our rail lines. That's where we put our highways. And that we're quite surprised when the flood and the overtop rail lines. The final thing on this is that zoning and planning has to be taken more seriously. People can't allow the plan to be made by the developer. The developer wants to build on cheap land in the flood plain. They want to build any place where they can. But we have to have larger scale of planning commissions that are not of the single jurisdiction that can issue permits for ecological reasons and state that this is an ecological zone and here the things you can do within that ecological zone. And I think every country should learn that lesson and some places like California, this has done pretty well, but there're parts of California where it's not been done so well. But the Coastal Commission is a very good example of taking this seriously and that whole barrier conservation area is a very good example of taking it seriously.

One of the things that Australia does very well is our strong commitment to safety and a lot of things in the labor market are geared around the safety of staff when they're in the workplace. And we have to have a duty of care for the environment. That's safety for all of us.

So we've got a really strong record of putting in safety plans and statements, so that staff and people working in areas are covered and well looked after it. So we've strong reputation about that. But then the environmental plan is sort of the last thing with a little bit done where people think well it's been optional or nobody is going to read this. You know it's not about the length of the document, it's not meant to proper opened doors, but it's having that level of detail, not just about flood contingencies or but also about what to do in drought and what to do in typhoon

Blakely Disaster Readings

or what to do in an earthquake, so having those plans in place and it seems a bit almost fantastical turn to imagine all the different kinds of disasters that could happen, but do we need a couple of scenarios where we've just written out what those could be.

The Japanese have tried to plan mitigation into building but they did it after the building and settlements were already in place as the Tsunami in Sendai shows. And every district in Japan has its own district water supply under a playing field, it has its own electricity supply, it can be used in time of emergency, it has its own evacuation plan, which is evacuation inward, not outward, so the roads are clogged they have alternates. And they run scenarios. The areas prone to fire, they have fire plans. And they practice those fire plans. The earthquake areas, then they have earthquake plans and earthquake evacuation plans. So we have to have these things in our community level plans as well. This is not a scare tactic. We all have to plan for retirement. We have to plan some money inside to go to college. We have to make plans to keep our health. So this should be scare tactic. This is just the legitimate way to live and to live well. So I think we have learned another lesson. We didn't learn it in Katrina. We now have the opportunity to learn it. And this is a new year, so we have a new opportunity to practice better habits.



Figure 9: Author with community disaster warden in Kyoto, Japan, 2010

Insurance

The question of insurance companies is how insurance companies deal with disasters. Oakland was the best. We put all the insurance companies together in an insurance center and all the insurance centers had specialists in them, they would help people with their insurance policies, we created a floor and a ceiling, so even if you were not covered by an insurance company, an insurance company was allocated to you. They've reviewed the damages in the state, then underwrote a new policy, so that you would be covered and you would have an insurance settlement, so everyone got a settlement.

And I think we're going to have to come to a point that a person cannot be in a home without insurance.

Blakely Disaster Readings

And, we shouldn't think all this like you said as bad things. We should start thinking about how to do the good things now so that we can avoid the bad things later. And, probably the biggest corruption in the system of letting building permits, planning if you will, is people will say well, it won't happen on my watch. Once in a 100 years. We've got 99 years to go since the flood was last year

There are many others that we could go into particularly more recent disasters that have been huge in scale, Aceh tsunami is there but I think we made the point. This is becoming regular and it's expensive.

Section 2

Steps to Recovery

Blakely Disaster Readings

Chapter 8: The Rebuilding Steps

At the earliest stages the recovery program in Queensland looked insurmountable. There're so many things that have to be done. You know where do we start?

Well this is something that everyone says to me where do we start, we did you start in Katrina, where they started in other places.

So there're several steps and I have seven of them. There may be more, but these are the seven steps that I've used in the recovery programs I've been associated with and I've been done five of them. And this seemed to really work for me.

The tragedies in the Pacific region are being mitigated to a great degree by the actions of public officials as they commence the recovery process. It is important that the principles that guide the recovery be articulated early and clearly. These are:

1. Develop a very clear process for continuous engagement and listening. The physical manifestations of any disaster are short lived, a few years. But the trauma of the events live in the hearts and minds of people who experienced may scare for life. A long-term well developed program with various levels of help for residents, workers and volunteers has to be established and funded to meet the ongoing mental health crisis.
2. Re-establish security in all areas affected as soon as possible. Nothing provides greater confidence to citizens than police security, re-establishing power, opening schools and restoring the normal functions of government as soon as possible and in a form to fit the situation.
3. Examine the depth of the economic shock and move quickly to repair basic economic functions or firms that move away temporarily will stay away permanently. Every disaster economy is transformed by the shock and it is wise to look to future and not past economy to fashion the way forward post crisis.

Blakely Disaster Readings

4. Re-build and future proof the regional infrastructure which includes greening and decentralizing basic delivery mechanism like power and water and hardening essential infrastructure.

5. Establishing a community sustainable re-building program that places dwelling units in a better position to survive not just the current form of disaster but the larger long term impacts of climate change by examining locational issues, housing design and housing capacity to withstand changing climatic conditions.

Based on *Online Opinion* Article February, 2011

Blakely Disaster Readings

Chapter 9: Taking Advantage of the Disaster to make fundamental change

The tsunami that struck Japan on March 11, 2011, combined with the recurring nightmare of a yet uncontrolled and seemly uncontrollable nuclear reactor meltdown, represent easier disasters to fix than the underlying problems that Japan has to face soon. All natural disasters uncover deeper problems than the event itself. In New Orleans, where I directed recovery in the 2005-2007 period it was the city's inability to face underlying socioeconomic inequities and economic failures.

Japan's recent natural disaster in March has put that nation, once the envy of the post-World War II world, under a new microscope. Most of us are aware of Japan's fiscal nightmare of debt and the merry-go-round in the office of prime minister. Even so, an even more sinister set of issues has reared its head. The alarming fact: Japan, without corrective action is dying a slow natural death.

I spent several months in Japan in 2010 as a Fellow at the Kyoto University-based Centre for Disaster Preparation and Reduction. Earlier, I had worked closely with Japanese colleagues on disaster issues including the Oakland earthquakes (Loma Prieta) in 1989 and fires (1991). By the time I arrived in New Orleans, I had a small cadre of Japanese colleagues with whom I had been in contact, and remain today. So, my view of what is going on in Japan comes from the inside.

Blakely Disaster Readings

Japan is a nation with an enviable record for disaster preparedness. However, it was paralysed by the disaster that struck it in March and today is still unable to develop any internally cohesive approach to dealing with the aftermath of this tragedy.

A first dilemma: the Japanese were unable to react to a disaster that didn't fit their game plan. We heard and read how they were surprised by the tsunami breaking through the coastal defences, as well as how un-prepared their nuclear team was. But there's a greater issue for Japan lurking behind those surprises. Simply put, it's the Japanese nation's lack of flexibility in response to almost anything and everything that occurs in public and private spheres. On the one hand this characteristic has made the Japanese automobiles and electric appliances and cameras among the most reliable in the world. But when the Japanese operations manual fails, as it did during the tsunami, then the system has few responses, leaving the nation and communities paralysed.

Related to this is Japan's very narrow hierarchy. True, Japan pioneered the notion of assembly line corrections and improvements on the factory floor. But no such approach has been developed in government operations. In fact, virtually all decisions are made at the top – assuming anyone at the top will make the decisions.

As a consequence, it was the interventions of the US military and innovative, foreign-generated technological solutions to cooling down Fukushima Dai-ichi reactors that saved the world from the horror of an even more devastating disaster.

Blakely Disaster Readings

Now the lack of national leadership is complicating local recovery operations. As the days and weeks have gone by, various municipalities and or provinces have commenced their own recovery operations. In some respects the fact locals are taking over is a sign of a degree of local ingenuity. But in a very centralized national bureaucracy these communities are running big risks. The locals don't know if the national government will pay them back or in some cases, or whether they'll tell villages below the tsunami line that their recovery work must stop, that their towns are off limits for further development.

The second dilemma, the tsunami made clear is that Japanese citizens are old-very old as the post tsunami photos revealed to the world. Just as the post Katrina photos showed how black and poor New Orleans is.

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Figure 9: Aging Japanese population post tsunami from www.680news.com/news/world/article/197208--of...

Japanese people live a long time in fact Japan has the largest elderly population in the world. In one respect that is good. But less good is the other end of the demographic spectrum – not having babies, and a situation of out migration almost as large as in-migration into the country. Japanese marriage customs make most young Japanese women disinterested in marrying into a

Blakely Disaster Readings

family where they might be dominated by their mother in law. As a result, Japan's birth rate is far below a replacement level. By 2055 the age pyramid will likely be inverted.

Already, the drift to older averages ages means Japan's ability to bounce back from the tsunami disaster will be severely tested by a lack of human power. It is the young who return first post disaster and who want to rebuild. In New Orleans senior mortality was the highest of all age groups and many seniors over 70 couldn't withstand the trauma of rebuilding. The rural areas north of Tokyo have among the oldest populations in the nation. So, while the desire to return to the villages by the older fishermen is understandable, their capacity to do so isn't as clear.

Japan Demographic Profile in 2055

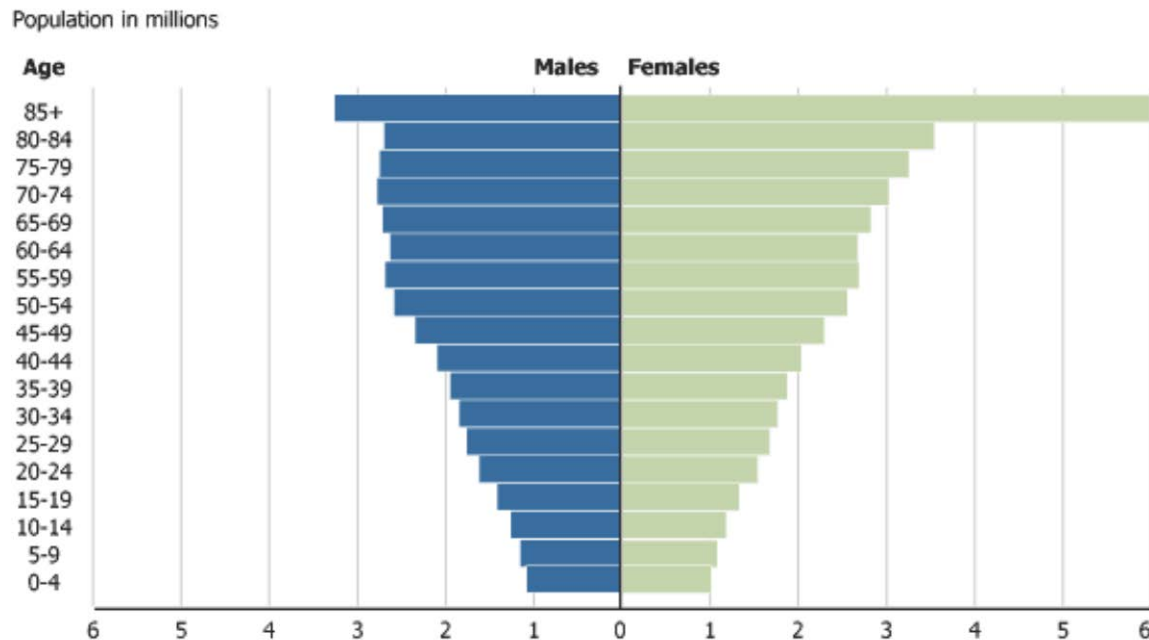


Figure 10: Japanese population pyramid, 2010 source <http://www.prb.org/images08/japan-age-sex-2.gif>

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There is in fact no way that most of the areas destroyed will be rebuilt before 2040-2050. At this point Japan will have more people over 80 than are under 20. So the question must be asked: who then will pay for, or be there, for the rebuilding?

The alarming reality is that inflexible immigration and fear of reducing the pureness of Japanese lineage is slowly killing the nation. Most Japanese are aware of this. But the response to any immigration reform has been slow and pitiful. Japan has even invented a virtual immigration for Chinese IT workers so they can get paid by Japanese firms yet stay in China. This past year Japan received its largest immigration number of immigrants so far recorded in a single year – over 400,000. But these were mostly home care workers for the elderly population. Almost none are the young energetic workforce Japan needs to fuel its economy, to shape its future and pay its debts.

Perhaps the Japanese will heed the counsel of Rahm Emanuel, former aide to President Obama and incoming Mayor of Chicago: “Never let a good catastrophe go to waste”. Perhaps the tsunami will be the ultimate catastrophe that Japan needs to revitalize its education system to focus more on creativity than conformity and to import new fresh blood from elsewhere in the world (maybe Korea, China and Indonesia as well as South America and Africa). New Orleans has benefited from all the new pioneers who are finding their way to that great city. Moreover, for all cities, the notion is to look at the deep issues that affect the community and not just those easy to attack and repair. Since, rebuilding is a long-term commitments, you have to be committed to the right direction not just the fastest one.

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What lessons for all communities come from Japan?

Japan occupies an important position in the international hierarchy of nations. Every community has both a local and a global position. In New Orleans it is music and the Sendai area auto parts and systems. Thus, the major lesson is how to restore global position in a dramatically changed circumstance. This is what all communities need to think about. It is best to think about this before a disaster. It is what many called “Alternative B”. Having a “B” plan is necessary now not merely for natural disasters but for global economic shocks as well. After the earthquake and fire in Kobe, 1998 the community was devastated both from the fires but also because it lost its shipping capacity for so long that the Port of Kobe was no longer among the international trade ports for steel and related materials. Instead of looking to restore the past as too many places do, like Detroit with autos, it embarked on a new biosciences education thrust that is helping it get back to a new global position. Similarly, New Orleans is moving into health care as the new pillar for its economy.

The next lesson is tackle fundamental social issues to reposition the image damage post disaster. Japan’s image suffered post tsunami but the greater damage is the transparency of the Japanese aging and rigid social structure. Post Oakland earthquake (Loma Preita, 1989) and Hills fires (1991) the issues of poverty and unemployment were exposed. Oakland embarked on a new strategic plan *Sharing the Vision* to deal with this issue head on. Results in Oakland were and are mixed but the efforts and new job creation went a long way to altering the image of the city.

Blakely Disaster Readings

Final lesson is to develop long term recovery systems. Japan has an enviable record for national disaster preparation but no institutional approach to post disaster recovery. Every nation needs a national recovery agency with regional capacities buttressed by an intergenerational disaster recovery assistance organization.

Based on *Citistate* Review Article, June 2011

Blakely Disaster Readings

Chapter 10: Who can and should build where post disaster—

In the wake of one of the nation's greatest bushfire tragedies, Premier John Brumby said: "They (the dead) unite us all in the task of rebuilding. "Because we will rebuild." This echoes similar words spoken in New Orleans only three years ago — in late 2005 — by the city's mayor, Ray Nagin, and then president George Bush. But the notion of rebuilding and the act of rebuilding are different things, as I have come to understand as we rebuild New Orleans.

The New Orleans experience is fresh, so I am offering it because Premier Brumby has correctly called for a royal commission to help in the process of finding the problems as well as identifying paths to solutions.

As an Australian-American and the director of recovery for New Orleans, as well as being a major disaster veteran in four other American disasters and consulting with communities across the world on rebuilding, I can share some useful lessons.

I need to set the context for my remarks. New Orleans is a different type of disaster than Victoria's. New Orleans suffered from levee failures and flooding that destroyed 80 per cent of the city. There were, and still remain, questions in some quarters as to whether New Orleans should be rebuilt at all given the geographic hazards of its location.

While bushfires and hurricanes are different, the long-term weather and natural conditions that caused both the hurricanes in the Gulf of Mexico and Australia's drought — global climate change — are the same. This means that more large-scale bushfires will occur in the near future in Victoria and elsewhere in Australia because we continue to build in dangerous areas. We can be more vigilant and reduce the opportunities for the human causes of bushfires, but the natural issues that spawned them remain for Victoria as well as New Orleans. So we need to know how, where and when we will rebuild our communities after these tragic events. I offer a few lessons

Blakely Disaster Readings

that might be useful to the commission, policy makers and citizens as we embark on rebuilding the devastated communities:

Evidence: It is important that all of the information regarding the causes and consequences be made known before rebuilding begins. In New Orleans we promised everyone they could return to the same location they inhabited before the hurricane if they built safely. But what is safe rebuilding? It is important to give assurance of rebuilding and equity as soon as possible. However, when people discover later that their rebuilt home or farm is subject to the same threats as before and their investment in rebuilding has little market value, they are angry. Residents ask why they did not have the information about the future dangers and options to locate in the same area in a safer location on land the same or larger size.

Participation in recovery planning: New Orleans had a bad start in the recovery process when experts laid out rebuilding zone maps developed with only modest input from community business and professional leaders. These maps effectively dismissed the option for some neighborhoods to be restored. This created a political reaction that cast doubt on the entire rebuilding process. So it is very important that the community members who suffered from the disaster are brought in early and provided with good data, good facilitation and a good process for helping in making decisions. Not all decisions can or will be popular, but they must be made in the open.

Recovery timelines: In an age of instant gratification and quick problem-solving on television, it is hard for most community residents to understand that it took many years to build the community and it will take years to restore. Safe restoration is better than quick rebuilding. So, short, medium and long-term goals and projects need to be articulated as clearly as possible. New Orleans residents continue to believe the entire city should have been rebuilt by the second anniversary because of President Bush's promises. As we assessed the underlying infrastructure damage to sewers, water, and power along with buildings suffering from extensive saltwater

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incursions, it became clear that rebuilding New Orleans, much like post-earthquake San Francisco and Kobe, Japan, will take more than a decade.

Separate disaster response from recovery building: There is a very strong role in post-disaster situations for emergency personnel to clean up and secure the site. But recovery is a different

business than disaster response since recovery involves not just the physical but the social, psychological and economic resurrection of the community. In New Orleans the combination of the two missions of disaster, FEMA and Recovery City of New Orleans, were confused, which angered people because responsibilities and leadership for the recovery could not be clearly identified. Finally, while there is a federal/national government leadership post disaster it must facilitate and not dictate local recovery direction.

Future proofing: It makes little sense to build back into trouble. But in too many instances the desire to build back soon overwhelms the need to build safer and smarter systems that can withstand foreseeable hazards such as climate change. In New Orleans we are learning from the Dutch how to build a city less dependent on levees to secure a better and more sustainable city. Victorians can and should also learn from Canberra's fire disaster as well as identify best practices globally as it rebuilds its communities.

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Chapter 11: Building Where—A Dilemma Based on an Interview with Paul Barkley ABC Radio National

PB. Does the government make the decision and say no I'm sorry, you can't build there or do the people who live in those areas reach that conclusion themselves with the assistance for example of government compensation?

Now there is an issue here that I don't know how we deal with and that is where a person says No matter what; I won't go. And that person then expects the helicopters to come in and get them, expects advanced warning systems, and expects all the services of government. At some point, you have to say if you make bad decision, we'll have to make decision that you forfeited those rights.

PB. Yes, Ed Blakely, that brings us to this issue of engineering solutions in the extent to which they can protect a city. We've talked about perhaps controlling development, but can we make cities more flood resilient and to what extent can we do so through engineering solutions?

Edward Blakely

Let me jump in here a little bit here and I'm sure that there are the people who think you can't engineer solutions, but the best thing to do is what the Dutch done, engineer where you can and let nature do what it should do, where it should. New Orleans is a classic example of that. By trying to keep the water out, you're making it more dangerous in New Orleans every day. The Dutch let the water run through New Orleans and many people don't know New Orleans was a series of islands. They were closed off by the levees. So at some point, the fastest river in the world, the strongest river in the world is going to the ocean, it's going to go straight, and it'll go straight through New Orleans. So we can engineer to some degree and that is to create better paths for these big river systems and so forth, but we cannot control them.

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Well I think there should be some things done to control future floods, but there is no – to the best of my knowledge, there is no fail-safe system here. And we give people the wrong impression. Let me give you another wrong impression, the notion of a 100-year flood. It's not

100 years. It is 1 in 100 chances. And so if we build these engineering devices, we give people the false impression, well this won't happen for 100 years or it won't happen for 30 or 40 or 50 years. And of course it's not going to happen next week, most of us will forget about it. I think we should really sit down with people and tell them what is happening, how it is happening, and how we can live with nature rather than trying to control that entirely.

There should be a Regional Planning Commission much like the Coastal Commission in California and there is some elsewhere in the United States with independent people on them whose regimes are not dependent upon the local politics. Sometimes these people serve on these commissions for minimum term of 9 years. And they determine where building can take place. Then the planner can issue a permit in those areas where building can take place under planning regimes. But planners are not a fault here. The planners frequently say no, but the City Council of the State Government overrules them and the planners get the blame on the other end, but frequently I've seen this in New South Wales, the planners have said absolutely no and then the ministry overrides them.

I think that personal security be required that every house much like the Japanese have done take some water off the roof and put it under the house much better during the rain, there're also plenty of devices now that will allow you store water under your house quite in large quantities of it up to several thousand gallons of water or liters of water under your house, so you would have pure water all the time. I also think that when houses are designed, run off from the house can be kept on the property of little ponds and things like this on the property, but we design all the water to run off the property on to the street, which will carry the water even faster, so there is no retention of water on the property and similar planning for all these things make the huge

Blakely Disaster Readings

difference. And I think these things ought to be required in building, particularly for building close to areas that are prone to flooding.

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PB. When will we have the next big one?

Edward Blakely

I wouldn't have been able to make prediction regarding the Brisbane floods as early as 2005 if this information wasn't readily available; it is readily available right on the web. I didn't have to go out and speak to some scientist is going to give us speech I did what any ordinary researcher does before giving the talk and discovered it, but the important issue here it seems to me is putting this back on the individual. Individual buys property in the essence as a license from the state, the state has a larger responsibility to say what is possible and what is not possible and so the first education has to be with the state and the people who run the state. The second education has to be with the municipalities and how they do business and then with the homeowner and make sure every kid gets education about water. And if we're going to live in these very sensitive areas, we have to be educated to them about them.

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Figure 11 Something to Celebrate Courtesy City of New Orleans

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PB. How did you get governments to change their approach. They've provided presumably with the same type of information that you've seen that led you to the view that this flood was predictable? And yet governments didn't seem to think that was the case.

Edward Blakely

Well I think there're two things here. One of them is that at what level of government is this information available and then what the risks the government runs by propagating it are, for example the United States has flood insurance, which is a disaster, because it basically says if you locate here the government will cover you with insurance and lower your risk. I think the people shouldn't be allowed to build there in the first place. And then flood insurance then has given the places, which is proper that the risk is low and the higher the risk, the higher the premium, and I think that when you pay your rates, you should also have an inspection of the insurance, so that if your insurances are not right the state says hold on here, we're not going to pay for this, you have to get your insurance that much like to have for your car much like the registration for your automobile, you have to have registration for your home, and you have to have insurance on your automobile. Don't you? Why not have insurance on your home?

Based on ABC National Radio Interview with Paul Berkeley February 2011

Section 3:

Recovery Management Lessons for Civic Leaders

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Chapter 12: Principles for Recovery Managers

Peter Drucker wisely said, “Company cultures are like country cultures. Never try to change one. Try, instead, to work with what you've got.” Peter Drucker could have applied his maxim to cities because they also have cultures. Cities that experience a major disaster have to be dealt with through their culture as well as dealing with the physical rebuilding. New Orleans is the story of culture shock. New Orleans culture is rich and complicated. It is this culture that informs the options and opportunities for its recovery. New Orleans is called the Soul of America. As this city searches to regain its souls it is a unique laboratory which will examine management lessons for cities, business and civic leaders in cities across the nation because at some point they too may face some form of urban upheaval.

There is no urban natural disaster larger and more exposed to popular view than New Orleans. New Orleans much like the dethroning of Ferdinand Marcos of the Philippines in February 1986 exposed the depth of a culture to the world. I have learned both from my new post in New Orleans in managing its recovery. I also have the vantage point of four earlier experiences in urban disaster (Oakland earthquake 1988 and fire 1991; LA Riots and earthquake; New York 9-11). The response of the communities in each of these events offers a perspective on how all civic systems have to prepare to deal with almost certain natural or man made disasters. My experiences suggest recovery response to city mega crisis like natural disaster or terrorism led events has more to do with the city’s cultural adaptation and preparation than the size or force of the catastrophe. The new and nearly certain combination of climate change, urban terrorism along with the sheer size and complexity of urban systems will create uncertainty and undermine the fabric of urban areas unless business and civic officials ban together well before disaster strikes to craft a means and structure based in the local milieu to respond to the tragedy transforming from devastation to opportunity. I assert that if appropriate actions and recovery templates are well understood, business and civic leaders can help local governments regain their capacity to remain competitive in a global economy. Business can run from disasters by

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decentralizing facilities but no business can hide from acts of nature or random violence of the modern globally connected world.

Clearly, no event in the United States since the Second World War offers more object lessons of post disaster management like New Orleans. The management approach in place in New Orleans provides an opportunity for reflection on how to shape the future from this tragic event. New Orleans is both emblematic and symptomatic of the kind of issues we will face as urban areas are threatened or struck by uncontrollable disastrous events.

Recovery Past and Prologue

Few Cities in the world offer as much to the imagination as New Orleans. It is the crucible of America's most widely known and highly regarded cultural innovation—Jazz. Movies, daily radio and countless magazines portray New Orleans as the center of American music and a unique bastion of cultural talent. But what is also painfully true is that New Orleans pre-Katrina had a disproportionate poverty rate of 23%, twice the national average and among the nation's biggest poor populations of any of the nation's largest 100 urban centers. Poverty compounded with years of social and physical neglect left the City of New Orleans too socially weak to cope with the catastrophe that befell it in August of 2005. As the world watched, the city was unable to cope with the crisis. Most of the city population with cars and resources were able to evacuate successfully. In fact, under the circumstances City leaders did a remarkable job in dealing with the immediate emergency. But the skills to move people out were no match for the requirements to rebuild a city that was 80% destroyed. Thus New Orleans slow recovery has little to do with the physical issues of rebuilding buildings or doing streets and houses. New Orleans like all of the cities I have worked in was burdened by its cultural roots of poverty in trying to forge its recovery future. An important question for New Orleans is what kind of a future does this City so ravaged by a storm, race relations, urban poverty and inner city decay want? Surely we are not

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trying to restore the socioeconomic past of the City. Similarly, New York was facing a crisis in the future of the financial industry as the city's basic building block on September 11, 2001. Almost immediately after a tragedy the socioeconomic position of New York was challenged by New Jersey locally and London globally. As a result New York and now New Orleans have to re-look at the real and not the imagined position of the city post disaster. How a city sees itself at the time of a disaster may not be what it wants to be post disaster. But the culture of the past will impede any progress to the future unless a new vision which recognizes the values of the past is forged.

Crime and poverty were driving out the music and entertainment base as violence rose and inner city decay increased. The question post Katrina is who will benefit or lose by the recovery process. The images of New Orleans for the displaced poor are not the same as the images or visions of the civic elites. Nowhere was this more evident than in the sound defeat of the business lead "Bring Back New Orleans" blueprint for the City. While business envisions a New Orleans of new commerce, bioscience and communications, a poorly educated and under-resourced urban population cannot see their place in this future. So, different perceptions of the future hamper the course of recovery.

The clear and simple message for business and civic leadership is that the process of crafting and sharing the future of the community has to commence well before tragedy creates caverns of distrust across the community spectrum. New Orleans is now in search of the devices to heal its social cleavages so it can move on in shaping its destiny. New York was in a similar predicament post 9-11 and took positive actions to build a civic coalition for the social and economic re-tooling of the entire city. New Orleans is re-looking at itself as a cultural and transportation gateway to South America as a device to bring the cultural and good jobs base to an economy too heavily dependent on low wage jobs in tourism. The new effort will place more emphasis on the creative use of the ports—air and sea—linked to the Mississippi River and railheads as a cargo hub for the growing middle class markets in South America, Africa and the Caribbean as well as with the wider Panama Canal, India and China. New Orleans cosmopolitan cultural base serves

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as a spring board for this approach that can build well-paying jobs linked to logistics that fit both the current and future populations. This change is big but it is not easy.

Recovery Clients

The winners and losers or victims of a natural or man-made disaster are not always easy to identify. Nightly news portrays New Orleans Ninth Ward as the victims of the New Orleans flooding. Similarly in 9-11 the widows and survivors were cast as the central victims of that tragic set of events. While these portrayals reflect compelling issues they may not portray an accurate picture of the deeper and perhaps longer term damage that can misplace resources as these wounds are healed. In New Orleans the homeowner was depicted as “victim”. As a result, a massive effort called *The Road Home* costing in excess of \$8 billion dollars was launched. While homeowners were deeply affected New Orleans is a city of renters with well over half the population occupying government Public University housing or private low cost rental accommodations. The *Road Home* program has developed its own painful problems in implementation. But in many ways the most affected and least able to cope post Katrina are renters. Since pre-Katrina landlords were either small landlords or absentees with modest investments in their building stocks, they are unable or unwilling to rebuild post Katrina. Moreover the combination of building costs and insurance makes the plight of these landlords more uncertain. Finally, post Katrina NYMBism is on the rise since many multiple units were occupied by the lowest income groups.

The New Orleans pre and post Katrina will be predominantly renter based. So, new strategies are required to make renting in lower density and higher quality as a key component for the recovery. Only business, that needs a workforce can champion such an affordable housing approach with a strong rental component on the simple basis that this housing stock is required for a healthy economy for now and well into the future. The lesson here is that good economic demography of the community needs must be part of the community planning base.

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Management Concept	Tools	Business Role	Gov't Role	Non Profit Role
Past and Prologue	Develop strong and regular reliable data sources that track the local economic trends and needs	Initiating and funding a non partisan data resource center	Developing reliable transparent city data on land and city assets	Creating non profit collaborative data sharing on church, university and other assets
Mantra	Create demographic center to provide updates on regional population base	Incorporate civic dialogue on community human social needs via business associations and roundtables	Taking an active role in metropolitan planning	Crafting community based leadership that can access and use demographic, economic and social data for local problem solving
	Organize ways for city expression become institutionalized across all sectors	Form civic leadership forums across race, gender and economic divisions	Have City institutions carry common messages with common	Giving Voice to the notion of a common way of articulating the civic

Blakely Disaster Readings

	and segments of the community via a common newsletters, Public University television or other vehicles accessible to all residents		vocabulary eg <i>One New Orleans</i>	agenda
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Recovery Mantra

Not only does the recovery need to target the right people, it needs a set of words and understandable targets to gain Public University momentum. In New Orleans for more than 18 months active community planning engagement occurred. Community visioning sessions were held across the country for the New Orleans Diaspora of over 200,000 New Orleanians spread across in 37 states and in every city neighborhood. A few key words that paint the picture of what the recovery will look like are essential in dealing with a scattered and traumatized population. New York had a compelling graphic with the hole in the ground and many architects, planners and civic leaders generating words—but “Ground Zero” stuck. These words provide for all an image of what must be done to re-establish the place and honor the memory as well as defend the turf. In New Orleans after the long process of civic engagement a simple concept has emerged—“*Target Recovery Areas*”. Target areas convey what New Orleans needs which are clear targets for investment and recovery implementation. Target areas are words that capture the spirits of the consultation process. There are 17 of these target areas.

In many ways giving “structure” with “voice” creates a believable articulation that shapes the civic recovery dialogue and acts as the new civic mantra. These words are shaping action.

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Recovery Insourcing

As the flood waters receded, in many respects New Orleans was an island marooned with few contacts to other places or resources. New Orleans did not choose to be isolated. In fact, the City was searching for resources. But the nature of federal law as well as the deep crisis the City found itself in, without access to the essential resource it needed most, in many to kick start the recovery. The City had too little money to access many of the federal reimbursement programs. Cities and businesses and non profit charitable organizations around the world offered exceptional financial resources such as house gutting and demolition as well as food and shelter. But government, business and charitable resources came in a form of what these organizations wanted to give and not what the City of New Orleans needed. Many cases and New Orleans was not an exception was faced with mountains of food for victims with no refrigeration or storage places for it. All of this well-meaning work is usually therapeutic for the givers but of little use for the receivers.

In New Orleans after much searching for the funds to spark the recovery it became clear the City had to look at its own resources of and its people. One overlooked resource, blighted and vacant property, became a new financial boom for two reasons. First, much of the abandoned property estimated at between 10,000-20,000 lots is on dry un-flooded land. Second, the city has the legal capacity to take this property post Katrina for health and safety reasons if the owner cannot be found via an extensive process. This previous liability of blighted property is suddenly an asset for re-building the city in a safer and more compact form.

Looking for fallow assets and developing an approach to capture new values from this is an opportunity many communities find post disaster when innovation is required. Cities like companies need to look inward to inventory all of their assets both physical and human. Universities for example have human assets in staff and students that are seldom pre-positioned to respond for recovery post disaster. But university talent can reach around the world for

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solutions local government and local government cannot as the primary tool for recovery. Matching the resources the city has with the resources it needs quickly is very important for any city. Business can help both in leading such an inventory of local business assets but also stimulate fresh thinking about other civic assets that might be transformed in the event of a citywide recovery program.

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<p>Insourcing</p>	<p>City inventories of institutions and their capacity and roles need to be developed well before any disaster both for emergency services and for recovery</p>	<p>Business Roundtables need to be in place with the resources available from all segments of the business community well articulated and pre-organized for any emergency and recovery</p>	<p>Government needs a focal point for recovery planning in a designated office with a clear mandate</p>	<p>Non profits should ban together to form a clearing house for their asset use in recovery including universities that might house such a clearinghouse</p>
<p>Institution building</p>	<p>Create citywide leadership team for the recovery</p>	<p>Business led consortia of organizations formed as in case of 9-11 in NYC that can articulate business role in the recovery</p>	<p>Form a Recovery Office to Manage Recovery Efforts soon after the disaster with key management team formed across the bureaucracy</p>	<p>Establish consortium of non profits and charitable organizations so that duplication of resources does not occur and outreach to other communities</p>

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				is coherent and resource needs and coordination can be funneled through this system
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Recovery Institution Building

City governments are not built for long term emergencies. Moreover, the internal apparatus of government resist crisis. Local government likes stability. As one wag said, “local government is for roads, rats and rascals”. New Orleans is no exception to this maxim. Local government wants to return to its old pre-emergency ways as soon as it can. As a result, for 18 months various parts of City and non city agencies added recovery to their normal agendas. In some instances like rubbish removal scaling up was possible. But in other areas like building services, the repair of hundreds of Public University buildings for an under staffed city architecture and building department was impossible. Yet, New Orleans like many cities attempted to simply add work or scale up when the functions are all together very different in kind. Building new buildings is a post disaster need and not normal maintenance and repair. Therefore, a new institutional approach has to be designed with a new recovery construction team outside the day to day operations. In post fire Oakland Fire Area Planning and Permitting programs were set up just to handle the fire rebuilding programs in the Oakland Hills as a separate institution. This act hastened the recovery by years.

New Orleans has a new Office of Recovery Management to guide the recovery process. It acts on its own with respect to some FEMA related activities and sets priorities for the use of city assets to provide quick responses to the immediate and to plan for the longer term recovery of business, community and city governments to then move back into the existing bureaucracy when the process is stabilized.

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Conclusions

Every major city around the world has to be prepared not just to respond but to control the outcomes from a large scale natural or physical disaster. Natural or man-made physical disasters are management challenges not just for government but for the entire business and social community. The lesson here is that businesses can work with government in building more flexible led and responsive institutional structures before a disaster strikes. A civic partnership like the New York led by the New York Regional Plan Association is the type of institutional approach that cities need to look at before disaster strikes. In this instance clearly a good offense is better than defensive structures post disaster. A well thought out management framework has to be in place or put in place to deal with any crisis quickly. Cities that manage their recoveries will reach for business and non profits as strategic partners. Hopefully, New Orleans Katrina experience is a useful guidance for communities around the world as they prepare for recovery before they deal with disaster.

Based on several speeches in 2010

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Figure 12 Making a Few Point Courtesy Michael Lindeman

Chapter 11: Goals of Recovery—an Interview in Business Connect Magazine

Businesses are attempting a rebuild in the face of further disasters the discovery of lots more bodies, the further suggestions that they will many more earthquakes to come maybe as big as 7.6, 7.9, these sort of aftershocks are being predicted and perhaps more tsunamis to come as well. But as they start to think about rebuilding, what are the sorts of things they should be considering in Japan.

Interviewer

When you think about what they've got to do the scale of it just must bigger the imagination.

Edward Blakely

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It does and last year I was in Japan at the Disaster Prevention and Reduction Centre in Kyoto. So they think long and hard about such things. We went through scenarios and the biggest event was about a 9.0 hitting Tokyo and the best we could come out is loss of lives around 30,000 which seem to me just outrageous but to them they've got it down from 300,000 or 400,000. So, the Japanese are the best prepared people in the world but you can see even with the best preparation in the world you have things that you don't expect like the tsunami of this force in that location was kind of the soft underbelly. What they can expect now...

Interviewer

So, why do you say that was this part of Japan less prepared than others?

Edward Blakely

They were prepared using fortifications that failed and not paying attention to the past. It was sea coastal town little bit to the north, the southern areas are little better prepared than the northern areas because they are closer to Tokyo. So you had a situation where it hit a very, very vulnerable area. Now what do you have to think about? The first thing you have to think about is where you are going to rebuild because it may not be there. And you know how we rush to say we are going to rebuild and you don't heard the Japanese saying that. I think they are going to thinking long and hard about where Sendai or areas of Sendai are going to be rebuilt. And there may be some lessons in this for us. They didn't build Kobe back the way they had it before. I think the Japanese will start repositioning their cities so they can handle such disasters. And this is really tough for them because they don't have the best budget situation in the world. They don't have the best demographic situation in the world. So, this is going to be a huge strain on them but they have no choice.

Interviewer

When you say there are lessons for us, you mean whether it's Victorian bush fires or Queensland, you know cyclones and floods?

Edward Blakely

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Well, there are couple lessons for us. First, we are on the same volcanic trail, you know the red trail around the Pacific. So, we don't have to have an earthquake here but there could be one in the Pacific that could have a huge impact on us particularly Queensland and that's where we are anticipating it but it could be farther south. So, we need to prepare ourselves and also I've said we really have to look at where we are building along the coastline.

Interviewer

Okay. This was the case in Katrina, wasn't it?

Edward Blakely

New Orleans and many cities are too low and further levees to protect New Orleans were eroded and that was the mangrove swamps. We have to look at what's going to protect us and where we have to build for good protection that will be moving some things, it will be putting some barriers up but we can't just hope it won't happen. You know each of us gets in our car everyday and we say we are not going to have the accident somebody else is, but somebody does. Well, we put on our seatbelts, you know, we check the brakes and so on. We've got to start checking the brakes, putting on the seatbelts.

Interviewer

When you look at the map of Australia, where do you think are the vulnerable places?

Edward Blakely

All of our northern area right across our northern tier, the northern territory, the northern part of that. The northern part of Western Australia, the northern part of Queensland, these are very vulnerable areas.

Interviewer

You are talking about particularly about tsunami, are you?

Edward Blakely

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I am talking about tsunamis. These are very vulnerable areas and these are vulnerable areas of course to typhoons and Hurricanes as well.

Interviewer

When we talk about the Japanese and the extent to which this was the weak underbelly, but also it's partly a story of how effective their preparations were. You compare this tsunami, for instance, to the one that hit other parts of Southeast Asia, the loss of life was much less so always seem so already that there is going to be a lot less.

Edward Blakely

It seems so already but you know loss of one life is a terrible thing. They are very well prepared. They have local shelters that are underground. They have water supplies for 5 days. You heard about people being out of electricity. That means the main system wasn't working but they have local systems that will work that can kick in. Some are operated by generators, some by solar and some by hand. So they are very well prepared, they are very organized. Everyone

knows where this should be, where they should go, and what they need to do. But I've heard from my colleagues there and they say this is the first time since they have been working at the center that people were confused, that the strategies that were too employed when an earthquake located at a certain place and this is something different. And the way they operate when you have something different you need a new set of orders, but there were not new orders for this different situation. So the Japanese leadership had to modify the older orders for disaster.

I have been in contact with colleagues, they are doing that now, and they're beginning to put things back in shape. But the nuclear reactors are the dominant thing right now.

Interviewer

Well, I must say from an outside perspective this is the hard thing to understand. I've read so much about how some of the more recent skyscrapers that were terrifically engineered at great expense to avoid earthquake damage and in fact they have worked amazingly. I still don't quite understand how, given that level of preparation, you could have these nuclear reactors which

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don't seem to have survived this one in particular of course the Fukushima reactor doesn't seem to have survived this.

Edward Blakely

Well, that was one of the early reactors and I suspect it didn't have what they called the suspended system where the reactor sitting in almost like a water barrel and it can rock around. The old systems were rigid, and they thought the rigidity would hold. But now we know that if we have a reactor, it has to be in a suspended system so that the reactor core can move around. And if we try to hold it tight and it cracks, a crack, a leak very dangerous thing.

Interviewer

So some of the post-Fukushima reactors, if there are any, they'll be built on this kind of soil.

Blakely Disaster Readings

Edward Blakely

They'll be built in the new system. But I don't know how you retrofit a reactor. That is an issue that the Japanese have to face. How do you retrofit one of these things?

Interviewer

Have it as a kind of disaster expert, the one point where you think they are really in pretty difficult territories with the reactors.

Edward Blakely

It's with the reactors their buildings are in good shape you know they have withstand the horrific shock so that gives them some hope for Tokyo. But the reactors and other soft systems they have to be looked at and I think the entire seaboard has to be looked at because you have a lot of fishing villages, a lot of small towns where that kind of new engineering technology has not been employed as yet.

Interviewer

And the other, of course, thing they face at the moment is that earthquakes don't come in once, do they?

Edward Blakely

No. Disasters come in multiples and we saw that with Christchurch and it can be a long time between intervals. So, let say this one still going on small episodes but we could have another big one, right, five, six, seven within the next 6 months and it's quite likely unfortunately.

Based on Interview by Debra Cameron on 702 Drive Radio

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Chapter 13: Long Road to Recovery

I remember my ride in from the airport in on January 7, 2007. It was late evening and I was going to my new apartment on Jackson Street in the central city area to take on my new job as Recovery Director for the City of New Orleans. I arrived at the building and felt not the chill in the air but the eerie chill of total silence. It took until the next morning to realize what was so something different. There were “no birds”.

New Orleans has come a long way since that day a bit over 5 years ago. But not in New Orleans or anywhere else like the pace of recovery from Katrina. That is a given. But New Orleans like Haiti had many problems well before Katrina struck. Haiti and New Orleans have some remarkable similarities. Both places are poor. Both places had years of failing infrastructure from poor roads to water and sewer systems that failed years before horrible events. So, recovery is not getting back to where you were before the catastrophes. Recovery is totally re-thinking the entire economic, social and physical structure of the community.

Few communities anywhere have actually recovered as fast as New Orleans is recovering. This remarkable recovery speed is certainly a testament to the hard work of citizens and many volunteers. New Orleans citizens are showing how determined they are with over 72 percent already returned to a City. The city alone suffered \$20 billion in direct damage to its infrastructure. No matter what dimension one looks at you can find a remarkable story. Public University infrastructure is over 90 percent in place. Most Public safety facilities are working at full capacity even though 3 new fire houses out of over 20 and 2 police stations out of seven have to be rebuilt. Parks and playgrounds are open in all areas of the City already serving youth and adults. New libraries are in design and scheduled for opening within 18-24 months. The city is paving more streets in the current year than at any time in its history. All of the major convention, sports and visitor destinations are not only open but hosting national events including a Super Bowl for 2013. There is little doubt that the lag in federal funding and disputes

Blakely Disaster Readings

over what was damaged by the storm and what was already in poor repair pre-Katrina exasperated everyone. Nonetheless, the recovery plan is being carried on time and at a remarkable pace.

Recoveries from disasters are not fast anywhere. San Francisco and Oakland which suffered less damage than New Orleans took more than a decade to recover. Comparably damaged cities like Kobe, Japan have taken 15+ years to recover and many other cities more time. But the inconvenient truth is that any city hampered poor preparation and poor internal governance will take many years to reach a state of good repair and stronger institutions. Port Au Prince is a classic case of lack of preparation and weak internal institutions. Before Port Au Prince can recover a new approach to what needs to be done to build a government and social order that can survive has to be developed. Certainly international organizations can help but the goal is to help Haiti help itself. Even with this approach we have to be realistic. The best we can expect as shown in the chart below is 5 years to reach stabilization and 20 to complete the process of building a city and nation that can care for itself in any emergency. The very best research indicates that few recovery reach full swing in less than 55 months or nearly 5years. San Francisco took 40 months with a well agreed upon recovery plan. In

The National Academy of Science provides some useful guidance on where we are and how far we have to go.

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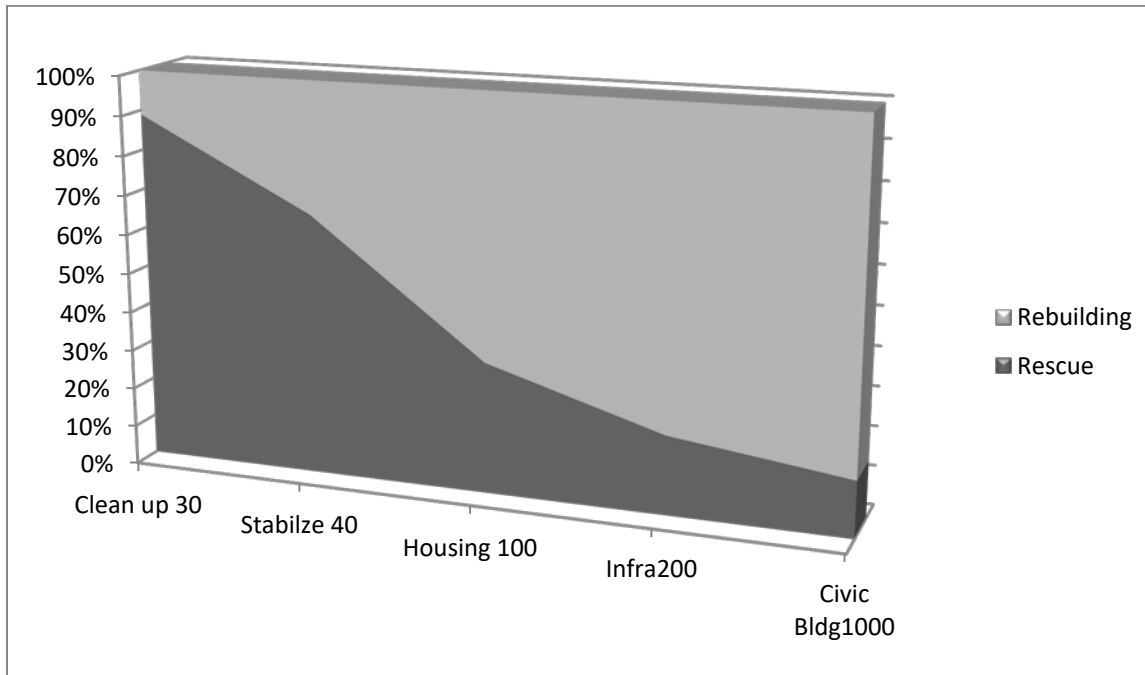


Figure 13 Based on National Academy of Science Recovery Projections 2006

As the Chart shows our full recovery will, most likely take 1000 weeks or nearly 20 years. This is the same estimate that other researchers like Lawrence Vail and Thomas J. Campanella in their book *Resilient Cities* (MIT Press, 2005) have suggested for a disaster of this scale. In fact, there are no counter illustrations of disasters of this magnitude anywhere taking a shorter time. In essence, while Port Au Prince will improve like New Orleans and places in the world will show marks of hurricane Katrina for many years. The real issue is not building faster but building better and smarter. The primary threats to Haiti its region will come from rising and warming seas increasing the number and strength of hurricanes in the next decades. So, Haiti and the entire Caribbean has to gear up for new disasters of similar magnitude. Sound preparation now such as re-organizing power systems, hardening water infrastructure and re-enforcing all schools as shelters should be taken now.

Blakely Disaster Readings

Australia has many building with solar and other technologies and sustainable temporary housing systems that can make a difference in recovery for Haiti, the Caribbean and our own neighboring Pacific neighboring nations. Let's offer aid to rebuild better places now and not wait for disasters. Let's be in a hurry to do it right.

Blakely Disaster Readings

Chapter 14: What can design/engineering and planning professionals give to recovery?

The response to a devastating natural disaster is by necessity a complex task, fraught with difficulties and danger – from the emergency response, when the first responders do their best to secure property and protect lives, to crisis management, when an assessment of the damage and a prioritization of repairs are made, and then finally recovery, when rebuilding begins. At all of these three stages, the well-organized utilization of knowledgeable and experienced professionals in the tasks at hand will have a significant impact on the success of the post-disaster recovery process. It is in the final stage, however, where professional skills from the design, engineering, planning and related fields are most needed. So, I thought I might provide, from my own experience, some ways those of us involved in these professions can help communities undergoing recovery – things the communities need and don't need from us.

Firstly, let's look at the things they don't need.

Pet projects – nothing is more distracting than a designer with a pet project renamed as the great disaster rebuilding idea. These ideas from all forms of New and not-so-New Urbanisms raised as the answer to all floods and all manner of mitigation. There is little doubt that new compact development has to come about, but a slavish prescription shouted at every office holder is not a recipe for attention, and it puts the community off good ideas if they are pushed too narrowly as the answer to every problem.

Ad hoc-advice – is as bad as no advice. It is best if a consortium of design professionals is formed that will provide a cross-section of advice and act as guides to good practice for the community. These guides to good practice should be broadly disseminated, and include information on how to prevent fraudulent building construction by shady operators. Good volunteer residential design review and inspection of building plans should be put in place by the design professions as a community service. Designers could collaborate with universities to use student interns as associates in plan reviews, ensuring people get good advice and students gain good new skills.

Blakely Disaster Readings

Fee seeking – the best way to prevent people from being hurt by high fees is for the design profession to post a list of reasonable fees on the web for homeowners to see. Opportunism post-disaster hurts all of us as professionals.

Blame games – blaming other professionals, such as planners, for the fate of residents in floods hurts the entire field. We need to work together to come up with sound practices for the community as an outcome of the floods and other disasters. New self-imposed codes of building should come into being and be promoted by the professions as a group.

Building capacity – what is really needed post-disaster is the building of professional capacity. This would mean developing new practices that will help the affected and other communities prepare for similar events in future – and allow for prevention, where possible.

Localism – too many times professionals on the scene behave like they have a unique and exclusive skill set and understanding of the situation that must be used post-disaster. Global assets and knowledge have to be incorporated after any disaster, and there are good places to go to get that knowledge, especially Japan and Europe, where centres exist to train and re-train professionals in disaster management.

Now, on to the things those communities do need...

Dialogue – let's use the disaster to start a dialogue on the wider issues facing the community, ranging from natural hazards to income inequality and economic development. A disaster is a good time to re-charge and re-envision the future. Only a few months ago, Queensland was discussing rapid population growth and how it might be harming quality of life. Population and demographic profiles along with settlement patterns have to be on the table for deeper, richer conversations about where we live, who the winners and losers are, and what the future holds.

Blakely Disaster Readings

University involvement – rather than proceed on the basis of government guesswork, now is the time to establish a knowledge base to guide action. Some kind of data-driven think-tank should be formed to provide direct advice to policymakers and industry, jointly funded by both, so that the best information, and not the loudest voices, are used to formulate policy direction.

Re-organizing governmental bodies to face the future – government will move to comfortable organizational structures they are familiar with because there is little pressure to do things differently. The Public University like what they know. But as we move into a new era of global scarcities, the old will not serve us well. In some areas, like water and power, it is clear that new, decentralized models will be required to provide both safety and reduce prices, as well as increase resilience. In other areas like education, senior care and income inequality, what we have is obviously not working in the present, and has little hope of meeting future needs. Design professionals know this and can help others see it and understand it. We cannot serve the future well by designing for the past our clients know. We have to press them on the future they are terrified to face.

As Winston Churchill said in the depths of the Second World War, when all of Britain feared the worst and thought giving in might be more tolerable than going on, “Sometimes your best is not good enough. Sometimes, you must do what is required.” Now is not the time to cling to the design silos of the past, now is the time for us to do what is required to secure a better world.

Based on an article in Australia Design Magazine, May, 2011

Blakely Disaster Readings

Chapter 15: Defining a University roles Pre and Post Disaster

Universities almost everywhere in the world have the largest pools of resources for disaster recovery in the academic staff and scientists, experts in administration (since many universities are as big as small cities), the technical staff ranging from construction, buildings and maintenance to the large pools of very able and nimble minded students. Recovery managers have to know how to use these resources and when. If they are not used universities can be very vicious critics or a source of enormous drains on the recovery by insisting on their needs to take care of students and scientific resources as higher priority than local community needs.

While American Universities expect to be part of recovery efforts, this is not true everywhere. No matter where universities they are, they must operate from the base established prior to the incident which forms the platform of capacity they possess or they role they plan. If this is not spelled out the University's role becomes unclear to the institutions that it intends to assist. I will develop a typology of University roles in this lecture as a template for understanding the ideal type for university engagement in recovery efforts post disaster. I am limiting this essay to post disaster engagements even though in many instances university resources are used during a disaster from stadiums and hospitals to rescue teams.

University roles are usually shaped by the universities prior community involvements. One of the reasons for this most universities have a portfolio of expertise and organizational systems that can respond to extra-mural community involvements. This ranges from have a Vice President for Community Affairs or similar title with a network of in place activities and resources that can be re-directed to the immediate needs of the crisis location. In some cases, the university has a well defined mission but several entities through which it works with no central device. For example, some universities have schools of medicine or architecture that are part of the community for their clinical activities but the university itself views its role as a training ground and not an interventionist. So, in disaster or any other set activities each institution will define its role in a way consistent with its bureaucratic arrangements. I completed my dissertation on a topic that bears this out. I looked at various American Universities response to the War on

Blakely Disaster Readings

Poverty in the 1970s. What I found was simply that the University defined the War on Poverty in terms of what it was already doing and not terms of the needs of the poor neighborhood or community that it served. So, if the university viewed its role as training social work professionals it sought grants to place its professionals in low income areas without any assessment of the needs or even the preferences of the community (Blakely, 1972). This should come as no surprise. Almost all institutions transform problems into their own dimensions. This conceptual framework is the backdrop for a set of models and roles that I present here.

In this approach I depict University roles as bureaucratic platforms. No university operates solely from any single approach. But there is usually a predominant approach. Universities do not offer these services in a vacuum. Government at some level is almost always the client but in some cases the wider community or non profits and other actors might well be the primary clientele for the recovery services. These are only meant to be archetypes and not tight definitions. This typology can and should be expanded on. The illustrations I use come from my own background in disaster involvements. The size and the scope of the disaster may alter the extent of the role but seldom affects the direction. I fully recognize this is not the only or best set of illustrations. I will elaborate on each of these in the next section.

Blakely Disaster Readings

University Roles in Recovery

University Model	Definition	Role Example	Recovery Approach	Gov't /Community connections
<i>Institutionally Engaged</i>	University is centrally engaged in the civic arena with defined office and senior leadership	University has a Vice President for Government and Community Affairs with a set of articulated activities and investments in the local/state civic— University of Southern California	University mobilizes the entire institution and all of its resources to deal with the recovery mission <hr/> USC acts as the home base for post Rodney King riot rebuilding program	City or State places its resources in the University and uses it to launch the recovery. City/State Recovery offices located on or near the campus and campus resources ranging from project management to government grants and programs run by the University

Blakely Disaster Readings

<p><i>Institutes or Schools as the Fulcrum for Engagement</i></p>	<p>The University has a set of identifiable institutes or programs that can be mobilized to meet the challenges of the situation</p>	<p>School of Public University Policy or Planning have useful capacities</p>	<p>University provides or focuses its efforts through these organizations immediately makes them available in the disaster and they work with local institutions</p> <hr/> <p>University of California at Berkeley with its Architecture and Urban Planning-re-plan Bay Area post earthquake</p>	<p>In this case the local/state and other organizations usually have a long term set of relationships with the University staff and there is mutual understanding and respect.</p> <p>The University provides needed information and advice to government</p>
<p><i>Consortia</i></p>	<p>A group of Universities in the same setting have a set of programs that work together</p>	<p>In an emergency these institutional networks are mobilized into a single framework</p>	<p>Many different sets of skills are required in a disaster but they need to be coordinated to be fully and effectively used</p> <hr/> <p>NYU-New</p>	<p>In this arrangement the Universities and governments nominate the leadership of the Consortia and it organizes</p>

Blakely Disaster Readings

			School, CCNY consortium post 9-11	a central resource center so that the resources of the entire set of institutions can be used effectively
<i>Expertise</i>	University staff and faculty have expertise the community can access	University uses its communications or other information systems to inform community and government of resources	Experts are employed as consultants and advisors on technical issues in recovery <hr/> In Katrina/Rita the Corp of Engineers, State Gov't and various community groups used expert advice on levee reliability and future options	Selecting University experts is useful when the experts are well known and highly regarded so that policy is re-shaped through this approach
<i>Good Offices</i>	University uses its neutral science and empirical perspective to	University has a set of experts or think tanks that on a regular basis deal with	When there is debate over various important and sensitive issues	For the University to play this role the government and community

Blakely Disaster Readings

	assist with difficult issues	policy issues such as Law or Policy Clinics	the University can be the neutral to advise all parties as to the best direction <hr/> UCLA Real Estate Institute used to settle issues of estimating damages from Northridge Earthquake	must have a history of positive interaction
<i>Capacity Building</i>	University has program and institutes with the ability to export skills and training that enhance local expertise and institutions	University has some form of external education programs that can be easily mobilized	Institutes used existing organizations to train local community leaders as well as adding capacity to local government <hr/> Post Katrina Harvard JFK School and Penn's Urban	Community organizations can gain skills from these outside resources. Government officials can and should go to training programs both to enhance their skills and as a way of reducing post

Blakely Disaster Readings

			Institute with its Curex program that assisted in developing new professionals for the recovery	disaster fatigue
<i>Advocacy</i>	Various units of the University act as advocacy for projects and programs that benefit the low income or other disadvantage groups	These units usually nominate themselves (Law, Public University Health) because they are aware of the general under service to certain groups or become aware of actual cases	Race and class conflicts always grow post disaster <hr/> Milano Graduate School work with Hispanic and undocumented workers post 9-11	Local/State and federal governments are always weary of such groups unless the University make sure that they stay within bounds of social responsibility
<i>Adhoc</i>	In this case the University take no active role but part of the University taken on the role of providing university not	Most universities that are distant from the tragedy take on this mode.	Since the University is not based in the area it is hard to make an institutional connection <hr/> Post Katrina	

Blakely Disaster Readings

	as schools or programs but a collection of interested faculty or staff and students		professorial teams from several universities like Georgia Tech, Brown, Dartmouth and took on areas of New Orleans as laboratories of recovery	
<i>Free Lance</i>	University staff or students make decisions on their own to develop projects and volunteer in any ways they deem help	Universities usually have a volunteer center that can be used as a resource but this type activity has no formal university base	The entire Gulf Coast had many volunteer from local and distant universities across the world	Governments see such resources as useful but very taxing since there is no connecting point for these individuals

Blakely Disaster Readings

This is a starting typology which can be built on. I will now turn to a more elaborate discussion of each and some of the pluses and minuses of each.

Blakely Disaster Readings

Institutionally Engaged

Public University Universities are best positioned for this approach since it is central to their mission. The capacity of the Public University to mobilize all of its resources is superior to almost any other university since the central university has federal Public University funding that comes annually which can be distributed throughout the university to accomplish its goals. The major advantage is the organizational structure of the Public University which is much more top down than private universities. In most cases the Public University has a policy institute that is already engaged with local and state government. In addition, the university uses local government resources as part of their training programs so there is little or no knowledge gap between the university and the local governmental organization or in some case state and even federal resources. For example, the Public University provides almost all of the hazard mitigation professionals in the nation. As a result, the federal, state and local officials in this field are on a first name basis, have similar training and attend the same conferences and meetings. So in an emergency they form an immediate support and information sharing group. In an emergency this network comes into play quickly. The advantage here is also the dis-advantage. Since these groups are so intimately associated they usually see the problems and resolution through the same prism.

Some private Universities like Penn and the University of Southern California have built exceptionally strong community links. These universities see these links as assets in attracting faculty and students as well as advancing applied science. These universities move into the disaster arena very easily because they have the internal structure to do so. Since disaster and recovery are emerging disciplines it will be relatively easy for these universities to build specializations in their existing curricula to accommodate this direction.

This approach is best used by large multi-disciplinary universities that can support these community or regional efforts with a strong fund raising base as well as a set of well placed academic departments, schools or institutes that have their teaching and research programs

Blakely Disaster Readings

oriented to a dependent upon rich and long term connections with the communities they serve. Public University has this as a built in orientation.

Cities, States and other governmental agencies need to have engagement systems already in place for this to work well. In many governmental agencies there are on going university links with university departments and schools. For example, until recently all of the City of San Francisco's urban development and zoning projects had to go through the University of California at Berkeley's simulation lab. Moreover, UC Berkeley's transportation, materials and other labs are also the State labs. Berkeley's School of Public University Health is across the Street for the State Department of Public Health as result, the link between University and State are exceptional close with some State employees actually on University payrolls. Penn has deep root in Philadelphia's urban planning systems. Finally, almost all of the Big-10 Universities the Extension Service operates some State government labs or institutes and the university has offices in every County with senior staff advising local officials routinely. In all of these cases, the link between State or city are so close that in an emergency the mobilization of these resources is part of the recovery process.

Disaster Recovery for these institutions is the norm but even in the instances of total university engagement, there are areas of poor interface in disasters. First, the senior officials in charge of university-community interface have organized for disaster purposes but not long term recovery. That is, in a disaster the university hospitals and experts are used to mitigate the damage. In a few cases post disaster institutes are called on but there is seldom a plan to assist local governments re-plan the city, develop new economic and housing models etc. Moreover, recovery is a many year process and the university is not set up to do this nor is the University funded for this purpose. University staffs also have little knowledge of the federal rules and regulations for recovery. Finally, university staff is far better at finding problems than developing and administering long term solutions

Blakely Disaster Readings

Since, we are in a era of climate change it makes sense for universities with long term civic engagement missions to develop recovery teams and train them side by side with local and state officials. These universities are the very ones that can launch new curricula or modify existing curricula to train and develop recovery experts and maintain institutes that capture knowledge form ongoing recovery efforts and translate that into material for workshops, courses, books and other dissemination tools.

Institutes or Schools as the Fulcrum for Engagement

Schools or Institutes that have some links to government practice are ideal collaborators in disaster management. Clearly all applied schools from engineering to medicine and Public University policy offer excellent resources. When the disaster is nearby, these schools can offer their expertise quickly and directly though the relationships they have built up over time. There is also scope for Schools distant from the tragedy to offer specialized expertise. Penn's Curex program in New Orleans is an excellent example of the exporting real estate and urban development expertise to the setting. UC Berkeley in Engineering and Cornell in Urban Planning mounted efforts tied to schools to the New Orleans efforts. Harvard's JFK and Dartmouth's Geography program found a neighborhood as a locus for offering expertise to New Orleans.

The question is always who in the School will lead such an effort no matter where the incident occurs. University academics have ongoing research projects and programs so any diversion from these efforts is personally costly for them. Funders do not suggest interruptions in grants and book editors expect manuscripts on time. Complicating this is the fact that the best known faculty is also the most knowledgeable and commands the most respect inside the university and in the community. In many instances, a senior administrator with a collection of students and faculty attempt to mount the effort but this means some administrative efforts are diverted to make the program work for an undetermined amount of time. On the other hand, institutes that are directly related like flood mitigation can increase their grants and contracts so disasters are

Blakely Disaster Readings

new found opportunities for them. Public University policy units can also shift some of their efforts on the margin during a recovery period. But ongoing leadership for such efforts is very difficult to maintain since recovery is a many year issue in most cases. Unless, an Institute alters its mission the recovery offers a temporary opportunity for deeper engagement with government agencies.

On the government side university help is desirable but not at all costs. Governments find the key staff they desire most are not the ones who are available or that the University has not mechanism to commit its institutes to the long term that recovery takes and the projects that the institutes receive their funding related to local government or community are not flexible enough in a time of crisis. Finally, a tension inevitably arises between the Institute's views of best practice and the government's current actions. Professors or staffs how sound critical of the government lead to government bureaucracies closing down the open communications channels. New York Mayor Rudy Giuliani closed access to information to universities post 9-11 because critical comments could harm federal fund raising efforts.

In the best of worlds, University institutes that are to be involved in recovery have to have melded the recovery program into their ongoing mission with government and community. This requires some reliable funding stream that supports both disaster preparation and recovery activities that can be enhanced as needs arise.

Consortia

Consortia responses to recovery come from prior relationships among the universities in working with government. In the Public University and Institutes of Technology arena many of these consortia are in place as a result of federal funding in earthquake, sea and flood mitigation research and service. So when a disaster occurs the network among the universities springs into place. There are many university inter-institutional relations for various purposes. In New York the Universities have been collaborating with none another in various programs to strengthen

Blakely Disaster Readings

government service at the local, state, national and international levels. So, there is an ongoing collegueship among the Deans of Schools of Public University Policy and leading government officials. In many other major cities such consortia are formed to improved public education, reduce crime or deal with immigrants. In a recovery, this same network is a foundation for exploring how individual schools within the consortium or several schools might combine efforts in ways consistent with the prior services. An extreme example would be a set of Universities taking on running a school district post disaster. More likely illustrations or the Schools acting as information clearinghouses and doing research for local or state governments needed for grants or to obtaining other resources. Almost always, student credit and mentoring of students to work in the disaster is a response through the consortium so that students can receive credit for various courses from a network of universities. So, in post Katrina New Orleans students are attending seminars at Xavier University and receiving credit at schools across the nation.

Consortia are based on opportunities to share resources and in an emergency these resources are usually damaged or the personnel scattered. As a result, consortia need to work out their contingency plan and potential roles in a disaster situation.

Local or other governments need a common entry point for these resources that is separate from the volunteer coordinator's office.

Expertise

In many ways expertise is the easiest resource to articulate. On the other hand, it is hard to make sure the right expertise is offered. It is also difficult for the so-called expert since time for an expert is a valuable resource. Experts in a field provide information but there is the need to absorb and implement the information. Moreover, most university experts have many clients. As result, unless the government is well organized and has a relatively elaborate bureaucracy the expert is of very little use.

Blakely Disaster Readings

Experts tend to have narrow range of skills to offer too. So, the flood expert might not be the best person on levees. Universities may be able to provide a list of experts to the community but the range and depth of their skills is not easy to articulate to the consumer government or community group.

Foundations are a major asset in identifying and supporting experts post disaster. Since Foundations are not bound by civil service and other bureaucratic issues that might impede obtaining the correct experts, links with foundations for governments is a very important resource. Unfortunately, few government agencies have ongoing no foundation relations or university resource pools to draw upon.

Since the need for experts depends on the circumstances the best way to meet this need is to develop expert pools. A single foundation or group of foundations or even the federal government might develop a registry of experts that is web based so local governments; States or community groups could access it. No matter how deep the list funding the expert is an issue. There are several ways to deal with this. One is what is called a Task Order—this is a device that allows the government to access human or other resources on an as needed basis with built in costs already settled and base contracts in place. Every government agency dealing with recovery and disaster management needs to have a budget for such Task Order specialists. Federal and State governments need the same type of access so the right experts can flow to the problems when needed efficiently.

Blakely Disaster Readings

Good Offices

Universities are first seekers of truth. The credibility of the university and the academy is at stake in any setting where there is a contest of evidence. Disaster create many such evidence conflicts ranging from what the cause and the consequence of the disaster. Katrina is a prime example where the extent of the Corp of Engineers complicity in the disaster is still an open question. Similarly, there are many ways to deal with environmental mitigation for the Louisiana wetlands. Government and other scientists advance various alternatives and cost estimates, so unbiased university analysis is important in determining which ways offer the best options. It is difficult for a university to play this role in recovery because passions are high and information plentiful. Moreover, the local university might have been harmed by the disaster itself so some groups cannot disassociate the university damages from individual or collective university staff judgments. On the other hand, scientists have long term interests in protecting their reputations so they want to put their best uncontaminated findings.

When, where and how to use the university in controversial or difficult choice situations is not evident. But it easier to use the University for Delicate Choice Situation than it is to use consultants. It is best to use the National Academies that offer scientists from across the nation than locals. But many situations are confined to unpacking local choices such as where to build and how?

For a university to play this role it is best for the University to have an Institute or some organizations with a history of fact finding and credibility. Law Schools tend to have such programs in place. But increasingly Public University policy and urban planning programs incorporate conflict resolution or mediation programs.

Local, State or community groups need to have a long term relationship and history of dealing with difficult situation using university information and conflict resolution resources.

Governments are accustomed to dealing with compromise but community groups are not. So, it

Blakely Disaster Readings

is important to elaborate the role of University resources in conflict situation well ahead of an actual event. Some communities have run simulations so that community groups can learn how to use these facilities in real crisis situations. University of California Davis has a program that trains local conflict resolution volunteers and community conflict programs. This kind of outreach activity is essential.

Capacity Building

Enhancing human resources individually and collectively is a traditional role of universities. Almost all universities operate some form of extended education activity for professionals. In recent years universities have tailored education for firms and governments and delivered these programs on site. The purpose of these activities is to improve the performance of the total organization or its capacity is the goal. The term capacity building has come to mean not only improving the human resources but technology applications as well. The best aspect of university taking capacity building roles in a disaster is that it is exportable. Any university with the requisite expertise can offer and export its resources to the scene of the disaster. This occurs in most disasters when governments turn to university institutes to assist in staff development programs to deal with FEMA or other disaster agencies. But in recovery the skill sets needed are in housing, economic development, crime and mental and social health. Some universities reach out to offer programs while others invite local teams to their campus for upgrading skills. Harvard has taken the approach of bringing local administrators from a disaster area to their regular summer programs in Public University policy and business administration. Penn has exported its real estate and economic development program to the Katrina disaster area to build a recovery cadre in New Orleans. In Los Angeles UCLA developed a long term community capacity building program post King Riots

The University of California at Berkeley created the University-Oakland Metropolitan Forum to build community civic capacity combining government, community and business into a new force for transforming the economy and social base of the Oakland Region post 1989 Earthquake. This institution was a very unique and valuable device in dealing with the

Blakely Disaster Readings

challenges of rebuilding a large area of Oakland after the worst urban fires in US history in 1991. Capacity building is done by all universities in one way or another. In Recovery it is important to identify the exact fit between the needs of the community and what capacities need to be built for the recovery. Governments can make this process work better by having a recovery strategy that incorporates capacity building programs as part of the recovery process.

Blakely Disaster Readings

Advocacy

Universities have a role in dealing with social inequality in the United States. Advocacy for those who cannot deal with the complications of recovery is a natural outgrowth of the university mission. University staff, faculty and students can be a resource to disaster residents in dealing with insurance, government grants and home construction. Advocacy can also lead to University faculty taking actions on their own in support of projects or groups. In some instances this leads to tensions and even conflicts with local or other levels of government. It is important for the University to take position as to its role and the latitude it is providing its staff and students as advocates.

Advocacy can also manifest itself in gaining new policies or policy directions such as promoting more compact development or the use of local energy materials etc. Articulating the advocacy goals and methods of achieving these goals is tricky. Political action of some kind is required which blurs the other role of the university as “good offices or capacity builder”.

Advocacy is an important tool but it has to be handled well so that the University’s broad goals are kept intact as a neutral resource. Governments can take advantage of advocacy positions to insure services and other programs aimed at community improvement are included in the recovery agenda.

Adhoc

This is the default role for universities in recovery. As opportunities emerge the University, its staff or students take advantage of these prospects. In most cases ad hoc projects emerge from the situation and contacts disaster area people and organizations have with the University. As people mobilize as volunteers with the University imprimatur they find ways to meet their own needs in the disaster situation from volunteer work with churches to working with community groups. Ad hoc activities give Universities visibility but no control over what is delivered. Thousands of university based volunteer have turned up in disasters from University programs all over the world. Good things happen from volunteer ad hoc projects. Some staff and faculty

Blakely Disaster Readings

undertake important studies that aid in recovery. The university role creates some confusion in these cases because the volunteer is from the university often but not sponsored by the university. As result, the university tends to not know how to handle these activities and the receiving government or other entity does not know the authority of the volunteer.

Governments with good volunteer program can use these resources and coordinate them in disaster activities. Liability is a very big issue for governments using volunteers so the University needs to find ways to reduce these liabilities for government agencies. The best adhoc volunteer situations are program based such as a group of students and faculty making a neighborhood plan. But when volunteers from Universities start clearing out houses or other dangerous work this present real problem for government because it creates unmanageable risks.

Free Lance

Free Lance differs from adhoc because there is no direct relationship between the university person or program and the University. That is a staff member on leave comes to the disaster area and enters into activities that may beneficial but there is no official connection. Free Lancers are part of every recovery. In many cases these individuals can reach back into their institution for assistance. But the Free Lancer is an individual with resources but not a university resource.

Free lancers are both a resource and a pain. Some free lancers use their institutional affiliation to enhance their credibility within the recovery for a variety of purposes. It is not unknown for a free lancer to appear on television and present un-authorized information with considerable authority relying on their university affiliation. This kind of thing creates suspicion on the part of governments and harms relationships at every level. A number of such free lancers have made themselves difficult nuisances in the Katrina Recovery offering advice in areas where they have no real expertise.

Tentative Observations

Roles universities play in recovery are very closely related to their basic mission and their institutional capacities. How you are organized implies how your will respond. But the larger

Blakely Disaster Readings

message is that disaster and recovery are not central to university research or service missions. Even changes at the margin are not easy for universities. The very organization and staff direction requires substantial examination before universities can play roles in recovery. Complicating all of this is the fact that disasters are short but recovery is a long term activity. No university is prepared for a 5-20 year commitment for the recovery of any locality.

Each of the roles described has its merits and all are used by every university at some time or another. An essential role for every university is to develop an internal approach to both disaster and recovery situation for the institution to offer communities locally or at a distance. Every community can become involved in capacity building at some level and using its curricular resources to prepare people in some aspect of recovery from engineering to dealing with social trauma post disaster.

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Lesson from New Orleans

New Orleans is a new laboratory for all of the roles described. While little data has been compiled a useful thesis can be crafted on the role of universities post Katrina/Rita. One of the greatest challenges for the New Orleans community was the lack of any form of coordinating institution for all of the university and other resources that were made available to the City and community agencies. Moreover, the local universities took an ad hoc approach rather combining in some form of consortium to maximize the resources that these institutions had within them. One of the reasons for this was that all of the local universities were substantially damaged by the storm. As the New Orleans universities have recovered they have developed different modes to provide resources to the City and communities sometime duplicative of the resources offered internally and externally by other universities. The City of New Orleans has no ongoing history of University City collaboration. In part, this is because university faculties as individual activists attack the City for numerous failures pre and post Katrina. A few faculty members transcended this role especially the President of Xavier University Norman Francis but his high profile was not taken up by his students or staff. Finally, the City of New Orleans has not mechanism for engaging external resources no matter the source. It is important for any city to develop an office and central resource center to both assess the City's needs in the broadest sense and to coordinate the resources that universities and other volunteers offer. Post disaster this is particularly important because university resources are pivotal in re-establishing the city's credibility with both internal and external stakeholders,

Conclusions

Recovery is a continuum. Unfortunately, conceptually the distinction between providing help for disaster and recovering long term from disaster is not well developed. As a result, Universities do not have a template to use to organize them or to deliver the resources for communities post disasters. In this essay I have tried to provide a typology of what is being done. We now need to develop clearer guidance and direction as to how universities can and should develop institutionally to meet the challenges of recovery.

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Chapter 16: Where to-Australia??

We are in the Carbon era. Copenhagen didn't result in any meaningful agreement and there is dwindling support for efforts to change energy use, reduce carbon production and make better more efficient cities. There is a public support after our recent disasters to make Australian cities better and more resilient.

One illustration of this is the broad acceptance of the Christie report on transportation an independent report sponsored by the Sydney Morning Herald. The Christie report is an illustration of the connection between smart cities and a clean environment.

For Australia to meet any form of self imposed climate change target post Copenhagen is important. But, the real agenda isn't those targets. It is the target to build a new sustainable industrial base and to grow more and better jobs. Good jobs are the goals of Australia for the next several decades.

Building the rail systems the Christie report suggests isn't for convenience it is setting the framework for a totally new Australian economy based for building smart cities.

Building a new rail infrastructure presents the opportunity that building the Harbor Bridge, the Snowy River Scheme and later the Opera House did in opening new frontiers for Australia as a modern nation with smart exports.

If the world is going to use less coal, own fewer cars and use less water someone has to create new industries to build the urban forms and systems or to or re-create systems to meet this challenge.

We Australians have profited from high energy use. It is our mineral wealth that is driving the rapid Chinese city growth. It is our raw materials exports that are allowing the expansion of manufacturing in India and much of the Asian Pacific.

Blakely Disaster Readings

But cuts to energy consumption don't benefit Australia so we see little reason to be part of a drive to conserve energy or lower consumption, cutting our standard of living.

To counter this attitude we have to see the need to re-build our cities in a post disaster era with a new thrust in sustainable and resilient living as a challenge and opportunity not as a loss.

Australia can create new jobs with a new focus of exporting material and technologies that build climate change resilient and sustainable cities.

Some of our current minerals can be transformed with smart engineering into better building products for city building.

Cities are already the fulcrum of national economic growth and prosperity of the nation. Increasingly as knowledge based industry become a larger part of economic exports our cities must be competitive places for people to come and build their ideas into economically competitive products and services.

Cities that build and retain and form human capital will be the strongest, most resilient and disasters free to be competitive in the world. The Government has established a Cities unit and a new program that requires all of our metropolitan areas to develop integrated urban plans in the next two years.

This is not just a good idea it is an idea to move us in the right direction for building a new economy. We must have great cities housing innovative knowledge producing environmental and design industries to both save our cities and create a new economic engine for the nation.

Our nation's export wealth flows through our cities and so are the real enduring resource to build wealth. So, as we improve the infrastructure of our cities, as the Christie report suggests with respect to transportation for Sydney, we are also positioning the nation to produce a new global export sector in city building.

Blakely Disaster Readings

For the first time in human history most people live in urban locations. The cities, especially in the developing world are expanding at an alarming rate. China will build more than 100 new cities of more than one million people each in the coming decades.

Throughout Africa, Latin America and the Middle East cities are being built or re-built to match the needs of the influx of people leaving farms or immigrating to urban squatter or legitimate dwelling systems. We have to make these places more livable and sustainable for a stable world.

As the world looks for solutions for growing population in an urban form to face climate change, and as it urbanizes, Australia is remarkably well-positioned to provide solutions for better communities across the world.

Australia (in coastal cities) is one of the most densely settled nations in the world except the City State's like Hong Kong and Singapore. Our capital cities are among the top 25 livable places on the planet. We have an enviable record in diversity and equity. So, we start the process to rebuild the nation's urban infrastructure with a good base.

We need to look at our resource base for city building.

First, we have every weather type and condition of the fastest growing part of the world like China, India and the Middle East and Africa.

Second, city building is a mature industry in Australia with world's best practice design engineering and construction firms. We generated most of this base since the World War II years and in the boom immigration years from 1970-2000.

Third, we have the world's most advanced and largest securitised real estate market in the world. Australian real estate, engineering and architecture firms are in an unusual position to export city building technologies and techniques to our neighbor nations and around the world.

Blakely Disaster Readings

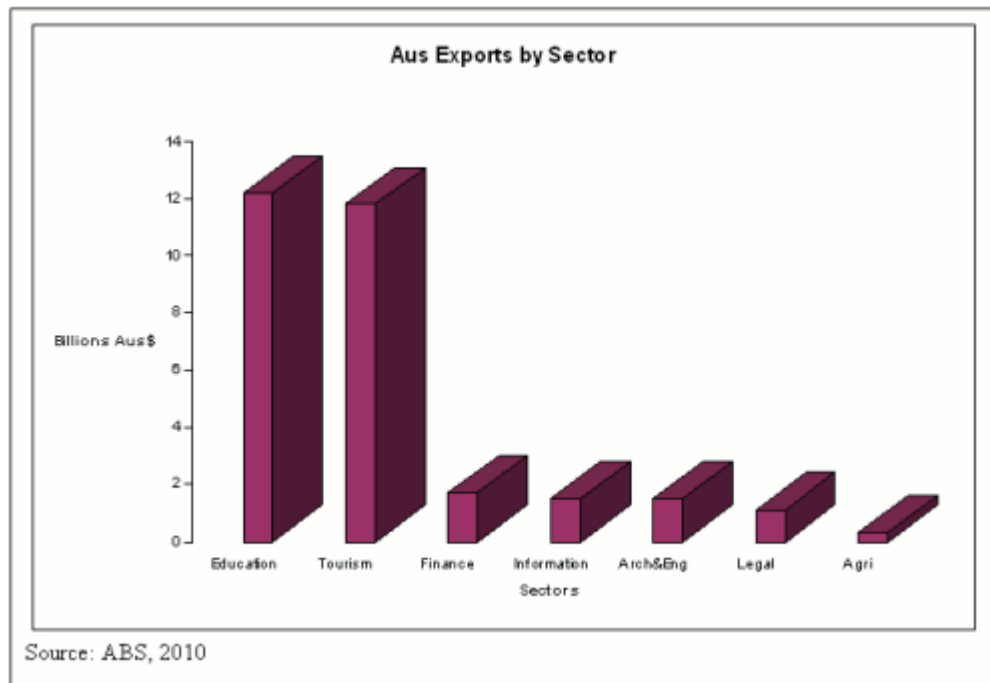
Fourth, Australia is home to many world class development firms from finance like Macquarie to development such as Westfields to Lend Lease, Stockland, Mirvac, Multiplex and world leading design and engineering firms and many more.

Australian architecture and design firms are already Asian regional leader in formulating environmentally sensitive design. The Snowy-Mountain Scheme operates in large scale water purification efforts in India and other Asian nations. And, Aussie firms are leaders in solar power and renewable energy.

We have exceptional talent in environmental engineering that is producing new products for desert and tropical climates to do everything from retard erosion to purifying water. We are spawning new firms in areas as diverse as disaster resilient housing to wind power systems and new battery and bio-fuels.

For example, Australian technology is pioneering in design and engineering of green low energy buildings for sustainable city building in the Middle East and China. It is clear from the graph below that our skills, capacity and know how in building sustainable places is recognized globally.

Blakely Disaster Readings



Australians are becoming world leaders in new materials products and processes. So, as we build and re-new our cities we must use this as the opportunity to create new firms and new products that can compete globally. To meet the challenge of converting this diverse array of

organizations and enterprises into a new export sector we have to nurture these firms and give them a platform to expand their global opportunities.

This calls for leadership from Austrade to form an international sustainable and disaster industries working group and for the national government to follow the lead of our European competitors like Sweden to make trading in sustainability a national endeavor with funding, national competitions for best firms and tax breaks for export firms in this new arena.

Why shouldn't Australia award the equivalent to the Global Sustainability Prizes every year? This would put a spotlight of the world on us for what we do in the world and what best practices are around the world.

Blakely Disaster Readings

We have another advantage in the global sustainability competition. We don't have immediate competitors among our global regional neighbors. This is the time, like in the "Great Depression", when re-building the nation with projects like the Sydney Harbor Bridge provide an opportunity to re-position the nation's economy for a new era.

Post disaster is the new era, we can use our know-how to rebuild our cities using scheme like the Christie Report as models for the world class rebuilding. Let's view the re-building of our rails, roads and suburbs not as a crisis but the opportunity to build new jobs and a better future for all Australians.

Based on Article On Line Opinion Sep, 2009

Blakely Disaster Readings

Finale

This is a potpourri of comments and ideas about post disaster management. It has some redundancies as a result of the sources. I make the same points several times in different ways. Overall, I hope the reader comes away with a few well-articulated ideas.

First, post disaster recovery is different from the rescue operations that come after any major disaster. Moreover, the rescue tools are not suitable for long term use after the crisis. But the first response to simply rebuild the way it was isn't constructive. Clearly, there is no going back. In fact, going back will place the community in the same dangers it just faced. Furthermore, the building footprint of the community may have been a contributor to the disaster as well as making the community more vulnerable to another similar disaster. Man-made disasters are more random but the issues arising from those events other than terrorism such as train crashes can be mitigated by looking at new ways to deal with the problem versus simply responding to the tragic events with the same methods that led to it.

Second, message is that we have to anticipate many more significantly worse events than the ones we have experienced since Katrina in 2005. There are many reasons for this but the most important one is that the climate is becoming more erratic. As a result, many more places face problematic futures. Urbanization is both a blessing and a curse. We have built settlements in

Blakely Disaster Readings

very vulnerable places. Thus, any small climate change causes deep shocks to the human built environment. So, we have to prepare for the worst and not merely hope for the best.

Third, every disaster is an opportunity. It is an opportunity to deal with the past as well as move to the future. Demographics suggest sweeping changes in who will live where and how. While preferences for large family homes remain in place the consumers are disappearing for such housing choices. We can use post disaster resilience and rebuilding to forge a path to the future with better and richer settlement systems tied to more decentralized infrastructure that can survive disasters. The old centralized systems are efficient for the present such as the grid but make us increasingly vulnerable in the future.

Fourth, it seems unnecessary and wasteful to re-invent how to do recovery post disaster. There is an emerging body of knowledge that needs to be shared and a profession of post disaster managers developed. Professionalization of post disaster management is not an added layer but a resource to communities in time of strife. Communities call on emergency first responders' from all over the world in a severe disaster. Moreover, all communities in the developed world have relatively well developed first responder training for professionals and volunteers. But once the disaster is over, the next steps are not as clear. So, I am suggesting a parallel international network of post disaster managers who are trained to assist communities and work alongside local professionals as they embark on the recovery process.

Finally, I view repositioning of current assets such as major infrastructure and buildings as a first step in disaster prevention. This will mean moving to high ground or away from the coast or different kinds of structures that are moveable or float. We have to be realistic and deal with

Blakely Disaster Readings

what we know is coming. Hiding from the future will bring disaster and no actions to prevent it are too expensive if we save human lives.

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Urban Planning for Disaster Recovery

Integration and Collective Action: Studies of Urban Planning and Recovery After Disasters

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INTRODUCTION

Many of the activities that fall under the broad description of “planning” have characteristics that might be described as a form of governance or collective action—a role that urban planning can at least partly play—particularly insofar as it relates to the management of land, physical systems, and distributions of human activities. This theme is followed in this book, where the focus is upon the suite of actions that represent urban planning, sometimes known as town or city planning. The book examines disaster risk reduction and, in particular, the recovery stage of what is known as the disaster cycle. As discussed later in this chapter, this “cycle,” an imperfect but descriptively useful term, acknowledges that disasters occur at given times, but that human actions relating to disaster risk reduction actually occur in one or more of four phases: planning, preparation, response, or recovery.

The theory base used in this book derives from a number of sources in the literature of urban planning, disaster management, and various other approaches to integration and interdisciplinary actions. In parallel, however, it demonstrates that a sustained, evidence-based, and integrated long-term action is fundamental to successful planning outcomes, and that poorly coordinated and planned recovery can lead to long-term risks that could have been avoided. The next section goes on to set out a description of disasters, the characteristics of the recovery, and the ways that urban planning can contribute to recovery.

COPING WITH DISASTERS

Hazards can be defined as natural or manmade conditions that have a potential for social, infrastructural, or environmental damage (Coppola, 2011; Oliver-Smith, 2002). Under certain circumstances, the interactions of hazards with human systems

might lead to disasters, i.e., disruptions of normal functioning of a community or society that involve large human, material, economic, or environmental losses and exceed abilities to cope with the affected society (Emergency Management Australia, 2004; Twigg, 2004; UNISDR, 2009). Historically considered as “Acts of God” or inherent natural phenomena, disasters are now understood as an outcome of social development patterns with higher risks of exposing vulnerable populations to hazards (Mileti, 1999; Oliver-Smith, 2002; Wijkman & Timberlake, 1984; Wisner, Blaikie, Cannon, & Davis, 2004). Consequently, since the 1950s tactics for coping with disasters have steadily evolved from civil defense–based response and relief approaches, with their roots in the “Civil Defense Era” following World War II (Coppola, 2011; Quarantelli, 2000), to risk reduction strategies (Pearce, 2003; Tarrant, 2006; UNISDR, 2004).

At present, general terms, such as “disaster management” or “disaster risk reduction” are used to define standard and organized efforts for reducing harm to life, property, and environment due to disasters (Coppola, 2011). These efforts can increase a community’s resilience. Resilience is understood here as an ability to cope with various catastrophes by surviving them, minimizing their impacts, and recovery with minor social disruption (Cutter et al., 2008). In addition, because the type of resilience that planning deals with relates to urban and the “built” environment, it is also useful to consider resilience as stated by Meerow, Newell, and Stults (2016, p.39):

the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.

Disaster management processes are usually described according to the components of a cycle comprised four interrelated groups of activities, two of which occur before the catastrophic event and two afterward (Alexander, 2002; Coppola, 2011; Emergency Management Australia, 2004; Topping, 2011; Twigg, 2004):

- **Mitigation or prevention:** includes long-term actions aimed at reducing impacts or to eliminate the likelihood of future disasters. These actions can be either structural (e.g., civil engineered defenses, physical retrofitting) or non-structural (e.g., land use planning, insurance, tax incentives, legislation, knowledge development, education).
- **Preparation:** comprises specific measures taken to reduce the impacts of an imminent disaster. Among these are emergency services training, establishment or strengthening of forecasting and warning systems, stockpiling of food supplies, evacuation planning, acquisition of emergency response equipment, preparation of shelters, etc.
- **Response:** consists of emergency actions taken during the impact or immediately after disaster strikes to reduce or eliminate its consequences. They include rescue and relief activities, evacuating and sheltering affected people,

enforcement of public order, resumption of critical infrastructure, coordination of external aid, etc.

- **Recovery:** includes repairing damages and restoring essential community services, restoring community back to predisaster conditions, and creating new opportunities for future development. Among these actions there are re-establishing housing, transportation, public services and economic activity, cleaning of debris, and social rehabilitation programs.

While preparation, response, and recovery are generally sequential activities, mitigation can be conducted at any time (regardless of the occurrence of actual emergencies) (Topping, 2011; Victoria Department of Justice, 2013). The length of response and recovery activities, in turn, will vary from case to case. As discussed further, in large-scale disasters, for instance, the latter may take up to several decades (Alexander, 2002).

RECOVERY AS A “PHASE”

Actions taken during the prevention, preparedness, and response stages can significantly avoid or reduce impacts (environmental, structural, economic, or social) when disaster strikes. The process of rebuilding, repairing, or reconstructing and returning a system to a functional state is referred to as the “recovery” stage of the disaster cycle (e.g., Blaikie, Cannon, Davis, & Wisner, 1994; Coppola, 2011). Aside from rebuilding, the recovery stage aims to restore community to less vulnerable state (Alexander, 1999). Following the response stage, recovery completes the disaster cycle and often shifts back to the prevention stage, acknowledging that some recovery activities are planned for at earlier stages of the cycle (Alexander, 2002). Typically, well-conducted activities undertaken during the recovery stage are the result, in a comprehensive disaster management system, of many activities having been planned in advance, including the allocation of responsibilities and development of regulatory frameworks. Realistically, however, unforeseen situations occur in almost every large disaster event, because of their inherent nature, resulting in unplanned recovery activities. However, if at least some recovery activities are undertaken in planning and prevention stages, time frames will be shortened, particularly relating to the restoration of vital services and facilities.

Recovery follows on from the emergency or response stage, typically only hours after a disaster. However, recovery commonly continues for many years, depending on the level of damage and the resources and capabilities available to a community (Alexander, 2002; Blaikie et al., 1994; Burby, 1998; Clary, 1985). For example, damages resulting from Hurricane Katrina, 2005 in New Orleans, LA, resulted in impacts that have required recovery to continue for almost a decade after the event at the time of writing (Federal Emergency Management Agency, 2012). The prolonged duration of this stage results in certain planning challenges. The early stages of recovery usually involve developing plans for temporary housing, allocating funds for various

aids, securing various sources of technical and medical equipment, etc. An important challenge often emerges at this stage, between taking speedy action to resolve immediate issues and achieving long-term disaster risk reduction goals. For example, provision of crisis housing and shelter is typically required within hours or days and consumes significant allocations of land, funds, professional attention, and associated services such as sewerage, food, health care, and so forth. However, as increasing land and resources are allocated to ostensibly temporary, short-term actions, they often impede long-term goals, such as ensuring that the overall layout of a town or city will be more resilient as a result of using the recovery process to redesign key aspects, perhaps including relocation of permanent housing or businesses and associated infrastructure. Awareness of these potential events and activities, therefore, should be included in earlier stages of the disaster management and planning, ideally before disasters occur. These would typically include matters such as development of plans for temporary housing, allocation of funds, and distribution processes and responsibilities for aid, ensuring availability of technical equipment. Of course, the nature of disasters and unforeseen events almost always results in unplanned activities within this stage.

Recovery activities can be divided into short- and long-term actions. Examples of short-term activities are the restoration of vital support systems, providing immediate aid to victims such as temporary housing, medical and humanitarian aid, various financial relief schemes, and recovery of basic facilities and services, such as water and sewerage systems. Examples of long-term activities include rebuilding and reconstruction of the community, thereby aiming to restore physical and spatial images of the community. Reimbursement schemes for property losses, such as insurance, financial aid, or buyback schemes, as well as establishment of ongoing communications with the public and various social rehabilitation programs, are also included in long-term recovery activities (Alexander, 2002; Coppola, 2011).

Recovery is sometimes considered to be the most challenging of the four stages of the disaster cycle. One reason is the need for close collaboration among professionals, agencies, and interest groups from a diverse range of disciplines and perspectives, for recovery to be effective. Recovery must not only include the physical restoration of damaged structures but also initially provide for the safety and well-being of victims in terms of potential vandalism postdisaster, the allocation of funds for restoration works across a range of agencies and people with differing impacts and tenure or other circumstances, surveys of overall damage, clearance and removal works, development of plans for the future, dealing with political processes, and reassessment of hazard risk with new data. Accordingly, it is not uncommon for some actions to conflict with and contradict other activities in the recovery process and, indeed, with other separate urban planning goals (Alexander, 2002; Coppola, 2011). For example, an area might be considered hazardous and highly risky by certain professionals after disaster surveys, but be retained as a residential zone according to regulations that also take into account growth pressures, affordability, and political necessity. These types of conflicts might be resolved by additional assessment, integration between agencies, reallocation of decision-making powers,

and development of improved procedures and dispute resolution mechanisms. All these changes fall under the broad banner of governance, of which urban planning plays a significant part. Moreover, governance needs to provide a room for adaptation, acknowledging that while “ideal” recovery processes would be based on plans formulated *before* disaster strikes, in most cases political appetite and resources do not remain strong and sufficient enough to support predisaster reconstruction planning (Alexander, 2002).

Additional recovery challenges exist under the broad banner of “time,” particularly the long periods required to develop and implement plans and if significant changes to predisaster states are sought. While recovery plans seek to bring a community back to a less vulnerable state in a timely manner, they typically require several stages of analysis, development, verification, and ratification, including the public. This, however, is often neglected due to time constraints posed by the nature of the recovery stage, coupled with a desire to bring communities quickly back to a functioning state (Alexander, 2002). In most cases, recovery processes tend to rebuild communities in very similar ways as predisaster states (Glavovic, 2010). This does not always allow sufficient changes to take place, again due to time constraints and the need to understand and work with social and community factors. While many residents and recovery managers will generally desire getting back to some sort of predisaster state as soon as possible, measures including ongoing community education and communications need to be established to explain, improve, and integrate changes, to ensure any community is returned to a less vulnerable state.

Another important temporal aspect of recovery is that it typically includes, even if only briefly, what is often seen as the “window of opportunity”—a period during which there is potential to change and improve disaster prevention measures significantly (e.g., Alexander, 1999; Mileti, 1999). Usually a rather short time period, it does not provide many opportunities for change, such as in urban planning, which is an important element of rebuilding processes. It can however, provide opportunities for important regulatory, financial, or cultural modifications to the mechanisms and agencies that underpin urban planning and management processes. The limited time frames for significant changes appear to be due to the political and bureaucratic processes, which contrast with the technical and scientific facts of planning, but are nonetheless inherent to planning powers and implementation. Another reason is the unwillingness of many community members to radically change approaches immediately after an event, when there may be a strong desire to return to predisaster conditions. Despite relief and recovery attempts, “...many people rebuild in precisely the same places and in the same manner so that they remain exposed to recurring events” (Glavovic, 2010, para. 6).

PLANNING FOR RECOVERY

As described briefly earlier, disaster recovery is a prolonged and demanding process that might take years or decades, rather than months. The processes of restoring functionality in a community and of reducing its vulnerability to potential future disasters

require collaboration between various agencies and disciplines, adding considerable complexity to activities during this stage. While the range of disciplines is deserving of a separate analysis and a study, this book focuses on one major aspect of recovery—urban planning and related exercises. There is an urgent need to address urban planning and recovery, particularly in a time of rapid change and urbanization. It has been calculated that in the year 2050 approximately 68% (around 6250 million people) of the global population will be urban. It is also predicted that by 2025 there will be 37 megacities with more than 10,000,000 inhabitants in the world, 22 of which will be located in developing countries (Heilig, 2012). In these countries, economic and environmental pressures are driving people from country areas to rapidly forming cities and urban agglomerations, seeking improved livelihoods, leading to rapid and uncontrolled urban growth (Twigg, 2004). Factors, such as population density, poverty, rapid expansion of informal settlements, overcrowding of tenement districts, failure to ensure minimum safety features, and a lack of governance mechanisms (Pelling, 2003), are turning cities into “hot spots” for disasters (Joerin & Shaw, 2010; Wamsler, 2014). Additionally, this problem is exacerbated by exposure of urban populations to biological, chemical, and physical hazards, which, although also existing in many rural locations, are particularly intensified in densely populated cities (Twigg, 2004). For instance, the urban fabric materials and heat emissions aggravate climate effects (e.g., “heat island effect”); unregulated construction, in turn, leads to the occupation of hazard-prone areas, unsafe buildings, and deforestation (Twigg, 2004; Wamsler, 2014).

The strong tendency for disasters to increasingly occur in urban areas must be contrasted with the fact that this is not inevitable, *if* careful planning and management can be introduced and maintained over time. Urban planning for recovery is a core area for improvement that will yield significant returns over time, particularly as it relates to urban areas and their hinterlands. The following section introduces essential urban features that relate to disaster risk reduction practices. Classified in four groups, they provide arguments for further attention and discussion in the various chapters of this book.

URBAN FEATURES AND RISK REDUCTION

PHYSICAL ASPECTS

Physically, urban environments can be managed in three different ways to prevent hazards turning into disasters. *Hazard mitigation* can be achieved through either (1) an appropriate management of environmental or physical conditions that compound/amplify hazards (e.g., vegetation clearance to prevent forest fires) or (2) by building physical defenses to reduce negative impacts of hazards (e.g., seawalls for tsunami protection). The appropriate *location* of urban features separating them from hazardous areas is another preventive mechanism. This can be achieved via (1) restrictions on constructions in vulnerable zones or (2) relocation of existing activities (e.g.,

moving buildings to higher ground to cope with increasing sea levels). Finally, physical *adaptation* of urban elements has potential to reduce impacts of hazards (e.g., building codes, design guidelines, or subdivision limits for vulnerable zones).

SOCIAL ASPECTS

In a broad sense, the most important ongoing social process influencing disaster risk reduction in cities is rapid urban expansion, which results from natural population growth and rural–urban or international migration (especially in developing countries) (Pelling, 2012; Wisner et al., 2004). This process is usually characterized by high urban densities and rise of social inequalities (Wamsler, 2014) and leads to increased levels of urban vulnerability, especially among those marginalized by gender, age (e.g., young and the elderly), ethnicity, religion, or disability (Twigg, 2004). Poor and marginalized urban dwellers have diminished capacities for coping with disasters, due to factors such as lower levels of education, insecure tenures, lack of social networks, and deficient access to governmental and financial support (Peacock & Prater, 2012; Wamsler, 2014). Additionally, the socioeconomic status and demographic features of a population, combined with levels of experience and education regarding disaster risks, will have a significant impact on the risk levels of a community and the resilience of community members. It is also important to note that this can change over time, for example as a community’s demographic tends toward an aging population, or to seasonally high levels of tourists, or as part-time hobby farmers displace more traditional long-term farming communities.

ECONOMIC ASPECTS

Norris, Stevens, Pfefferbaum, Wyche, and Pfefferbaum (2008) argue that a community’s economic resilience to disasters is determined by three factors: economic growth, stability of livelihoods, and equitable distribution of income and assets within populations. Twigg (2004) and Wamsler (2014) point out that economic urban risk reduction can be fostered in three different ways. First, a *diversification* and *sustainability* of activities and livelihoods (with proper income levels) has a means to decrease disaster risks. For instance, Adger (2000, p. 354) points out that for a community “dependency on a narrow range of natural resources can increase the variance of income and hence decreases its stability.” Second, by ensuring the adequate protection of critical assets and infrastructure [e.g., those “vital to both disaster response and to the overall safety and security of the affected population” (Coppola, 2011, p. 338)]. Third, proper *financial mechanisms* such as insurance and access to grants and credit for implementing mitigation measures have the potential to decrease risks associated with disasters. Disasters can drastically influence the economic situation not only of the affected area, but larger economic communities, such as a state or even a whole country or region, as it impacts not only houses and structures but also the economic assets of the area, such as manufacturing.

ENVIRONMENTAL ASPECTS

UNEP (2005) underlines that “healthy ecosystems often provide natural defences” to hazards (UNEP, 2005, p. 8) and therefore “degraded ecosystems reduce community resilience” (UNEP, 2005, p. 11). Twigg (2004) and UNISDR (2009) also suggest that environmental degradation (e.g., poor management of natural resources and destruction of ecosystems, such as deforestation or pollution) has the potential to increase the frequency and intensity of natural hazards, thereby increasing the overall vulnerability of community. For example, pollution of marshlands and their development in the Mexican Gulf area resulted in decreased numbers of natural hurricane defenses and influenced drastic damage brought by Hurricane Katrina to New Orleans (The Department of Homeland Security, 2006).

Wamsler (2014) argues that interaction of cities with their natural environment might lead to increased disaster risk in six ways: influencing urban climate, creating new hazards via built elements, expanding into hazard-prone areas, compounding new hazards by bringing together a range of competing land uses, producing high emissions, and changing hazard patterns due to dynamic urbanization. On the other hand, adequate environmental management provides opportunity for disaster risk reduction, according to UNEP (2005). It underlines the following: (1) inclusion of environmental change as a parameter of risk; (2) complementation of environmental scientific knowledge with locally based one; (3) protection and value of ecosystem services; (4) combination of engineered defenses with environmental technologies for disaster risk reduction; and (5) strengthening of capacities for environmental recovery. Twigg (2004, p. 249) underlines that “environmental protection or renewal is technically feasible” through activities, such as reforestation, waste management, and sustainable farming and grazing practices, supported by environmental education.

URBAN PLANNING

A brief summary of urban planning is provided here in preparation for a fuller explanation in Chapter 2. Recovery activities after a disaster event must deal with the diverse and complex functions of human settlements, sequencing activities over time in such a way that ensure both short-term and long-term goals of communities are effectively achieved (Australian Emergency Management Institute, 2011, p. 3). As a key part of this, urban planning is primarily concerned with managing the spatial arrangements of cities and towns, in keeping with its ongoing role as urban manager (Hall & Tewdwr-Jones, 2011). This includes, but is not restricted to, the range of physical facilities and structures that settlements need, such as water and sewerage infrastructure, hospitals, schools, offices, industry, and housing. The distribution of these different physical aspects is fundamental not only to the recovery but also to the ongoing functioning of an urban area during “normal” operations. For example, the distance and mode of transport between homes and typical daily destinations,

such as work, school, childcare, health, and recreation facilities, is an enduring challenge for urban planning. Similarly, the location, density, height, and arrangements of structures play a key role in determining the ways that an urban place will function. In addition to determining where structures are to be, the interwoven question is to ensure that certain areas are left free of development. This could be to allow sufficient space for food production, aesthetics, recreation, protection of natural areas, or to maintain space for future growth and change. Successful recovery planning needs to integrate and balance the needs and challenges associated with “everyday” and “emergency” operations.

In parallel with the physical aspects of settlements, and implicit in the brief description above, there are many and complex *human* aspects of settlements necessary to their success (Healey, 1997; Keeble, 1952; McLoughlin, 1969). In planning terms, this could be understood in a fundamental way as “land use”—the activities that occur on land and in buildings themselves—and the many links between these land uses. These aspects of use and activity are closely tied with, but separate to the nature and qualities of structures and physical spaces (Bracken, 2014; Lynch, 1984; Tugwell, 1975/1948; Unwin, 1909). Humans have complex needs that include aspects throughout their entire life cycle, from birth to old age, across a range of capabilities and choices. Cultural, recreational, familial, civic, political, and personal aspects of human life need to be accommodated within urban areas and within wider regions. These diverse activities occur within the structures and across private and public domains of urban places and impact upon vulnerability levels and types.

Human settlements are dynamic and always going through changes, whether it be growth and decline, in terms of demographics, economic qualities and fortunes, political and citizen sentiments, quality and life cycle of building stock, to name a few. Accordingly, planning is focused on balancing out and managing current circumstance with future goals and possibilities (Hopkins, 2001) that often coincide with risk management. Accordingly, planning also seeks to integrate management over urban change processes and the development of land and buildings over time (March, 2012). These controls might be based on zones, regulations, master plans, funding, development corporations, or design review committees. Whatever the planning tool used, the key rationale is that while individual citizens or corporations might own land, the achievement of overarching goals for a community, town, city, or region will often require their activities to be directed or even sometimes restricted so that overall benefits can be achieved. For example, an individual might find it lucrative to commence operating a noisy factory on his or her land in a well-serviced and accessible inner city area. However, if this is an existing residential area, it is common that urban planning regulations will prohibit the factory in that location, since the overarching benefits of maintaining residential safety and amenity outweigh a single individual’s property rights. Similarly, in risk reduction terms, it is common to discourage development in floodplains to improve the resilience of settlements and the burden on the community when floods do occur, even while many individuals may wish to build there.

Because planning is oriented to the management of change and seeks certain physical outcomes, it achieves this, conceptually at least, via establishment and use of processes providing legitimacy as part of representative government, rational decision making, and shared understandings. These processes include plan making and plan implementation. A range of models exist, set out in more detail in [Chapter 2](#), which seek to use evidence, inclusive, democratic, moral, and rational to make decisions spanning individual and collective matters. Further, these goals and area of jurisdiction span the geographical range from individual sites and structures, though to entire regions and nations. This can be summarized as planning being evidence-based spatial management of settlements to achieve a range of goals that balance out current and future needs, the need for at least some level of equality of process and outcome, and management of expected risks. However, as set out in [Chapter 2](#), these expansive and far-reaching goals also pose a number of challenges and these have considerable implication for the integration of urban planning with disaster risk reduction.

CONCLUSIONS

This book provides an understanding of urban planning so that those involved in disaster recovery can better understand its potential, as well as its limitations and challenges. In parallel, it provides a starting point for those who already work as to planners understand the nature of disasters and particularly the importance of considered action in the recovery phase of disasters.

The following sections of this book set out key areas for attention, complemented by case studies and examples to illustrate ideas and concepts that can be transferred to other settings. The next two chapters set out fundamental principles across the fields of disaster risk reduction and urban planning as they relate to recovery. Following this is a series of chapters that take up the important theme of governance, acknowledging that urban planning derives its powers and acts through organizations and agencies established by and with government.

As discussed in the final chapter of the book, there are limitations to the power of urban planning in recovery processes, and it is important to acknowledge such limitations. However, experience shows we have many opportunities to improve disaster recovery processes and urban planning has much to offer, particularly in terms of providing an integrated framework and range of spatial organization mechanisms for improved recovery and long-term disaster risk reduction.

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Urban Planning and Recovery Governance

2

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INTRODUCTION

When disasters occur in and around human settlements, their consequences are highly place-specific, revealing how a particular hazard interacts with and has consequences for the way humans have built upon and live in given locations. Once a disaster has occurred, the process of recovery challenges urban planning, a discipline charged with the management and ongoing improvement of our settlements, by presenting an opportunity to reconsider and improve upon a settlement's characteristics. We present in this chapter a way of thinking about urban planning during the recovery phase that is procedural, as well as being future-oriented to improved disaster resilience as an ongoing process.

A common approach used in recovery is the principle of “building back better.” Oriented to a whole-of-community risk reduction approach, it also seeks to reduce the likelihood and consequences of future disasters, as well as rebuilding. It is intuitively logical as the possibility of ongoing losses from repeated events is very real. For example, in the United States the proportion of repeated payments under the National Flood Insurance Program is approximately 25% of the dollar value of payouts, despite being just 1.3% of the total number of policies held (Cleetus, 2015, p. 4).

Establishing planning processes and governance that facilitate improved risk profiles during recovery is now understood as a core goal of disaster risk reduction. The Sendai Framework for Action 2015 review of Build Back Better highlighted the centrality of good governance prior to events to recovery, and that:

Recovery needs to be viewed holistically - as part of a continuum, inseparable from preparedness, response, mitigation, and sustainable development. Moreover, recovery must be approached in a cyclical nature wherein actions to strengthen resilience are taken both before and after disasters occur – rather than a linear approach that limits recovery action to the aftermath of an event

UNISDR (2015b)

Despite the logic of reducing future disaster losses and general acceptance of the concept, it remains problematic in practice, particularly within the complexities of urban planning practice and its governance settings that are not generally oriented to

disaster risk reduction (DRR). In particular, there is often limited agreement regarding what “better” means and there are typically multiple views on how to achieve outcomes across various recovery scenarios. Even if consensus is reached, the construction sector might not have the capacity or inclination to deliver radically new designs and materials in quantity—as happened in Australia after the Black Saturday bushfires (Kornakova, 2016). In another case, after a devastating wildfire in 2014 in Valparaiso, Chile, nongovernmental organizations (NGOs) rebuilt many houses immediately, recreating the vulnerabilities of the previous settlement. Alternatively, following the 2004 Indian tsunami, many small fishing settlements, often with informal tenure, were relocated away from the sea for safety (e.g., Bavinck et al., 2015; De Silva & Yamao, 2007). However, this disrupted the livelihoods of surviving residents and, in some cases, led to increased risk when the cleared set-back areas were rebuilt with tourist facilities. Furthermore, a focus on buildings alone can overlook financial, social, and economic issues. Local livelihoods and local economic activity are particularly important, such as in Christchurch, New Zealand, in which the post 2011 earthquake central business district cordon displaced about 50,000 jobs.¹

We suggest that urban planning, understood as a form governance, can play a significant role in improving pre-event conditions and post-event rebuilding that are beneficial to effective recovery. In particular, planning can act as a highly effective spatially realized knowledge and decision base for ongoing improvement and decision making, as well as building governance capacity. As suggested by the UNISDR (2015b, p. 3):

[T]he single most effective decision a community or country can make to ensure efficient and effective recovery is to strengthen government systems for recovery before a disaster strikes, through pre-disaster recovery planning. During much of the actual recovery period, many decisions will require split-second action that allows little or no time for analysis. A pre-disaster plan or strategy outlining overarching goals and objectives can help guide post-disaster planning, and reduce the likelihood of ad-hoc behaviors or decisions. It can ensure that pre-existing vulnerabilities are addressed and disaster risks are reduced.

Urban planning can increase certainty that recovery will improve risk profiles by pre-establishing building standards, overall allocations of services and infrastructure across communities or regions, and the assumption that risks in existing settlements are within acceptable standards. However, this certainty may be at odds with actual practical abilities to modify the strategic direction of growth and change in the recovery process. Further, the prior manner of development remaining after an event (such as street patterns and location of activities, for example) may be at odds with contemporary standards of risk, ecological, social, and economic sustainability. Accordingly, practically achieving ideal standards in terms of risk reduction and sustainable development may have to be traded off with the capacity of local industry and government to deliver. Notwithstanding these challenges, urban planning offers considerable potential for risk reduction and recovery. While it is valuable to appreciate the outcomes of good urban planning

¹ See Chapter 6.

[see Sendai Framework (UNISDR, 2015c)], there is a parallel and ongoing need to understand *what* planning is and *how* it actually occurs. The next section sets out key planning processes and mechanisms, particularly as they apply to developed and democratically-oriented countries or those in transition.

URBAN PLANNING: RECOVERY AS *PROCESS*

A core goal of mature planning systems is to bring about advantageous spatial arrangements of all the physical and functional features in urban and regional areas. These might include housing, recreation, health services, infrastructure, transport, education, industry, and so forth (Halligan & Power, 1992). It is noteworthy that while this understanding tends to focus on physical matters, such as the design and location of structures, the purposes of planning are equally oriented to improving social, economic, and ecological outcomes via these physical processes.

Many models of urban planning processes exist and these continue to be contested and refined over time. Importantly, the most enduring procedural model has its origins in the work of Patrick Geddes, known by the shorthand of Survey-Analysis-Plan (Buxton, Goodman, & March, 2012). This was further developed by various others and applied at multiple spatial scales, for many purposes, notably Mumford (1968) who championed evidence-based strategic planning and action at the regional scale, Abercrombie (1943), and later Lewis Keeble at the metropolitan, town, and precinct scales (Keeble, 1952). The model at the core of these approaches is known as rational comprehensive planning (RCP), although diverse and important variants exist, notably systems planning (McLoughlin, 1969). The model was adapted to urban planning by Meyerson and Banfield (1955), seeking to reduce the negative influences of corruption, subjective values, and politics upon planning processes, in favor of a more scientific and evidence-based approach. The key steps of RCP (as adapted in Keeble, 1952; Taylor, 1998) are:

1. analysis of situation and identification of problems/opportunities;
2. identification of alternative goals and objectives;
3. design of alternatives;
4. comparative evaluation and selection of alternatives against goals;
5. implementation; and
6. monitoring of effects and adjusting goals or other parts of the process.

Even while RCP is periodically criticized, augmented, or ignored since first being developed in the 1950s, it remains relevant (Hoch, 1994; Levy, 2000; Sandercock & Kliger, 1998; Yiftachel, 1999, p. 21). It is noteworthy that the international standard for risk reduction processes *Risk management – Principles and guidelines* (ISO31000, 2009) is an adaptation of the RCP approach. Alternatives such as incrementalism (Lindblom, 1965) are more pragmatically based on the “reality” of managerial approaches that adopt the approach that ongoing adjustment to plans are needed. While perhaps appropriate in certain implementation processes, this approach is criticized for its complexity and attendant loss of strategic and collective oversight, and

more fundamentally for its appropriation by various bureaucratic, political, business, or interest groups. While a popular approach as an ideal, the impacts of *realpolitik* often make this ideal implausible, although its use in plan making rather than implementation settings remains more realistic.

As set out in [Chapter 1](#), recovery is generally understood as the process of rebuilding, repairing, or reconstructing and returning a system to a functional state after a major event or shock (e.g., [Blaikie, Cannon, Davis, & Wisner, 1994](#); [Coppola, 2011](#)). In parallel with physical rebuilding, this stage is one in which attempts can be made to improve the resilience of communities ([Alexander, 1999](#)), including a range of social, economic, and ecological measures. Central to urban planning's ability to add to recovery processes and make improvements to the functions of settlements is an understanding that urban planning must always occur as a *process*, even while some end point ideals of settlement design and function may be a key aspect of directing planning's activities.

While boundaries can become blurred, planning processes broadly occur as either *plan making* or *plan implementation*. Plan making involves all of the prior activities associated with envisaging, testing, and selecting desired future outcomes, for example, the preparation of a policy and associated regulations to restrict and improve construction on sites subject to landslip. This would be based on initial technical and evidence-based analysis, usually with mapping and spatial components. The *implementation* of this policy might include mapping and then applying the regulations to the correct sites and the assessment of individual land owners' applications for development against the criteria of the policy.

The outcomes of implementing planning policy, if successful, might be that future development on highly risky sites would be precluded and that development on moderately dangerous sites would be managed and designed to reduce risks to a manageable level. Development control processes are commonly used to require that the design, materials, and layout of physical structures are appropriate. They also ensure that people occupying these areas are aware of risks and are capable of evacuating in a timely manner or of effectively responding to a disaster. Additionally, sites with low risks would also be identified so that streamlined processes could be established for these areas. For example, an individual might apply for a permit to build a house on a site with moderate landslip risks. The assessment procedures would determine the characteristics of the risks on that particular site, including seismic, engineering, geotechnical, and other expert inputs, and issue a permit subject to conditions. The conditions might include restrictions on excavation and vegetation clearing, engineering requirements for the structure, earthworks and water management on the site, and so forth. The benefits of such a process would be that overarching (including non-hazard-oriented) goals such as managing development pressure and aesthetics would be achieved, while also managing risks to individuals and the community to a level that is quantifiable, economical, and considered acceptable when assessed against a range of tests.

PLANNING USING EVIDENCE

In developed countries, the practices of urban planning use various sources of knowledge and evidence as a base for developing future directions, to provide guidance in recovery processes, with rational reasons providing legitimacy. Among these sources are various data sets, past experience, professional and personal knowledge, interactions with other agencies, decision makers, professionals, and community members to name a few (Krizek, Forysth, & Slotterback, 2009). This places the development, assessment, and application of various evidence as a core element of practice. Moreover, the holistic nature of planning requires a multidimensional approach to practice as it includes a range of different systems, at different spatial scales. Analogous to a living organism, any city consists of many diverse systems, such as transportation, water supply, infrastructure, waste removal, energy provision, housing supply, economic production, health provisions, and many others. These need to be integrated to be sustainable, particularly since considerable amounts of resources are consumed in developing and maintaining a city. Therefore, evidence in planning is core to justifying the multidisciplinary elements underlying the decision-making processes informing planning. For example, informed choices about the release of new land after an event in a particular location will have implications for costs in terms of infrastructure, housing, affordability, distance to places of work, loss of habitat, requirements for new schools, health care, and so forth. Importantly, the nature of urban development may have implications for disaster risk management, meaning that hazards need to be fully understood and risk profiles developed for any proposed and existing settlements. This section briefly introduces evidence in planning and provides several examples with particular focus on hazard mitigation.

Put simply, urban planning is an exercise in urban management based upon spatial understandings such as mapping being combined with various other types of analysis and action (e.g., setting parameters for future growth patterns) being taken on this basis. This requires the gathering and analysis of various data sets to provide a sound base for understanding the benefits and implications of the many possible futures a human settlement might take. These data sets will include topography of the area, population trends, transportation assessments, economic trends, and so forth. Topography is usually presented in spatial data sets, also referred as geospatial data or geographic information, identifying the location of features and boundaries of natural and constructed features. With ongoing development of technologies, these data are becoming more detailed compared with previous survey based data. As a part of mapping exercises, spatial data are analyzed and converted through various software packages and can further be used by planners for development or updating of various maps on different levels.

When applied to DRR and recovery techniques, spatial data can be used to identify vulnerable areas based on geographical features of analyzed areas. For example, growth trends could be identified and combined with mapping that model flooding

levels and velocities, leading to development of policies that direct growth to more suitable areas and specify particular building standards. It could also be used to plan evacuation routes while ensuring road capacities are sufficient, to find appropriate locations for future development, or to ensure that sufficient distances are maintained downwind from a potential hazard such as an oil refinery. Spatial data and modeling can determine locations suitable for development, including matters such as further analysis of soils, for example, to allow avoidance of landslide hazards, combined with the use of building and construction codes, and provision of detailed engineering inputs. [Chapter 7](#) provides more detailed practical example of evidence applied planning in Switzerland, demonstrating the need for multiple evidence sources for planning for DRR.

Empirical (used here to mean “observed”) data are another example of evidence being used in planning to inform choices about the management of cities and regions over time and, particularly, in the recovery process. For example, statistical analysis of populations allows identification of trends in general or of specific communities (e.g., growth rates, health differences between parts of the city, transport preferences). This also allows identification of the likely demands and needs of a community projected into the future, selection of the most beneficial growth, and change strategies. For example, if a population is aging significantly over time, it may be appropriate to provide different housing types in the future to complement that population’s needs, combined with health facilities catering to elderly health care.

Empirical data can be used to influence development strategies, resulting in modified economic strategies, changes in planning and building requirements, land use and zoning of the area, or other actions. Importantly, when applied to urban planning focused on disaster management, empirical data allow professionals to estimate vital elements that can assist in the prevention stage. For example, the number of households likely to require evacuation assistance could be modeled for a proposed new housing development, allowing an informed decision about the risks associated with it to be understood and dealt with or simply avoided in advance. For example, recent changes in wildfire planning in Victoria, Australia, require provision of defensible space and removal of nearby vegetation for new homes, based upon a combination of wider mapping, detailed site assessments, and setting of site-specific building standards based upon likely future risks.²

Evidence from different fields and disciplines allow planners to create various scenarios of possible future events and test them out to identify best available solution. This is particularly evident in the creation of evacuation routes and refuge points in advance of future potential disasters. Spatial data and any previous event histories allow professionals to establish potential future disaster characteristics, which can be further added to community maps. As discussed in the next section, however, this typically requires inclusion of many other parties and collaborative approaches with other stakeholders.

²See Chapter 10 for more details.

GOVERNANCE AND RECOVERY: PLANNING WITH AND FOR OTHERS

Governance in democratic nations is generally understood as the wider set of processes that bring about collective outcomes, including but not restricted to, the formal agencies and institutions of government and often the public and interest groups (Healey, 1997). In this sense, it is also understood as being based upon good process that builds capacity in the wider citizenry in addition to a narrower view of “correct” decisions and outcomes. This wider view acknowledges the value of group learning, the development of trust, and the need to understand and acknowledge the views of diverse stakeholders. The processes of recovery, however, also place particular demands on the need for decisiveness and strong action, meaning that trade-offs need to be made (March, 2012). So while good process is important, it might not always be enough in disaster recovery. Recovery, and disaster management, is typically assessed against outcomes, as well as processes. An argument can be made that this is reasonable and what is expected by all the stakeholders in recovery.

Tierney (2012, p. 344) articulates the connection between governance and impact reduction:

disaster governance consists of the interrelated sets of norms, organizational and institutional actors, and practices (spanning pre-disaster, trans-disaster, and post-disaster periods) that are designed to reduce the impacts and losses associated with disasters arising from natural and technological agents and from intentional acts of terrorism.

We might dispute aspects of this, in particular the conflation of terrorism with disasters inter-related with natural processes, but the overall picture aligns well with understandings of good governance, as set out earlier—with an important exception being the emphasis on outcomes. Similarly, at the global level, the United Nations Office for Disaster Risk Reduction (UNISDR) emphasises outcomes in its 2011 Global Assessment Report (UNISDR, 2015a, p. 116) and noting also that good disaster governance is not easily achieved, concluding that “aside from reducing disaster mortality, existing risk governance capacities and arrangements generally fail to achieve their aims.”

Although definitions of governance generally include all formal and informal means of management by government and organizations fulfilling key social and economic roles, most discussion, ranking, and commentary draws on formal institutions, especially the institutions of government. Commerce, civil society, and NGOs are too often absent even though they are important at all stages of DRR and management and are key to recovery governance and outcomes.

TOWARD GOOD DISASTER RECOVERY GOVERNANCE

We acknowledge that urban planning is only one aspect of overall governance processes in recovery. Governance is a complex and dynamic set of mechanisms that extend well beyond the formal agencies of government and political influences.

In the case of recovery, there are the added stresses of time pressures to help those affected, the emotional, and practical strains associated with dealing with the aftermath of a significant event and the potential for finding ways to improve risk profiles during recovery. Urban planning is often a key factor in these processes, with its potential to influence physical and spatial outcomes in ways that impact significantly upon social, economic, and environmental concerns.

Understanding the quality of governance and finding ways to improve it is key to effective recovery. As a starting point, the Overseas Development Institute (ODI) and United Nations Development Programme (UNDP) have developed and applied a disaster risk governance index (Wilkinson, Comba, & Peters, 2014). It starts with the position that human development, political stability, and democracy are needed for good disaster risk governance. However, the resultant index score depends on the details of the combined index construction (Wilkinson et al., 2014, p. 12). The index rates governance by measuring both disaster-specific actions, such as plans, regulation, and policies, and more general attributes, such as accountability, transparency, and participation. The resulting index ranks many countries highly, yet many achieve considerably lower scores, such as Vanuatu in the South–West Pacific region.

The index is based on three existing indicators with global coverage that focus on “generic governance characteristics, and environmental shocks and stresses” such as those from disaster risk management and climate change adaptation. The three indicators comprising the disaster governance index are:

1. coping and adaptive capacities as measured in the World Risk Report (Alliance Development Works, UNU-EHS, & The Nature Conservancy, 2012), including perceived corruption index, good governance (failed states index), various medical facility and health outcome indicators, and a range of capacity indicators such as literacy rates and natural resource management;
2. the readiness score Notre Dame Global Adaptation Index (ND-GAIN), that is, the national level scores of vulnerability and readiness to adapt to climate change, consisting of economic, governance (e.g., accountability, stability) and social indicators (e.g., education, mobile phone usage, rule of law); and
3. the national monitor for the Hyogo Framework for Action (now Sendai Framework)—indicators from all five priority areas are included. These are that DRR is a national priority with capacity for implementation; risks are identified, monitored, and with early warning systems; a culture of safety is developed; risk factors are reduced; and response capacity is strengthened.

The top ranked countries are mainly those with high levels of human development, such as western European, North American, and Australia. However, there are exceptions—disaster recovery outcomes in Italy and Turkey have been poor despite solid performance on the index, which might be a result of a series of very destructive earthquakes. Lower scoring countries tend to have problems implementing disaster risk governance and find that finance and expertise are limiting factors. However, there are exceptions here as well—Cuba has been observed as an exception in development terms as it has long shown high capacity and positive outcomes in the area of disaster risk (Wilkinson et al., 2014, Box 1).

Good governance emphasizes local participation and power. There is a question of how much influence local communities should have on national/state governments, especially those with centralizing tendencies. For example, the US and Japan local governments typically have much more autonomy and responsibility compared with other similar countries such as Australia, and nationally the countries score high on all aspects of the ODI–UNDP index. However, the case of Hurricane Katrina in New Orleans stands out as an example of poor disaster risk governance at every stage including recovery—processes were lacking and the outcomes remain poor. Limited resources and less than favorable formal arrangements do not have to result in poor governance and outcomes.

To summarize the arguments above to the extent that this is possible: high scores on indexes emphasizing democratic participatory processes do not guarantee a sound recovery, and at an individual event level this is far from the case. Recovery governance needs to include a focus on outcomes, and those outcomes need to be achieved for the people involved within a reasonable time frame. This is far from straightforward. There is a real risk that property owners find themselves unable to rebuild or use their land, entangled in arguments about insurance, and generally caught in a context of uncertainty and indecision, which can be exacerbated by open-ended processes and legal arguments. This potentially has negative implications for local livelihoods and economies. As governance is concerned with both processes and agencies, the latter must be explored to establish clear understanding of good governance.

URBAN PLANNING AND THE MAIN AGENCIES IN RECOVERY

A key theme of this book is recognition that urban planning can be a key mechanism oriented to achievement of collective outcomes, focused here upon DRR in the recovery phase. However, it is important to note that “balancing” is often required between individual and group outcomes and control, and between governmental and individual responsibility. In this sense, urban planning processes can sometimes result in reallocations of rights away from individuals, in favor of overall benefits such as to future generations, including risk reduction.

While various sectors have significant roles to play, the main medium through which urban planning achieves collective outcomes is via government agencies. These include local authorities, municipalities, and town councils at the local level that prepare future development plans and maintain and enforce land use regulations or zoning rules. They often carry out important public projects integrating the needs of human settlements, such as building levees, building standards, vegetation management, and development of emergency management systems and warnings. In parallel, there are typically metropolitan-, state-, and national-level agencies with planning responsibilities and influences, such as state or national planning departments. In addition, many stand-alone agencies exist. These are usually oriented to particular tasks, such as housing, roads, redevelopment of key sites, or natural resource management, defense, and security.

A key aspect of western urban planning traditions and practice, as it is facilitated by government agencies in the recovery phase, is its legislative underpinnings. To provide legitimacy for agencies to carry out their roles, it is typical that a legislative base exists to provide a range of powers, responsibilities, and procedures. This legal foundation enables various agencies to act and to make decisions that often cut across the property or personal rights of individuals to build upon or use their land. From this basis many of the main processes of planning, such as the mechanisms for preparing plans and implementing them, have key statutory elements. These will include matters such as the notification of land owners and occupiers if changes to planning regulations are to be made, provision of key information, lodgment of objections and appeals, and final decision procedures. In addition, it is common that there will be a legislative basis for the interactions between the various agencies relating to planning, such as transport, waterways, natural resources, education, and health.

Recovery processes can be contrasted with the relatively “routine” nature of ongoing planning, even while the core goals of providing for human needs in a sustainable way remain, albeit under different circumstances. Recovery processes are typically facilitated by a specially established agency with the far-reaching powers required for the management of the complex tasks associated with this phase of a disaster. Often established by an act of parliament, or via powers already embodied in an emergency or disasters act, these recovery agencies are provided with extensive powers and finances that mirror the complexity and scope of the tasks associated with recovery. Many of a recovery agency’s tasks include matters directly or indirectly associated with urban planning. These include location of temporary shelters and reconstruction, reestablishment of utilities and services, measures to reduce ongoing risks, and the development and implementation of overall reconstruction plans involving multiple actors and processes. [Table 2.1](#) shows a simplification of the main actors and agencies by approximate governance tier. It also should be noted that sometimes there are some inconsistencies and problematics of power distribution associated with ad hoc nature of recovery processes. Larger organizations come into the process without clear understanding of context, goals, community needs, etc. and may be overly oriented to their own internal approaches and the expense of wider coordination. In larger disasters there is an ongoing issue of number of such organizations and their uncoordinated inputs, which often influence long-term recovery processes.³ We argue that good governance and clarity of roles has the potential to address these.

URBAN PLANNING AND RECOVERY: POTENTIALS AND PROBLEMATICS

Within the broad parameters of the agencies and groups outlined above, it is clear that urban planning is but one of many actors. However, we argue here that it offers an important toolkit that is integral to effective recovery. The final section of this

³ See discussions in Chapters 3 and 11.

Table 2.1 Typical Agencies and Groups in Recovery by Approximate Governance Tier (Indicative Only)

Level	Agencies and Actions
International or multinational	<p><i>Agreements</i> for aid, finance, expertise, and direct assistance. These are often set in place and updated over time as part of wider agreements between nations alongside other matters, such as military support, free trade, work right, and visas, but may occur in an ad hoc manner.</p> <p><i>Nongovernmental organizations.</i> These can take on significant roles that include significant autonomous actions, depending on the nature of the event. It is common for large NGOs to act quite autonomously or to be given significant powers in developing countries where government services have been overwhelmed.</p> <p><i>Religious</i> organizations. These often have strong networks and connections and actively participate in recovery processes, especially in developing countries.</p>
National	<p><i>Allocation of disaster relief and reconstruction funding.</i> This is typically managed and distributed by higher tier national agencies, usually directly tied to reconstruction agencies and activities. While it is typically associated with national and state-level declarations of disaster, it may also be associated with local actions, benevolent funds, or international agencies.</p> <p><i>Legislative basis for national or federal funding and action</i> (e.g., declaration of emergency/disaster).</p> <p><i>Insurance corporations.</i> These play an important role in the recovery process and may form agreements with reconstruction authorities to facilitate equitable risk reduction in recovery.</p> <p><i>Research and science institutions.</i> These play a role in providing a credible evidence base and may play a role in providing ongoing development of knowledge and improvement that can be taken up during recovery processes. (They may also exist at upper and lower tiers.)</p> <p><i>Military.</i> They often provide immediate relief and coordinate recovery; in some countries (e.g., the United States), they also participate in prevention processes (e.g., levees are often under military jurisdiction).</p>
State/provincial/ regional	<p><i>Spatial resource allocation agencies</i> (nondisaster operations) exist at this tier. These may include large-scale infrastructure and planning agencies: urban planning and population distribution, water, sewerage, drainage, energy generation and distribution, roads, public transport, and so forth. During recovery, these agencies often take on extraordinary roles or form special panels that fast-track delivery of tailored planning and other outcomes.</p> <p><i>Social, medical, welfare, and other human-orientated agencies.</i> These, associated with human well-being, are funded and have regulatory powers at this level, such as housing, welfare, and other services.</p>

Continued

Table 2.1 Typical Agencies and Groups in Recovery by Approximate Governance Tier (Indicative Only)—cont'd

Level	Agencies and Actions
Place or disaster event scale	<p><i>Review boards/boards of enquiry or royal commissions/inquests</i> into the causes of and reasons for disasters. While these agencies may be legal in their basis, they may have far-reaching powers of recommendation and reform with impacts on recovery. They often override “normal” legal and planning powers. They may integrate and use the knowledge of expert committees.</p> <p><i>Response agencies.</i> These may often continue to have inputs and may take a significant role in recovery, often on the basis of strong legislation and allocated funding.</p> <p><i>Extraordinary recovery agencies</i> with special powers. These are typically headed by ministers, commissioners, chairs, directors, and boards. They play a central role in integrating and regulating activity as a central organizing body with extensive discretionary powers that may override normal processes. They may have a statutory basis in emergency or response agencies.</p> <p><i>Private sector</i> companies. These, contracted to clean up and/or reconstruct, provide services (e.g., water, telecommunications) or establish funds and programs.</p> <p><i>Local government.</i> This is often the main point of contact and delivery of services to local communities; even if they are overwhelmed by an event, they are often supported by other agencies. It is noteworthy that is common for many planning functions to be delivered or administered by local government, and this extends to recovery processes.</p> <p><i>Grass roots organizations.</i> These may form spontaneously or develop from existing voluntary or other preexisting groups. Often formed around shared interests or concerns, these groups may endure and mature in the long term or continue only if the need remains. Examples include religious, educational, sports, social, and other volunteer organizations. It is often the case that grass roots organizations form around planning and related issues in the recovery processes, such as the introduction of modified regulations that impact upon rebuilding.</p>

chapter sets out the main mechanisms of urban planning, integrating these with a brief discussion of the potentials and problems associated with these in recovery. This provides a framing for the more practical examples provided in subsequent chapters.

The process of *vision building* is central to many aspects of urban planning (Hopkins, 2001). If successful, this production of shared purpose, perhaps projected forward 30–50 years into the future, is a powerful way to draw together disparate actions towards core organizing principles. Some of the most enduring city plans and designs have been undertaken on the basis of powerful visions, such as Paris’

boulevards, Copenhagen's "Five Fingers," and the Greater London Plan. It is noteworthy, however, that these examples also represent planning and planners being in positions of power and influence that are difficult to reproduce in today's settings. Further, in the immediacy of disaster recovery situations, it is often challenging for people and agencies to be able to project forward beyond more pressing concerns. We suggest that it is usually more appropriate to revisit only the elements of existing visions that might need to be modified to achieve risk reduction goals in the period of opportunity that exists after an event to rebuild in better ways and to allocate funding and greater political will in the most effective way. It should be acknowledged, however, that risk reduction goals can result in the need to change the entire vision of the community to seize opportunities and to maximise learning from past events. In such cases, there is a need for more extensive collaboration with other professionals and community.

Strategic planning is the process of directing or redirecting and integrating elements of ongoing processes, usually on the basis of maintaining and overview of the spatial and functional elements of settlements and the manner in which they are dynamic or static (Hopkins, 2001). This is where the often heard mantra of "getting back to normal" or "bouncing back" may be at odds with the most appropriate (and new) course of action. After a major disaster, returning to normal or to what was there before is often not an option, or is ill-advised due to the need to modify settlement patterns and urban areas so that the initial circumstances that brought about the event are modified. There are circumstances where disasters are far from abnormal, for example, earthquakes in New Zealand or droughts in inland Australia. In other cases "normality" may be a contributing factor to the community's vulnerability to the disaster. Traditionally, psychosocial and environmental recovery aimed for the restoration of "normality" or the predisaster state, or a limited improvement on this. In contrast, infrastructure and economic recovery offer the opportunity for substantial, strategic improvements. For example, destroyed infrastructure and housing are frequently replaced with up-to-date facilities, and local commerce may receive new equipment and training. Often, restoration may not be possible: people may be left with permanent injuries or trauma, parts of the local economy may not be able to reestablish, and the area may be stigmatized as a scene of tragedy. We argue that "normality" can be changed to the "desired state" of the system, as discussed by Meerow, Newell, and Stults (2016), and further move toward the "new normal"⁴. Nevertheless, opportunities for major change and economic enhancement may present themselves, especially where similar disasters are not frequent.

Urban planning processes are often the most powerful in that they represent a mechanism to establish wider decision-making criteria on the basis of *policy and regulation* (Hopkins, 2001) and are often integrated with legitimizing governance structures, such as representative democracy and funded government agencies. Policies are statements of intent, such as "we will not allow new development in areas designated 1:100 year flood zones" and will be backed up by law, regulations in ordinance, and processes of decision making that draw on multiagency

⁴ See Chapter 5 for further discussion.

consultation and the application of technical and professional expertise. This may also include opportunities for consultation and citizen inputs. In recovery this may provide significant strength to achieve improved risk profiles, but existing policy and regulation may also have put in place decision-making processes that reinforce the reproduction of risky settlement patterns. Further, many parties may have strong vested interests in maintaining pre-event policy settings to protect financial or other interests. Another potential outcome, as discussed in [Chapter 10](#), is driven by the general desire of the community to get back to “normal,” which places additional pressure on decision makers and new regulations, codes, etc. that may be adopted in a rushed manner, often without careful consideration and considered inputs from the science community.

A key tension that emerges across the recovery literature is the challenges between using current regulations and processes, which may no longer be appropriate, allowing sufficient and fundamental autonomy to local communities to ensure capacity is improved and the need for extraordinary powers to be allocated to rebuilding or recovery agencies to give them some chance of being effective. Accordingly, pre-event decision making, agency integration, and citizen participation practices that may be written into regulations may need to be modified significantly. Importantly, it is important here to note that opportunities to improve settlement patterns and to develop new risk profiles will often be tensioned against the need to maintain livelihoods, to return to “normal,” and to achieve targets set by government. This may be further complicated by the presence of outside agencies, such as NGOs, and researchers who would not normally be present and who typically seek to achieve specific targets within set time frames (e.g., housing rebuilds and of infrastructure works).

Agenda or project planning is based on planning agencies having a key role in the location, type and timing of major projects, facilities, and infrastructure ([Hopkins, 2001](#)). In recovery this might include new flood walls, additional clearing of forest fuels, improved response infrastructure, and so forth. However, the recovery literature is replete with examples of inappropriate and unwanted structures provided after a disaster. These are typically provided according to a standard design from another time and place and take (often intentionally) little notice of local preferences, imperatives, or needs. Apart from sometimes violating cultural norms, imposed housing and relocation often separates people from their livelihoods that are key to their identity and survival. The literature therefore not surprisingly has long supported strong local involvement, if not leadership, in the recovery process for pragmatic, as well as ethical reasons. Nevertheless, the reality in many major disasters around the world in that local involvement is weak regardless of the rhetoric.

The need for good project management in recovery is paramount, balancing various expectations such as speed in reconstruction and restoration versus reducing risk and meeting other agendas (some of which might not be those of local people, such as lengthy exclusion from damaged areas). This also emphasizes the importance of project management in recovery. This may include other factors, such as equity and fairness: both in procedural and representation facets, and in term of outcomes,

even while this may be complicated by issues of uneven insurance, government support, and tenure type. Most models of, and commentaries on, recovery emphasize the importance of involving the affected community in its own recovery—ideally in a position of strong influence or leadership. However, despite this some models or aspects of recovery models assume strong leadership or control by the state or external NGOs. As much of the recovery assessment literature relates to developing countries, it often assumes that the government has limited capacity or is replaced in part by NGOs.

Local involvement and control is however not without its problems. For example, in Aceh, Indonesia, where it is reported that people would use key structural components and cement to extend and decorate the dwelling, rather than for structural integrity, thus making it much weaker.⁵ There are problems of exclusion of parts of communities, with reaching agreement (which can result in lengthy delays) and with meeting the conditions of external funders. However, these problems also exist with state run programs. The language of recovery has evolved and “community led” is now less common than a “resilience” approach. A paradox in some resilience recovery material or guides is that even though the emphasis is on the affected community, there is an assumption that the state would provide support and capacity building.

In summary, there are a number of key organizing principles to the deployment of urban planning as key contributor to recovery governance:

- The full range of spatial planning principles are deployed, rather than focusing only upon “traditional” approaches in a place, such as regulations and policies alone.
- Accountability, transparency, and the rule of law are supported.
- Participation and acknowledgment of local knowledge and particularities are matched with responsiveness and interaction with the use and dissemination of scientific and professional evidence.
- Extraordinary agencies do not cut across routine processes that would build capability, where possible.
- Community functions and principles of fairness and equity are held as higher ideals, including efficient use of materials and resources.
- The ongoing adaptability of settlements and building of capacity are key goals, as well as making improvements to the resistance of settlements to ongoing known threats in recovery processes.
- Planning is a fundamental element in coordination, specialization, and decision making in recovery.
- Existing and future generations are considered in decision making, as are ecological, cultural, and economic decisions.
- Pre-event planning for recovery is included in planning processes, balancing a range of non-risk and other needs.

⁵ See Chapter 13 for more details.

CONCLUSIONS

Urban planning, as a form of collective decision making relating to spatial outcomes, has goals oriented to individual, community, and state-oriented capacity building. At the same time, it seeks to balance these intentions against some level of centralized imposition of rules and parameters that ensure achievement of equity, efficiency, and ecologically sound outcomes across overall settlements, regions, and nations. Following from this, a fundamental tenet of recovery is that it should lead to improvements, especially regarding risk reduction over time, in the ways that the built environment is managed in terms of the range of incremental individual decisions and overarching directions for change that inform smaller scale decisions.

Recovery should not re-create risks or develop additional vulnerabilities. The often used slogan for this is “building back better.” In urban planning terms it is tensioned against the challenge for retention of pre-event settings, for it is common that many aspects of a community may be in a serviceable state and which represent a significant level of investment. Accordingly, the prospect of modifying road patterns, tenure boundaries, building regulations, and ways of using land generally, particularly those that are expensive to comply with, may mean that trade-offs are made that erode the ability to improve risk levels during recovery. The underlying principle is to link post-disaster reconstruction with longer term risk reduction and mitigation to ensure that the same conditions of exposure and vulnerability are not repeated.

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Assessing non-metro recovery across two continents: issues and limitations

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Rural and remote areas of countries such as Australia and the United States are less well-resourced and often poorer than their city counterparts. When a disaster strikes, therefore, their long-term recovery can be impeded by being situated 'over the horizon'. Nonetheless, they are likely to enjoy higher social capital, with 'locals' banding together to help restore economic and social life in the wake of a calamitous incident. At the same time, a repeat of extreme events, springing in part from alteration to the landscape through intense human occupation, threatens to derail sustainable recovery processes everywhere, suggesting that renewed emphasis needs to be placed on preparedness. Improved metrics are also required, spanning both pre- and post-disaster phases, to determine effectiveness. Moreover, a focus on the 'hardening' of towns offers a better return in limiting damage and potentially hastens the speed of recovery should these places later fall victim to extreme events.

Keywords: non-metro, preparedness, rescue and recovery, return intervals, rural, remote, and small fringe communities, social capital

Introduction

The objective of this paper is to shed light on the critical issues that continue to confront the rising number of rural, remote, and small fringe communities that have suffered large-scale disasters in recent years. These communities seem to be at the epicentre of many natural disasters, such as the destructive earthquakes and floods in countries such as Pakistan, Philippines, and Nepal. The impacts range from property and infrastructural damage (insured and uninsured losses), deaths and injuries, stock, crop, and other agricultural losses, and the destruction of wildlife habitats and even iconic landscapes. Climate-related disasters alone are predicted to affect some 375 million people in 2015, up from 263 million in 2010 (Ashdown, 2013).

Small places are less able to respond quickly to disasters because they are not critical parts of the global economic infrastructure and they have a less powerful political voice. Moreover, they have less capacity to tap into the human capital and material resources found in larger, more recognised seats of government.

Methods

This paper is based on observations stemming from close analysis of recovery in several non-metropolitan areas of which the authors have first-hand knowledge. The

research approach is grounded in policy analysis frameworks honed by Jeffrey Pressman and Aaron Wildavsky (1979, p. xxiii), in which they assert that: ‘The study of implementation (projects, programs and issues related to rebuilding) requires understanding that apparently simple sequences of events depend on complex chains of reciprocal interaction’. Moreover, they show that a case or a set of cases yields better understanding of the policy flaws that underpin action or inaction.

This evaluation follows the grounded theory approach developed by Strauss and Corbin (1994), from which it derives action propositions. Policy concepts emerge from the case-study information, avoiding the application of hypothetical constructs. Generalisations materialise based on inferences from the cases, generating insights into observed issues and phenomena. This approach is employed because there is no systematic cross-national data that disaster management specialists can use to form basic rubrics to forge implementation strategies or to create policy frameworks (Strauss and Corbin, 1990, 1994).

Understanding disasters

The Intergovernmental Panel on Climate Change (IPCC, 2012, p. 5) offers the following working definition of a disaster:

Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

The impact of a single event can be compounded by the triggering of one or two further catastrophic incidents, such as the mudslide in Chile in 2010, which followed torrential rain, or the pernicious sequence of drought, heatwave, wildfire—the hotter it gets, the drier it gets, and so on and so forth—experienced in Australia in 2009 (see Figure 1) and the United States in 2012 and 2013, posing a threat to water security (Schär et al., 2004).

The primary event can also have ‘lag impacts’, such as disease caused by floodwaters affecting sanitation and spillage into soils. The fires in Canberra, Australia, in January 2003, for instance, led to the pollution of the city’s water supply, with poly aromatic hydrocarbons following torrential rain across its catchments. Water authorities, made wiser by this event, acted to protect Melbourne’s drinking water after Black Saturday on 7 February 2009 by sending water from dams in fire-affected catchments to those that were not affected via established pipelines/aqueducts.

Of course, natural or man-made disasters that affect crops, farms, vineyards, and other agriculture or agricultural supports have long-term implications for food production and security. Disruptions, therefore, have far-reaching implications for national accounts as well.

Figure 1. The fire in Murrindindi, Victoria, Australia, February 2009



Notes: the sinister trappings of the Murrindindi fire in the ranges beyond Healesville on Black Saturday, 7 February 2009.

Source: Rosemary Langmaid.

Distinguishing between response and recovery

Two distinct post-disaster phases can be identified: response/relief; and recovery/rebuilding. The former may not always see people stranded or stuck, as, for example, with an oil spill. Rebuilding clearly is an intrinsic part of recovery, but recovery also necessitates social and cultural rehabilitation.

Furthermore, the distinction between rescue/emergency/response and recovery/rebuilding is sensitive to the country in question: the recovery phase in developed countries may not begin until the response phase has run its course. During the Black Saturday bushfires in Kinglake and Marysville, Australia, in 2009, for instance, the coroner had to complete her work first, which took several weeks. Consequently, there can be short- and longer-term responses, such as only rebuilding in less vulnerable places, or not doing so at all.

Can recovery be defined and measured accurately?

The Association of Bay Area Governments (2010, p. 3) in California has defined long-term recovery as ‘a process of restoring a community to a stable and functional state,

Figure 2. Relief operations in Far Rockaway, Queens, New York, after Hurricane Sandy, October 2012



Source: author (Edward Blakely).

given the inevitable changes that result from a major disaster'. Repairing, replacing, or rebuilding property are examples of such recovery. Yet, it remains important to have a way or ways of tracking recovery. Traditional benchmarks, such as per-capita gross domestic product, population growth, unemployment, and health- and education-related outcomes, including infant mortality and high school graduation rates, rarely are available at the town scale, and those that are, lack a sufficient cross section. Furthermore, owing to the overlay of macroeconomic decline affecting some towns it may be difficult to come up with broad baseline data against which improvements can be measured—that is, depressed rural areas may seek to recover beyond their pre-disaster state.

The process used to organise recovery after the Kobe earthquake in Japan in 1995 provides a developmental model for measuring progress towards recovery goals (Hayashi, 2011). In particular, Hyogo Prefecture was able to meet three key numerical targets: to rebuild all damaged housing units in three years; to remove all temporary housing within five years; and to complete physical recovery in 10 years. According to Hayashi (2007, p. 415), 'having numerical targets was critical to directing and motivating all the stakeholders, including the national government's investment, and it proved to be the foundation for Japan's fundamental approach to recovery following

the 1995 earthquake'. Anglin (2011) sheds further light on the issue by presenting a checklist pertaining to social infrastructure critical to the affected region. For instance: 'Are major institutions involved in community decisions?'; 'Is the local culture conducive to the economic adaptation?'; and 'Has local government created a fiscal and legal basis for growth?'. Similarly, Voith (2011) has outlined the practical means that can be deployed to rate the success or otherwise of economic recovery. And Pressman and Wildavsky (1979) emphasise, in relation to successful implementation, that an ever-increasing circle of parties add complexity, introduce delays, and ultimately diffuse recovery goals.

Defining a non-metro as opposed to a metro area

Non-metro areas are affected, for instance, by drought—a creeping disaster—far more than their city counterparts, changing the configuration of the landscape deeply and sharply for years subsequently. Moreover, they alter animal habitats and prevent the presence of some crops and animals, such as cattle and sheep, disrupting the economic life of many communities that lie near or in the midst of these zones. This form of hardship is something that city dwellers usually only experience in terms of food prices or water restrictions. For non-metro areas, by contrast, the entire life-cycle and ecosystem can be set back for countless years. Moreover, rural areas are predominant on lists of the most costly weather-related disasters (see Box 1).

A simple dichotomy between rural and city, though, is becoming blurred around the edges, particularly in the developed world where once isolated regions are undergoing 'urbanisation' (Salt, 2012). 'Sea- and tree-changers' are moving from cities in Australia and the western US to storm-surge or fire-prone non-metro and peri-urban areas in unprecedented numbers, vis-à-vis 'wild-urban interfaces' (WUIs) (Rifkin, 2014).

Box 1. Recent weather events in the US

(indicative of the growing influence of climate change)

- Mississippi River flooding, spring and summer 2011: USD 4 billion in damage.
- Drought and heatwaves in Oklahoma and Texas, 2011: USD 5 billion in damage.
- Tornadoes in the Ohio Valley and the southeast, April 2012: 32 deaths and USD 9 billion in damage.
- Tornadoes in Oklahoma and Pennsylvania, April 2012: USD 2 billion in damage.
- Tornadoes in the Midwest and northeast, April 2012: USD 2.2 billion in damage.
- Tornadoes in central and southern states, April 2012: USD 2.3 billion in damage.
- Tornadoes in the midwest and southeast, May 2012: 177 deaths and USD 7 billion in damage.
- Blizzards from Chicago to the northeast, January 2011: 36 deaths and USD 2 billion in damage.
- Super Storm Sandy, October 2012: 40,000 homeless, 31 deaths, and USD 527 billion in damage.
- Tornado in Moore, Oklahoma, May 2013: 25 deaths and USD 2 billion in damage.
- Wildfire in Yarnell Hill, Arizona, July 2013: 19 firefighter deaths, and 3400 hectares destroyed.
- Platte River flood in Colorado, September 2013: 10 deaths and USD 2 billion in damage.

Source: authors.

These are not ‘rural and remote areas’ in the traditional sense; rather, they enjoy close connections with cities that can buffer them partially from the worst economic effects of a disaster. At the same time, however, they can be more hazardous places in which to live. In particular, the way in which new dwellings are situated on the landscape creates a greater fire hazard, since flames can spread deeply into treed areas. Furthermore, residences frequently are away from good roads, making them harder to access and fires harder to deal with when they emerge. New inhabitants also can alter vegetation and wildlife patterns with marked impacts on the potential for fire and flooding—they have little feel for the ecology owing to being in city workplaces for much of the day. Lastly, city-siders can bring bad habits, such as ‘staying and fighting’, heightening the risks to fire and rescue personnel, and not knowing how to evacuate properly or where to go.

This ‘connectedness’ also plays out at a smaller scale in places that, while distant from big cities, are within easy reach of large regional centres (see Figure 3). In addition, high-speed internet is acting to limit the sense of isolation. Proximity to larger places, however, does not always mean that a community will be better positioned to weather the worst ramifications of a disaster in comparison to its more remote counterparts, as seen along parts of the New Jersey coast hit hard by Hurricane Sandy (owing to inadequate roads and old sewerage systems).

Figure 3. Flooding in Carisbrook, Victoria, Australia, January 2011



Note: This small town is a rural settlement that nowadays is an outlier of the manufacturing and service centre of Maryborough in the Shire of Central Goldfields.

Source: Central Goldfields Shire Council.

Nevertheless, there are still truly remote, isolated places where the local economy may be composed of little more than one or two ‘industries’. Examples include the Australian towns of Marysville in central Victoria (retail and hospitality), Wilcannia in the west of New South Wales (arts and crafts), and Malanda and Milla Milla (sugar) in north Queensland. The economic resilience of these towns is wafer thin.

Social cohesiveness, pivotal to the pace of recovery, rises as one progresses down this hierarchy. By contrast, towns situated within the urban fields of major cities can be expected to have less cohesiveness with tree-change residents often regarding them as places to bed down at night or on a weekend. In the wake of a disaster, many may decide to pack up and return to the city.

Case studies across two continents

Few countries in the developed world have chosen so far to establish standing national recovery programmes or authorities, despite a litany of cyclones, floods, hurricanes, super storms, tornadoes, and wildfires (Burby, 2006). Curiously, some of the more profound examples of *national* intervention are to be found in developing countries.

The following subsections of the paper examine a number of recent disasters in the rural US and Australia to rate the differing recovery responses of governments and non-governmental organisations (NGOs).

US

Event 1

The southwest of the US has become the site of multiple disasters in recent years, notably the major tornado in the Dallas–Fort Worth *metropolex* on 3 April 2012.

Response

A Tornado Recovery Center was established following this tornado, offering low-interest federal disaster loans. Provisions included repair/rebuilding guidelines/emergency home repair assistance and a free tree supply. In addition, a recovery effort site and a weather alert system came into being.

Event 2

A double disaster occurred in Texas between June and August 2012. A severe drought and ‘extreme’ or ‘exceptional’ conditions in much of the state led to a cascade of large-scale wildfires, as well as the outbreak of a deadly variant of West Nile Disease.

Response

The reinsurance company, United, set up help/expertise internet links, while the Federal Emergency Management Agency (FEMA) offered support to communities for rescue and disaster mitigation. FEMA provides a wide range of services, such as promoting mitigation and preparedness, sponsoring studies that reduce the effects of

natural disasters through engineering measures, and encouraging building away from floodplains, seismically active areas, and hillsides and wetlands. It advocates as well ‘safe development’ practices, but these have become ensnared in a patchwork of federal, state, and local regulations. FEMA’s mission, though, is not long-term recovery, but rescue and avoiding or lessening the load in this respect through mitigation. Recovery is left to state agencies and local governments. An impressive example is the Regional Disaster Resilience Initiative of the Association of Bay Area Governments (2013), stemming from earthquakes and fires in the San Francisco Bay Area. This is not only a planning tool, but also encompasses ready-to-go provisions in the aftermath of an event. Interestingly, the strategy stems from a grouping of local governments, rather than from the state level.

Event 3

Hurricane Sandy struck the entire eastern seaboard of the US (and Canada) in October 2012, hitting New Jersey and New York especially hard (Tollefson, 2013a). A storm surge in New York City on 29 October flooded streets, tunnels, and subway lines (Yaro and Kooris, 2012) and cut power in and around the metropolitan area.

Small towns along the northeast coast of the US, comprising recreational and retirement areas and retreats, were also badly affected. For instance, tidal surge overwhelmed the 50 kilometres of waterways in the town of Moonachie, located 25 kilometres west of New York City, engulfing streets with rushing water and forcing people to take immediate alternative shelter. A few communities along the New Jersey coast, which had become full-time living areas over the past two decades (see Figure 4), were devastated. Nearly 40,000 people were left without homes

Figure 4. Flood damage caused to seafront homes in Queens, New York, by Hurricane Sandy, October 2012



Source: author (Edward Blakely).

and in some cases with little buildable land for reconstructing them. They lacked the stronger, well-developed infrastructure of most urban areas: some still have small sewerage plants designed for part-year residences and road networks that were never intended for regular year-round traffic.

Damage in the US as a whole amounted to USD 65 billion.

Response

The Senate passed the USD 50.5 billion Hurricane Sandy Relief Bill and President Barack Obama signed it into law in late January 2013. In addition, New York State Governor Andrew Cuomo announced on 15 November 2012 the creation of three bodies—the NYS 2100 Commission, the NYS Ready Commission, and the NYS Respond Commission—to review comprehensively and to make specific recommendations on the overhaul of the state’s emergency preparedness and response capabilities.

The state also made provision for another super storm within two years. New York City, for instance, is upgrading its water system, shifting the focus from new dams or silt traps to managing reservoirs using software that automatically incorporates short-term weather forecasts and seasonal climatic predictions. This will help water managers to address droughts and floods (Tollefson, 2013b). Meanwhile, Staten Island (one of the five boroughs of New York City) has initiated a property buy-back scheme in line with a federal initiative to reduce the density of low-lying coastal populations. Properties no longer qualify (since 2014) for coverage under the National Flood Insurance Program unless they are two metres above the new storm surge flood level. If they do not meet this benchmark they face insurance premium hikes of between USD 20,000 and 150,000 per year. This policy to protect businesses, houses, and key infrastructure applies to at least 350 counties across the country, extending from Dallas, TX, and Nashville, TN, to Denver, CO, and Tulsa, OK (White House, 2015). Furthermore, Indiana, Montana, New York, and Wisconsin have adopted state-wide standards that either meet or exceed this new federal standard.

New businesses have sprung up to raise houses, insulating them from destruction in the short term, but not against expected sea-level rise in the long term. In addition, Klein (2014, p. 44) notes how ‘new luxury real estate developments are marketing private disaster infrastructure to would-be residents—everything from emergency lighting to natural-gas-powered pumps and generators to thirteen-foot floodgates and water-tight rooms sealed “submarine-style”, in the case of a new Manhattan condominium’.

Australia

Event 1

The Black Saturday fires that razed Melbourne’s peri-urban areas and other parts of the state of Victoria on 7 February 2009 claimed the lives of 173 people and an estimated one million animals. They ravished 450,000 hectares of land, destroyed more than 3,500 buildings, and injured 414 people and displaced 7,562 others. The McArthur Forest Fire Danger Index on that day was 300, making for a contagion equivalent to the destructive effect of 15 Hiroshima atomic blasts. Many of the burnt-out homes

were along ridge lines with once spectacular views (Fisher, 2012). The intensity of the heat in parts of Marysville was such that some houses literally exploded (see Figure 5). Interestingly, a Country Fire Authority firefighter in the town on that night promoted the practice of shutting tight all doors and windows. When the radiant heat finally arrived in vast quantities, the aluminium window frames expanded, popping the glass panes, and allowing the inferno to rush inside—like an egg in a microwave oven. The problem was that the expansion coincided (in both length and height) with the onset of the flames.

The Victorian town of Marysville was all but destroyed by the fires. One-half of jobs were in just two sectors, hospitality and the retail trade, and the magnets, the guest houses, and the nostalgia associated with its Edwardian and Victorian buildings on the main street were decimated, rather than simply damaged as in a flood.

The ‘catastrophic’ fire danger rating for the northern edge of Melbourne is projected to shift from the current 1-in-33-year frequency level to 1-in-3 by 2050 (Mercer and Buxton, 2011).

Response

The Victorian Bushfires Royal Commission and a Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) were established in 2009 to coordinate whole-of-government rebuilding and recovery. An immediate governmental response

Figure 5. The catastrophic effect of the Black Saturday fires in the town of Marysville, February 2009



Source: Country Fire Authority.

was to develop a Bushfire Attack Level (BAL) rating system in which homes are categorised according to one of six bushfire levels, ranging from low to extreme, based on risk factors including the McArthur Forest Fire Danger Index, the slope of land, and vegetation (Fisher, 2012). However, a key recommendation of the Royal Commission, compulsory buyback of properties at high risk (basically those along ridge lines), was changed to a voluntary scheme. A further recommendation to replace Victoria's 100,000 kilometres of dangerous single-wire earth return power lines met with a similar fate, as a mixture of aerial-bundled and underground lines was adopted. The Royal Commission wanted all lines to run underground at an estimated cost of AUD 40 billion.

Among the responsibilities of the VBRRA—one of 30 community recovery committees established after the Black Saturday fires—was a range of initiatives and programmes to help affected communities, as well as a Rebuilding Together plan jointly financed by the federal and Victorian governments and donor contributions. Much of the infrastructure built as a result, though, has been underutilised and has incurred high maintenance costs, burdening local councils that have lower revenue bases owing to a loss of residential properties (Productivity Commission, Australian Government, 2014; ABC News, 2015). VBRRA was wound down in 2011 and its work transferred to other councils, departments, and community organisations.

Approximately 50 per cent of schoolchildren in the burnt areas were still suffering from post-traumatic stress disorder (PTSD) by 2014 (ABC News, 2013). Teaching staff are not coping, owing to limited resources, or are not adequately qualified in psychological trauma and associated mental illnesses, resulting in crisis, burnout, and secondary trauma. Communities are struggling since there is no money left from the Victorian Bushfire Appeal Fund to support the psychological services needed to heal such disorders, which can take years to materialise.

No less daunting has been the emergence of 'volunteer fatigue'. This has afflicted bushfire regions, sapping firefighters and other volunteer groups of their energy and motivation (Jakab, 2012; see Box 2).

Box 2. Volunteer fatigue: reasons and signs

- The volunteers rebuilding bushfire-affected communities are experiencing a variety of psychosocial and psychiatric problems owing to the trauma experienced.
- The demographics of the rural communities involved in the bushfires yield a small pool of individuals from which to recruit volunteers.
- Volunteers are overworked and perform tasks that do not match their skill base.
- Volunteers are engaged in the recovery mission out of necessity not because of the normal motives that inspire individuals to volunteer in their community.
- A lack of support has left bushfire-affected communities struggling to continue with the mammoth task of rebuilding.
- Without leadership, the community's experience of volunteering is likely to be negative and unsustainable. The positive traits that volunteering usually installs in individuals are absent.

Source: authors.

Interestingly, the community recovery committees that were set up after Black Saturday worked in collaboration with the Australian Red Cross. The objective was to develop ways in which the organisation might use its *Lessons Learned by Community Recovery Committees of the 2009 Victorian Bushfires* document (Australian Red Cross, 2011), complementing work being done to support community-led recovery in flood-affected communities of Queensland. The state government there formed a Ministry of Disaster Recovery after devastating flooding in Brisbane in 2010.

Victoria has now appointed a disaster management commissioner, but few of its regional councils have people specifically trained in and/or charged with disaster recovery or preparedness. This is especially the case if they are located in remote areas that so far have been spared catastrophic fires or flooding.

The experience of Black Saturday and the preventative measures developed subsequently, such as evacuation orders and text alerts, served to lessen, if not eliminate, deaths in the Tasmanian fires¹ in January 2013 (during which some 1,000 people escaped by boat) and the early season fires in New South Wales in October 2013. However, given the density of settlement in fire-prone areas around Australian cities, and the country's propensity to experience the worst effects of climate change (IPCC, 2013), this accomplishment may be short-lived.

Box 3 lists 52 Victorian towns that the state government identified in 2009 as vulnerable to catastrophic bushfire. One of the towns, Kennett River, was destroyed by a bushfire in the Otway Ranges during Christmas 2015.

Box 3. List of Victorian townships noted as bushfire 'hotspots'

1. Aireys Inlet (Aireys Inlet/Moggs Creek/Fairhaven/Big Hill)
2. Andersons Inlet (Inverloch, Venus Bay, Waratah Bay, Walkerville)
3. Anglesea
4. Barongarook
5. Barwon Downs
6. Bemm River
7. Bendigo
8. Blackwood
9. Blairgowrie
10. Bolwarra
11. Breamlea
12. Cann River
13. Carlisle River
14. Castlemaine
15. Cockatoo
16. Creswick
17. Dandenong Ranges
18. Daylesford
19. Deans Marsh (Bambra/Pennyroyal)
20. Dereel
21. Dunkeld
22. Eaglehawk
23. Forrest
24. Gembrook
25. Greendale
26. Halls Gap
27. Hepburn
28. Jan Juc (Jan Juc/Bellbrae)
29. Junortoun
30. Kangaroo Flat
31. Kawaren
32. Lavers Hill
33. Loch Sport
34. Lorne
35. Macedon
36. Maiden Gully
37. Mallacoota
38. Marengo
39. Mt Helen/Mt Clear
40. Mt Macedon
41. Nelson
42. Noojee
43. Peterborough
44. Rye/St Andrews
45. Sandy Point
46. St Arnaud
47. Steiglitz
48. Trentham
49. Upper Beaconsfield
50. Warrandyte/North Warrandyte
51. Woodend
52. Wye River (Wye River/Kennett River/Separation Creek)

Source: ABC News (2009).

Discussion

Table 1 provides a simple compendium of the various disasters. It reveals that the scale of human loss in the developing world, with Sri Lanka as a reference point (Shaw et al., 2009), can be several orders of magnitude greater than that in the developed world, whereas the situation is likely to be reversed with regard to insured and uninsured losses. Furthermore, it shows that similar levels of preparedness occur in both categories.

US

Federal involvement, if any, extends only to recovery, not to economic development. New Orleans was the first place in the country to receive economic recovery funding through special congressional appropriation (Blakely, 2011). Some states, however, have sought to fill this void with locally developed recovery programmes.

Both the San Francisco Bay Area and now New York, for instance, have in place comprehensive preparatory, emergency response, and recovery strategies. While FEMA is now engaged in promoting disaster mitigation, in the wake of Sandy, it still plays a limited role in recovery. Certainly, the more preparedness measures that are undertaken the lesser the impact of a disaster and the shorter the recovery time.

A staggering 47 million homes, or 36 per cent of the population, are located in so-called WUIs, which account for 10 per cent of the country's landmass. This makes them especially vulnerable to the rising incidence of wildfire—economic losses have already doubled as compared to the previous decade.

Australia

Authorities' approaches to recovery usually have been organised around performance expenditure: many dollars spent on business recovery and home reconstruction, for instance, within a given time frame. This is in comparison to all of these items being linked in some coherent fashion.

At the individual state level, Queensland has been making some progress recently, although it confronts by far the biggest challenges and still has a long way to go. A Ministry for Community Recovery and Resilience has been created and is making inroads, investing more in disaster resilience, improving planning laws, supporting local government, and engaging with the insurance industry.

Meanwhile, Victoria has appointed a disaster management commissioner, but there has been a reluctance to date to invest public money in preparedness initiatives in bushfire-prone towns.

Across Australia only a handful of councils have developed recovery plans, among which are: Central Goldfields Shire Council (2013), especially for floods; Newcastle City Council (2012), especially for earthquakes; Central Highlands Regional Council (2011), especially for floods; and Tablelands Regional Council (2011), especially for cyclones. These could serve as templates for integrated resilience and recovery manuals applicable to small towns structured around any new data. Collaboration with

Table 1. Comparing disasters and responses: a summary of the basic parameters

Place	Event and date	Death toll	Damage	Impact zone	Post-disaster preparedness response	Recovery Process
New York City and New Jersey, US	Hurricane Sandy, October 2012	285	Extensive damage to infrastructure, including subways and substations. Some 400,000 homes destroyed	Coastal, especially small towns, retreats, and retirement villas	Strong and detailed	Well developed, new flood lines established outside of which no federal flood insurance
	Note: New York governor sets up NYS Respond Commission					
Texas, US	Tornado, April 2012	30	Extensive damage to homes and infrastructure	Town scale	Improved in the wake of the Moore, Oklahoma, tornado, especially in schools	Limited
	Note: A shortage of safe rooms and shelters, especially in schools. This became a flash point for parents					
	Wildfire/heatwave, June–August 2012	4	Confined	Rural	Roadmap to preparedness	Not known
Note: Triggered deadly outbreak of a variant of West Nile Disease						
Victoria, Australia	Bushfire, February 2009	173	450,000 hectares and more than 3,500 buildings destroyed. 414 people injured and 7,562 others displaced	Peri-urban Melbourne	Text alerts and evacuation orders, inter alia. System now in place but reluctance by government to introduce more substantive but costly measures, such as underground power lines	Somewhat piecemeal after the VBRRRA was wound down. Departmental replacements in particular found wanting in later floods
	Note: Emergency services commissioner appointed along with a director of relief and recovery					
Sri Lanka (benchmark)	Tsunami, 26 December 2006	30,000	Damage to villages, farms, and railway lines and rolling-stock	Coastal strip	Government invested in restoring or establishing mangroves as coastal 'green belts', through the Mangroves for the Future programme	Tsunami task force established, which evolved into a separate recovery organisation
	Note: An impressive response by any standards					

Source: authors.

the insurance industry, which has been assembling location-specific risk assessments (Suncorp Group, 2013), would also be a useful way to proceed.

No moves are afoot to have a national recovery authority; an initiative the previous federal Labor government was working towards (Council of Australian Governments, 2011); but not one continued by the Conservative coalition elected in 2013. Nonetheless, there has been some reform: a report by the Productivity Commission, Australian Government (2014, p. 32) found that ‘governments overinvest in post-disaster reconstruction and underinvest in mitigation that would limit the impact of natural disasters in the first place. As such, natural disaster costs have become a growing, unfunded liability for governments’. It goes on to recommend ‘a policy package across recovery and mitigation funding, budget treatment of recovery costs, and accountability requirements for all governments’ (Productivity Commission, Australian Government, 2014, pp. 37–43). Nonetheless, it will possibly take another event of the magnitude of Black Saturday to see a national organisation come into being.

Observations

Small, highly isolated towns with just one or two pillar economies can resemble developing countries in terms of disaster impacts. This is changing, though, in many places in Australia and the US. Populations are drifting towards regional centres and the fringes of large cities, which have their own inherent risks of cyclones, fires, floods, and hurricanes, yet faster internet connections. Hence, the deprivation arising from remoteness is lessening.

Certainly, expertise declines with remoteness. Preparedness–recovery manuals would assist the development of full-blown plans and the interchange of data/information between regional local governments. The insurance sector also is supplying products that recognise preparedness enacted by clients in the form of provisions for essentials (Suncorp, 2015).

Furthermore, the experience and knowhow within international recovery agencies are largely untapped resources for developed countries; knowledge transfer through training and secondment programmes provide further channels. In this context, the Red Cross has been a significant conduit for the transmission of social recovery expertise.

It has moved towards a far more comprehensive approach to responding to disasters. The Australian Red Cross partnered with the Shire of Augusta–Margaret River in 2014 in encouraging residents to adopt a ‘shared responsibility’ approach to emergency preparedness (Australian Red Cross and Shire of Augusta–Margaret River, 2014).

Below are some propositions derived from the cases reviewed for rural/small/non-metro recovery:

- Unfortunately, it seems that it might take a string of major disasters for governments to start integrating disaster resilience and recovery into their legislative programmes in any meaningful way. The growing number of natural disasters,

coupled with diminishing return intervals under the influence of climate change, suggest that a rethink is overdue on where disaster response emphases should lie, especially in economically well-resourced countries given the rising incidence of large-scale disasters within them.

- A focus on the hardening of places can provide a better return in limiting damage and hasten economic recovery should such sites (or their like) fall victim to extreme events again—especially via the suite of measures adopted by the NYS Respond Commission after Hurricane Sandy. In particular, vastly shortened event recurrence should mandate shifting settlements away from high-risk zones, such as floodplains and shorefronts. The costs of not doing so are destined to cripple financially future governments and to impact markedly economic growth. The Productivity Commission, Australian Government (2014, p. 33) has recommended that ‘Australian Government post-disaster support to state and territory governments (states) should be reduced, and support for mitigation increased’.
- Nonetheless, disasters can offer a one-off opportunity for renewal of a different kind, rather than more of the same. Examples are Kobe’s repositioning from a port to a high-technology-oriented economy after the earthquake in 1995, or New Orleans, Louisiana, reinventing itself as a centre for medical research after Hurricane Katrina in 2005. In addition, disasters provide an opening for the toughening of buildings and other infrastructure to withstand future events and even the embodiment of low carbon measures. Unfortunately, the application of these principles to severely impoverished countries, such as Haiti, is highly problematic.

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Endnotes

- ¹ The Tasmanian fire emergency resulted in the destruction of 100 properties, including 65 at Dunalley, and the burning of more than 45,000 acres of bushland (*The Guardian*, 2013). Other fire zones were declared but the capacity to provide advanced risk reduction was hampered by the past practice of allowing people to stay until a disaster is well under way.

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Equity in Recovery

3

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INTRODUCTION

This chapter reports on equity as an aspect of the capacity to recover from disasters. The concept of equity is explored, as well as the nature of disasters and a discussion about the ability to recover. People and communities, both in developed and developing countries, do not have equal recovery capacity. Recovery depends on a range of factors including the type of the disaster, personal resources, the local community, and government planning, particularly in relation to predisaster planning. This is not just response planning but planning to place the community in the fittest condition prior to the next potential disaster and to strengthen the resilience of those experiencing disadvantage.

While there are many types of disasters, this chapter concentrates on large-scale environmental disasters as the frequency of occurrence and the size of their impact on people are growing. This is due to the increase in world population, particularly population that is concentrated in urban areas, and the increase in extreme events leading to the risk of disasters arising due to climate change. The bulk of population growth is occurring in Asia. Between 1980 and 2010, cities in the Asia–Pacific region grew by around one billion people and United Nations projections show that a further one billion will be added by 2040 (UN Habitat, 2015). More than 75% of the increase in urban cover is projected to be in Asia, a trend expected to last for decades to come (Walsh, 2012). Unfortunately, many regions are unprepared, and without the capacity to assimilate this growth within short time frames, they have to be prepared for any impending disasters (Dávila, 2013). In contrast to most developed countries, population growth in Australia is exceptionally large, with also an accompanying trend toward growth in urban areas, including low-density growth along coastal strips and penetration into forested areas on the fringe of cities. This growth is posing many challenges for planning in general and for disaster recovery.

The growth of populations, in both developing and developed countries, increases the likelihood of individuals being located in places where disasters are more likely to occur. This is especially so with urban development penetrating into at-risk areas, such as on low-lying land (which may have been drained) and in forest areas, as is

the case on the edge of major cities in Australia. Peat forests are being drained and the forests are cleared for agriculture, especially palm oil, in Indonesia, thus increasing the fire risk of the now dry, underground peat. Urban areas are penetrating into forested areas in Australia, Greece, Spain, and parts of the United States, thus again increasing the bushfire risks and occurrences.

DISASTER EVENTS

While the potential for catastrophic events has always been present, anthropogenic climate change is resulting in the rise of extreme events, thus exacerbating the risk of environmentally initiated disasters. The growth of greenhouse gases in the atmosphere is leading to rising temperatures, including rising sea levels, changes in rainfall patterns, ocean acidification, and storm and cyclone events. These events are increasing the risk of disasters, such as bushfire, flood, storm and cyclone damage, and prolonged high temperatures. An Intergovernmental Panel on Climate Change (IPCC) report on extreme events notes that:

A changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather

Allen et al. (2011, p. 5)

A natural disaster may also arise due to the length, repetition, and cooccurrence of climate events. For example, many parts of Asia (at the time of writing, May 2016) are subject to an extended drought. This event is currently encompassing New Guinea, Vietnam, Burma, and India (McDonald, 2016, p. 12). While each extreme climate event may result in a disaster, the combination of events, such as rising sea levels and storm activity, is also likely to compound the adverse impact on people and the environment, challenging resilience and a good recovery.

Repeated events were seen in Queensland, where severe flooding occurred over an extended time. The rain in December 2010 came after a wet spring and caused nine floods that affected almost 1,300,000 sq. km of land, caused billions of dollars in damage, led to the evacuation of thousands of people, and resulted in 35 deaths (University of NSW, 2012). Severe flooding and Cyclone Oswald occurred in late January 2013, flood waters peaking at 9.53 m in the town of Bundaberg, accompanied by a series of tornadoes (Daily News, 2013). Four deaths were recorded. The 2010–11 Queensland floods were attributed to a La Niña event that brought very heavy rain to the east coast of Australia. Work by the Bureau of Meteorology (2012) has shown that record high sea surface temperatures in October to December 2010 also contributed to the record rainfall.

The major reinsurance company, Munich Re, has documented the world trend in natural disasters (2016). While there is a fairly stable pattern of geophysical events from 1980 to 2015, there is a steady increase in other environmental disasters (storms, floods, drought, and fire) (Fig. 3.1). In addition to the increase in the number

Blakely Disaster Readings

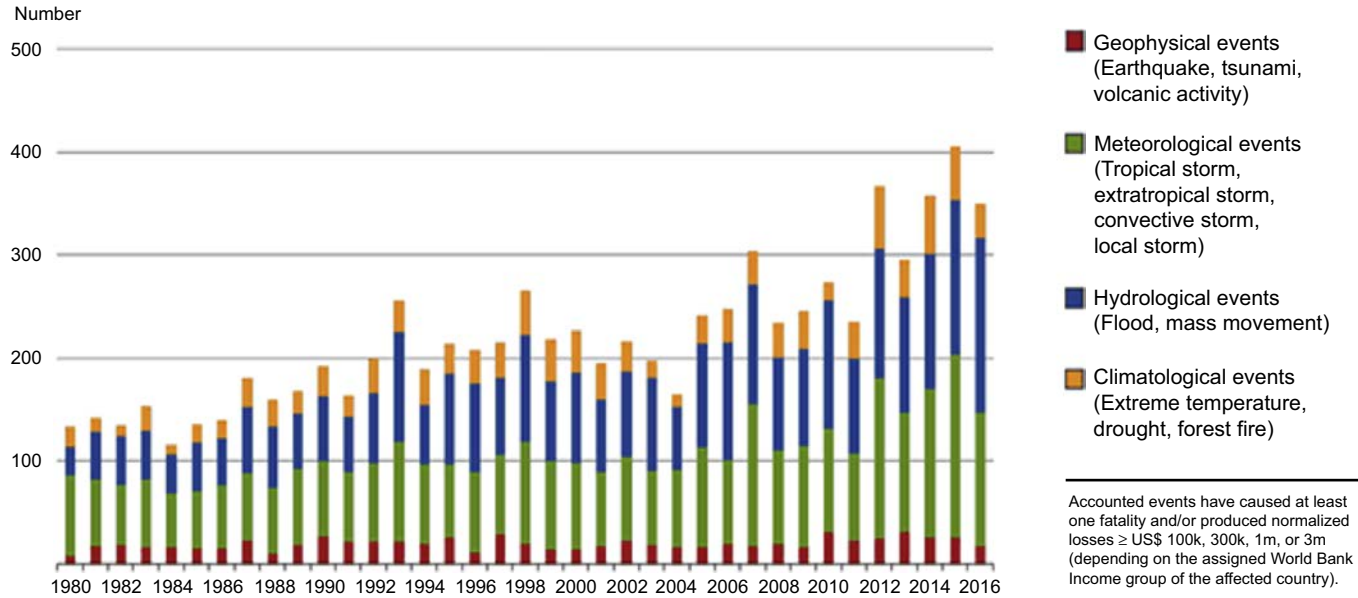


FIGURE 3.1 World Environmental Disasters From 1980 to First Half of 2016.

Munich Re (2016)

of events, their data reveals an increase in the impact of these events when the past 30 years is compared with the last 10 years (Höppe, 2015). Munich Re defines a catastrophic event as one which results in a direct insured loss to properties of US \$25 million or more (2014 values). However, this definition is likely to underestimate the number and severity of events. In developing countries the rate of insurance uptake is less than in developed countries, but insurance uptake in a developed country may also not be high, with 30% of homes in the Victorian 2009 bushfire having no insurance cover. Floods resulting from a hurricane are not counted as this is not covered by insurance, and insurance does not include events that don't involve property loss, such as the impact on people of a prolonged heat wave.

In the counted events, Munich Re measures the number of fatalities, overall losses, and insured losses. Thus, many of the impacts of a disaster remain uncounted, such as the number of physical injuries, which are often high, even in a developed country. In the first 72 h of the February 7, 2009, bushfires in Victoria, 414 people presented to hospitals, as a result of the fires (Cameron et al., 2009). Psychological injuries and stress reactions remain uncounted, as does loss of business revenue and the actual businesses. Indeed, many losses from disasters are not accounted for in many sources that estimate the cost of disasters. Also rarely mentioned is the reality that poorer people disproportionately experience natural disasters.

EQUITY

Inequality describes differences between people in terms of income and wealth, as well as education, health, and other social outcomes. A lack of equity implies unfairness and that it is preventable (Douglas, Friel, Denniss, & Morawetz, 2014). As Stiglitz says (2012), inequity is a choice. Inequity is present and growing within many countries. For example, referring to Australia, the authors note that:

In recent decades the income share of the top 1 per cent has doubled, and the wealth share of the top 0.001 per cent has more than tripled. At the same time, poverty is increasing and many of those dependent upon government benefits, including the unemployment benefit, have fallen well below the poverty line

Douglas et al. (2014, p. 8)

Many countries reflect a similar pattern of inequity with the discrepancy in wealth higher than the discrepancy in income (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, & Tsounta, 2015). Inequity entails more than financial issues. Inequity in health care access and use is more pervasive in developing countries. Women are disproportionately represented in the lowest income groups, and low-income earners are concentrated in certain regions, often magnifying the negative effects of inequity and creating clusters of socioeconomic deprivation (Demalo, 2014).

A common perspective to correct inequity is that all people should have equal opportunities. Sen (1992) uses the word “capabilities” to describe this, arguing that all people should have equal capabilities to achieve what they wish. This perspective

is often reflected in minimum standards, such as the provision of welfare benefits by many governments. In the case of disaster recovery, an example could be the ability to obtain a minimum standard of postdisaster shelter for all people, perhaps through low or no-interest loans to those who are left with few resources after the disaster. A capability approach has the advantage that it offers an equal platform that enables people to make their own choices about recovery, thus maintaining their own decision making and control over their future.

ABILITY TO RECOVER FROM A DISASTER

The ability to recover from a natural disaster will depend not only on the nature of the disaster but also, in large part, on the predisaster conditions. This includes personal resources, government planning, and resources available, as well as local conditions, such as community resources and social capital, the latter also being influenced in large part by government policy and planning. Those who have preexisting disadvantage or low resources are likely to be less able to recover from a natural disaster than those with more resources and better health and well-being. This suggests that two factors are important in disaster recovery. There is a need to improve the capabilities of those with the least resources to maximize their ability to recover after a disaster and also give priority to those who remain with the lowest capabilities postdisaster in the recovery stage.

NATURE OF THE DISASTER

The characteristics of natural disasters is such that there may be a need to respond to an immediate unpredictable event, such as bushfire, or there may be time to prepare for a more predictable outcome, such as longer term water shortages in Southeast Australia. Of course, as in the latter, even while an event may be more predictable, clarity of details may be less clear when a longer time span is involved. Thus, an event can be placed anywhere on the two dimensions illustrated by the stars in Fig. 3.2.

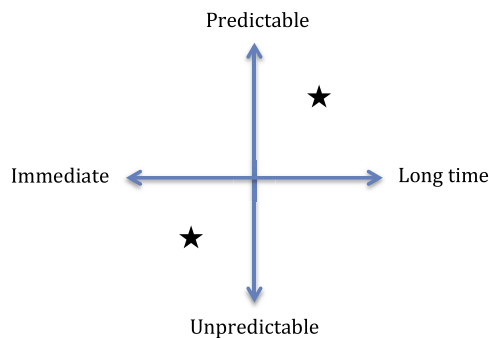


FIGURE 3.2 The Two Dimensions of a Disaster.

Even less certain will be the indirect effects associated with a disaster and thus the ability to recovery from these impacts. For example, where a disaster, such as flooding or a cyclone, occurs in a major food growing area, this may limit food supplies for a populated area or the commercial viability of a township in a region that processes the farm products. A further indirect impact may occur in that the shortage of certain foods may push up the price of these foods, thus placing their availability beyond the reach of some groups in the community. An event may carry some longer term impacts on health, such as the outbreak of cholera, or contamination of the water supply. Infrastructure damage on roads and buildings may need a longer timeline for repairs.

Severe, long-term indirect impacts occurred in 2010, when Pakistan experienced the worst floods in its history with one-fifth of the country flooded, effecting 15 million people (Kron, 2014). Over 1760 people were killed, drinking water was contaminated causing illness, and, significantly, 200 hospitals and medical centers were also flooded. Food supplies and livelihoods were washed away and 1.5 million homes were destroyed or damaged. Thus, the nature of the event (type, severity, location) has impacts on the ability to recover. Repeated or ongoing exposure to severe events risks a reduced capacity to recover, in environmental, human, and economic terms. The current drought in Asia (at the time of writing, May 2016) is leading to extensive consequences, including rice production being badly hit and severe water shortages, all of which will delay the recovery process, especially when the consequences are widespread, where personal and government resources are low in the first place and there is a risk of conflict occurring when recovery is difficult due to low levels of resources (McDonald, 2016, p. 12).

PERSONAL RESOURCES

As noted earlier, the impact of a natural disaster on households and communities will depend on their access to resources. In many situations people will adjust to adverse unintended impacts and absorb the cost, however, for some people and some communities, even a more minor event may result in long-term adverse outcomes. For example, after the Kinglake fires (in Victoria) in 2009, some people lacked the financial resources to rebuild their homes and now occupy government housing in a highly disadvantaged location in Melbourne; others have become homeless (personal communication). Personal factors that influence recovery include knowledge and information about how to prepare for, and respond to, the nature of the disaster and about personal, social, psychological, and economic resources available to undertake this response.

Those who are already experiencing disadvantage and social exclusion are more likely to have the most difficulties in both the short-term response to a disaster and the long-term process of recovery (Stanley, 2014). Their position of exclusion is commonly associated with fewer resources to deal with challenges. A second group of people who are “just managing” prior to the disaster may be at risk of being moved into poverty and poorer well-being post disaster. Thus, some groups and some

locations will need particular attention given to them in predisaster planning and assistance, and disaster response and recovery, as identified below.

THOSE WITH EXISTING VULNERABILITIES

People who need special consideration are those with existing vulnerabilities, who have:

- a low income and low wealth, thus little choice and flexibility, and lack of credit to negotiate loans;
- poor access to knowledge and poor ability/experience/power/connections in negotiating better outcomes with government and bureaucracy; and
- a lack of, or limited, social capital to call upon to provide support and assistance. This may be due to a low capacity to make and maintain social networks, such as due to long working hours or mental illness, or it may be due to geographical isolation from support networks and services.

In the developing world there remains many countries where the majority or close to the majority of people are represented in the first two categories of vulnerability, particularly in African countries and also in places such as India, Pakistan, Bangladesh, and Laos (Roser, 2016).

Following the floods in Queensland in 2010–11, the Queensland Council of Social Services found that those already experiencing disadvantage were disproportionately adversely impacted (ACOSS, 2013). Particular areas included:

- lack of insurance, or underinsurance, and the rejection of flood insurance claims left people unable to live in or repair their homes;
- loss of employment through disruptions to and closure of local businesses;
- loss of rental tenancies and inability to meet higher bond payments and rents;
- increased pressure on public housing waiting lists; and
- increased living costs.

With over 105,000 people officially defined as homeless on any given night in Australia, those who are already experiencing homelessness find disaster recovery difficult (Pendrey, Carey, & Stanley, 2012). This study supported the claim that a natural disaster tends to magnify preexisting disadvantages and health issues for homeless people and those in insecure accommodation, particularly around access to safe shelter, fresh water, transport, along with problems of mental illness, chronic disease, substance abuse, and posttraumatic stress. The type of natural disaster manifests particular difficulties. For example, in a flood situation, those experiencing disadvantage may be living in less satisfactory accommodation, such as caravan parks, which tend to be located in flood prone areas. Unable to locate elsewhere, people remained in wet conditions for an extended time. The study in Victoria found that living in a flood situation increased vulnerability to insect bites and skin infections and people found it difficult to keep clothing dry. The demise of public transport after a disaster renders it more difficult for homeless people to access resources or move out of the

area. Communication is difficult with those who are homeless because of their lack of phones and a fixed address.

THOSE WHO ARE AT RISK OF BECOMING VULNERABLE

A second group who may need special attention due to their potential vulnerability are those who were only just managing prior to the disaster (Stanley, 2014). An example here might be a farming household where all resources are used to maintain the farm prior to the extra demands from a disaster, which may subsequently lead to a further reduction in farming viability. Businesses and residences adversely impacted by a disaster, such as bushfire, may find that the price on sale drops considerably. Low-income home owners may not have taken out insurance (30% did not have insurance in the 2009 Victorian bushfires), or are underinsured, thus find that they are unable to rebuild. Indeed, the numbers of people in this category are potentially quite large in both developed and developing countries. It includes those who are frailer, have chronic illness, disability, or mental illness.

Often the indirect impacts arising from the disaster, discussed above, compound the difficulties in the recovery process for many people without the resources to support themselves. For example, the disaster may well disable infrastructure and services, leaving roads damaged and government offices and services, such as schools and hospitals, unusable. Damage to housing will reduce the availability of rental stock within, and nearby, the disaster area, as well as increase the waiting lists for government housing. Prices are likely to rise for available housing, and other necessities and local sources of assistance, such as community services, may become overwhelmed with demands. The Climate Institute reports that disturbed behavior is more common after an extreme event, such as substance abuse, family violence, and self-harm, and suicides rise as much as 8% (Doherty & Clayton, 2011). Both children and adults may suffer posttraumatic stress and lingering behavioral issues associated with fear or anxiety.

SOCIETAL RESPONSES

BROAD SOCIETY

Making decisions about the social justice position of society is difficult, as illustrated in the disputes around the IPCC meetings, where vested interests often prevail. Disasters in developing countries, which have a smaller economy and lower resources, commonly require considerable assistance from the United Nations and international agencies, as well as wealthier countries, to manage disaster recovery. This assistance is often short-term and unfortunately long-term recovery prospects are usually less certain. Nepal experienced a 7.8-magnitude earthquake on April 25, 2015, that killed 9000 people, injured 22,000 people, and damaged or destroyed 800,000 homes. One year later, little reconstruction has taken place (Taylor, 2016). Attention to equity within countries in response to a disaster is often left to charitable

organizations, subsidized by government, but still heavily reliant on donations from the public, as largely the case in Australia.

As noted, disasters are increasingly being linked to greenhouse gas emissions, leading to climate change and more extreme events, with the risk of disasters. Developed countries generate the greatest greenhouse gases, particularly with their dependence on fossil fuels. Within a country, the highest emitters of greenhouse gases are the wealthiest people. A very poor household has emissions of about 22.3 tons annually; households with one person working, who earns an average wage, emits about 28.6 tons annually; whereas, a high-income, tertiary-educated household emits on average 57.8 tons annually (NIEIR, 2007). Such evidence strengthens the social justice argument for equity where disasters are linked with climate change, as those who have the greatest culpability in creating the problems should pay the greatest amounts for the impacts.

Equity can also be argued on pragmatic grounds. A society with little disparity between people is a society where all people are better off (Wilson and Pickett, 2010). The International Monetary Fund reports that an increase in the income share of the lowest 20% of income earners is associated with higher growth in the country's Gross Domestic Product (Dabla-Norris et al., 2015). These findings are based on a wide range of areas where inequity can occur, reflected in disparity in child development, health, levels of crime, obesity, trust, and mental illness.

THE THIRD SECTOR

A disaster also adversely impacts on the ability of an agency to provide services, including meeting the increase in demand for assistance and the need to divert resources away from usual clients to assist people who would not be a client except for the emergency (Pendrey et al., 2012). Pendrey et al. (2012) found that only a small number of agencies had incorporated disaster risk into their organizational planning. Many were underinsured. Most community service agencies do not have the resources to respond to emergency events, especially when they occur every year or every few years, as has been the trend with the recent floods and bushfires in Australia or the extensive size of events as illustrated above in Pakistan. This is despite the fact that these agencies are often called on by government both to build community resilience and to respond to events.

COMMUNITY

Social inclusion or exclusion broadens the ideas of barriers to full participation in society beyond this being only a question of income, to being a multidimensional concept, including employment, participation, support, and political activity, as well as income. Fig. 3.3 shows the most important conditions (1% statistical significance) derived from over 1000 personal interviews with a stratified random sample undertaken in Victoria, Australia (Stanley, Stanley, & Hensher, 2012). The statistical modeling showed that a person who has higher social inclusion is also likely to have

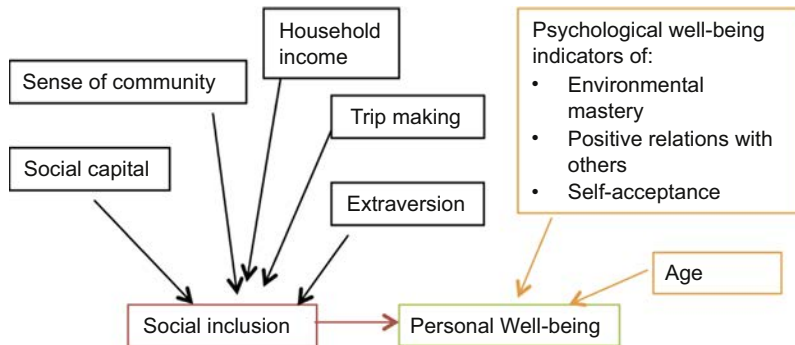


FIGURE 3.3 Drivers of Social Exclusion and Well-Being.

higher levels of personal well-being. In addition to an adequate income and having an extraverted personality, social inclusion is built from social capital, attachment to community, and the ability to be mobile.

Thus, improving capabilities is not only achieved through monetary handouts but also through measures that increase social capital, connections to the community, and the ability to travel. Improving opportunity, participation, and inclusion will increase personal resources and the ability of people to recover from a natural disaster ([Stanley & Vella-Brodrick, 2011](#)).

In July 1995 a heat wave in Chicago killed 739 people ([Klinenberg, 2013](#)). It was found that those in poorer neighborhoods were more vulnerable to the heat, but not in all poor neighborhoods. Those in poor neighborhoods who fared best came from places that had sidewalks, stores, restaurants, and community organizations that brought people together. During the extreme heat, people in this neighborhood were doing “wellness” checks on others, knocking on doors, and the community knew who was vulnerable. Living in this neighborhood with strong social capital prolonged life expectancy such that it was found to be roughly equivalent to having an air conditioner in each room!

The ability to work together facilitates active and social learning. This encompasses trial and error where communities generate knowledge and obtain new knowledge and adjust decisions ([Berke, 2002](#)). This is very important as responding to climate change, extreme events, and the possibility of disaster is not a “once-off” event. In a context of uncertainty and few ready answers, people need to continually adapt, respond, and change. People with experience and skill who have learned and are confident in this process will be invaluable to guiding others through this continually evolving process, thus improving the confidence and resilience of a community.

GOVERNMENT PLANNING

In large part, the capacity for recovery after a disaster is dependent on the pre-disaster planning that has taken place, particularly the quality and comprehensiveness of

this planning (Berke, Cooper, Aminto, Grabich, & Horney, 2014). Berke et al. (2014, p. 315) reviewed 87 disaster recovery plans in the United States and found that the plans have a “weak framework to guide recovery decisions to achieve long-term resiliency.”

It is argued in this chapter that comprehensive recovery is in part dependent on predisaster planning for social outcomes, with particular attention being given to those people and places with known vulnerabilities. Government planning is undergoing considerable change at present. Chapin (2012) outlines four waves of changes undergone by planning in the United States since 1950. He describes the last emerging wave as one that will be dominated by sustainable growth, which includes new policy areas such as site and neighborhood design, climate change, and change that will “tear down the institutional and intellectual silos that have limited effectiveness...” (Chapin, 2012, p. 11). This new direction also needs to encompass a broader uptake of social planning, such as the concept of “complete communities” adopted in Vancouver, where there is a strong integration of social outcomes in housing, transport, and health, all important components of equality, social inclusion, and well-being (Ohland & Brooks, 2013). How to achieve this integrated governance across functional divisions of government departments is a major challenge for planning.

As argued earlier in this chapter, priority attention should be given to particular issues associated with those people at risk of social exclusion. For example, land at greater risk of flooding, fire, or inundation by the sea is often offered at a lower price and thus purchased by people with a lower income, increasing their vulnerability. Those on a lower income are less likely to use building materials and designs that offer greater protection from extreme events as they are often more expensive than more conventional materials. Setting priorities for attention is difficult. The following is a suggested guideline for planning priorities that identifies and attends to those with the greatest needs:

Priority 1: Those at risk of social exclusion or poor well-being who have other vulnerabilities, who live in a location with a higher vulnerability to disaster, which has poor infrastructure and/or poor preparation for a disaster event. An example could be a lone parent on a low income who lives in an area with high risk of fire with poor transport services.

Priority 2: Those at risk of social exclusion or poor well-being with other vulnerabilities who live in a location with a greater disaster risk, for example, a lone parent on a low income who lives in an area with high risk of fire.

Priority 3: Those at risk of social exclusion or poor well-being with more than one vulnerability, for example, a lone parent on a low income.

Priority 4: Those at risk of social exclusion or low well-being, such as a lone parent.

Urban design can be undertaken to reduce the impact of disasters. For example, access to public cool areas, planting of trees to reduce the urban heat island impact, and the provision of water features to lower temperature can counter heat stress, especially for people who are homeless or have low-quality housing with little insulation.

With the higher incidences of disasters associated with increasing greenhouse gas emissions, there is likely to be a need to change some planning legislation to facilitate response to these changes. For example, planning legislation in Victoria relating to fire management covers buildings and the immediate area of development. It fails to allow for consideration of the additional fire risks due to climate change and take account of the wider environmental location of a building development (Stanley, 2015).

A further challenge for planning is how to effectively combine vertical governance or decision making from the bottom up with decision making from the top down, in order to integrate local citizen participation with broader, strategic planning goals. Public engagement to create a disaster plan that reflects local values, needs, and capabilities was one of six quality principles which arose from Berke's et al. (2014) study of disaster planning in the United States. Participation increases the likelihood that a neighborhood will be structured along the lines desired by local residents, who are often familiar with the local strengths and resource gaps. Such an approach will also build buy-in to community decisions and ownership of recovery plans. Indeed, community participation in decision making builds a sense of community, social capital, and engagement, as well as an opportunity to grow capabilities, self-esteem, and confidence, along with leadership possibilities. For example, a system can be designed where people are designated to check on vulnerable people during an extreme heat event, such as those who are house bound or elderly can be put in place.

It should be noted that the preceding points largely refer to disaster planning in developed countries. Disaster planning in developing countries needs considerable more attention because of the size and frequency of natural disasters and the extent of inequity present in many countries. The challenge is even greater as there is often an absence of sufficiently trained planners who adopt the contemporary thinking about inclusion and environmental sustainability, both critical variables for disaster recovery planning (Lehmann & Thornton, 2015).

CONCLUSIONS

The growing impact of climate change suggests that the trend of increasing natural disasters will continue. When these risks are aligned with increasing urban population growth and the growth in inequity, then the task of planning for disaster recovery becomes more urgent. Learnings from previous disasters reveal that those people with the highest predisaster vulnerabilities and fewer personal and community resources have the greatest difficulties recovering from disasters. There is a risk that some will not recover on a long-term basis with regard to employment, housing, and health problems. Thus, this chapter argues that recovery plans should particularly target those people and locations that have particular vulnerabilities. Predisaster planning should address the particular issues of vulnerability, such as avoiding accommodation being located on land subject to the risk of flooding and building personal capabilities and community strengths and supports.

The responsibility for successful recovery planning involves all levels of society, government, communities, not-for-profit organizations, and business. The case for involvement still needs to be argued, with a risk that international commitment for assistance not eventuating and the capacities of not-for-profit organizations being stretched too far. Government at the more local level has the challenging task of integrating across the functional areas, such as transport, health, and housing, while also coordinating governance, tasks, and actions, as well as offering information, leadership, and support across the community. The good part of this challenge is that where the community is offered this encouragement, supported by adequate resources, much of this planning and facilitation of action will be undertaken by a willing community, as evidenced in Australian research (Stanley et al. 2013). This study showed that given the opportunity, most communities are willing and able to make decisions and support other community members where the need arises.

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Blakely Disaster Readings

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When Systems Break Down: The Role of International Aid and Humanitarian Response in Disaster Recovery

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INTRODUCTION

This chapter provides an overview of the global humanitarian system for emergency management in shelter and housing. It is based on the author's experiences as a humanitarian practitioner with the Shelter Cluster and reflects issues and concerns from a field perspective. The chapter argues that urban vulnerability is poorly understood and that natural disasters, in particular, are events that expose the social, economic, and planning fault lines that underpin poorly managed urban growth. This is done through analyzing six components of humanitarian shelter coordination (relationships with government, local civil society and the private sector, protection issues, human rights in housing and property, cash and market mechanisms in humanitarian response, and accountability to beneficiaries). Natural disasters are also opportunities to address underlying urban planning issues and vulnerabilities, but these opportunities are frequently undermined through a slow transition process from response to recovery. While humanitarian agencies are capable of adjusting to urban crises, and there are some development agencies such as UN-Habitat and Habitat for Humanity that have an urban focus to their work, these skills are not systemic to the shelter sector. There is a general lack of connection between humanitarian agencies and longer term reconstruction organizations (such as the World Bank), and weak national governance structures often undermine recovery in the medium and long term.

In managing emergency response in shelter and housing, much is dependent on context. While systems for international emergency response are relatively simple in

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theory, in practice they must accommodate diverse human experiences and coping strategies after disasters. In the shelter and housing sectors, emergency interventions must also assist in catalyzing early recovery for urban and rural populations, men and women, economic centers, and household livelihoods, *inter alia*. While taking into consideration individual and households needs separately, emergency response must occur at scale, with speed, and provide the immediate basis on which longer term recovery can occur—these are vital, yet often contrary, impulses that provide challenges for both the humanitarian system and the emergency response.

As the world moves further into the Anthropocene, an increasingly unpredictable climate and a global population that is now predominantly urban underline the importance of urban disaster preparedness, risk reduction, and response. Fifty-four percent of the current global population now live in cities, and this proportion is projected to rise to 66% by 2050 ([United Nations Department of Economic and Social Affairs, 2014](#)). Despite this, most international nongovernmental organizations (NGOs) and United Nations Agencies have their origins in agricultural development, rural emergencies, or conflict response that largely characterized the postwar boom in international aid and development. There are relatively few agencies that specialize in urban development or humanitarian response.

HUMANITARIAN REFORM AND THE TRANSFORMATIVE AGENDA

Several attempts have been made over the last decade to reform the international humanitarian system. The scale and complexity of the major international response to the Asian tsunami in 2004, which killed 230,000 people and affected many more across 14 countries, led to major calls for reform focusing on humanitarian financing, coordination of humanitarian response, and United Nations leadership ([Save the Children, 2014](#)). A reform process initiated by the United Nations Emergency Relief Coordinator, together with global civil society representatives, who form the Inter-Agency Standing Committee (IASC)—a body that provides oversight and strategic direction of humanitarian response on behalf of the UN General Assembly—sought to improve the effectiveness of humanitarian response through greater predictability, accountability, coordination, and partnership. There were three main components of humanitarian reform that now provide the institutional basis for disaster management. These are as follows:

- The *cluster approach*: addressing the need for “adequate capacity and predictable leadership in all sectors” of humanitarian response.
- *Humanitarian financing*: addressing the need for “adequate, timely, and flexible financing” of humanitarian response, notably through the Central Emergency Relief Fund.
- *Humanitarian Coordinator strengthening*: addressing the need for “effective leadership and coordination in emergencies” by the senior UN figure in country ([OCHA, 2016](#)).

Essential to the process of reform is the principle that effective humanitarian leadership is inclusive, acknowledging the significant growth in number, funding, and influence of international NGOs over the past decade, as well as the relative weakness of UN Agencies in providing overall sectorial leadership. The principle of partnership acknowledged the importance of the three main pillars response acting together: UN Agencies, NGOs, and the Red Cross/Red Crescent Movement. Commitment to partnership between these pillars was endorsed through a set of principles developed in 2007 ([Global Humanitarian Partnership, 2007](#)).

The major structural change to the humanitarian system was the introduction of “clusters” as a formal mechanism to replace the previously ad hoc and voluntaristic “sectorial” approach that had proved deficient in managing larger scale responses. The core elements of humanitarian response were divided into 11 areas relating to life-saving response foci, each with its own separate lead agency that has designated responsibility for coordinating the cluster in emergencies. The 11 IASC clusters and lead agencies are presented in the following table:

Global Humanitarian Cluster Lead Agencies

Cluster	Lead Agency
Camp coordination and camp management	UNHCR/IOM
Early recovery	UNDP
Education	UNICEF/Save the Children
Emergency telecommunications	WFP
Food security	WFP
Health	WHO
Logistics	WFP
Nutrition	UNICEF
Protection	UNHCR
Sanitation, water, and hygiene	UNICEF
Shelter	UNHCR/IFRC

IFRC, International Federation of Red Cross/Red Crescent Societies; IOM, International Organization for Migration; UNDP, United Nations Development Program; UNHCR, United Nations High Commissioner for Refugees; UNICEF, United Nations International Children's Emergency Fund; WFP, World Food Program; WHO, World Health Organization.

The crucial differences between the “cluster” and the “sector” are that each area of life-saving humanitarian endeavor has a designated lead agency that would provide specialized, predictable, and accountable leadership in emergency response. Additionally, with the exception of IFRC, agencies agreed to be the provider of “last resort” where emergency gaps could not be met by humanitarian partners. Overall, the cluster lead agencies are responsible for setting humanitarian response policy and strategy in their area; developing and disseminating technical standards; analyzing response needs, gaps, and protection issues; providing the focus for overall sectorial analysis and fundraising (through the UN Appeals process); and representing/advocating for the sector. In natural disasters, the cluster lead agency must also work

closely alongside government to support where the circumstances are overwhelming to national authorities and to build capacity of national counterparts (IASC, 2015).

Recognizing the importance of partnership and the enormous resources brought to humanitarian response by non-UN Agencies, the Humanitarian Reform Agenda has sought to include non-UN organizations in coordination leadership. However, despite the inclusion of IFRC, IOM, and Save the Children in cluster leadership positions, a criticism remains that humanitarian leadership remains unrepresentatively UN centric. The cluster supporting emergency response and recovery in housing is the Global Shelter Cluster, which is co-lead by the UNHCR and the IFRC. This division in leadership responsibilities means that UNHCR leads the Shelter Cluster in conflict settings, whereas IFRC convenes the cluster in natural disasters. To preserve the neutrality principle that underpins the Red Cross Movement, several terminological niceties are observed in describing IFRC's role. IFRC "convenes" rather than "leads" the Shelter Cluster and generally will not take on cluster responsibilities in an area where the Red Cross Movement is lead by the International Committee of the Red Cross—the specialist agency within the Red Cross Movement that works in conflict. In this situation, leadership could pass to UNHCR, IOM, or to the best placed NGO in-country to coordinate the response. A further clarification in IFRC-led clusters is that, following an agreement with the United Nations Office for the Coordination of Humanitarian Affairs, IFRC would not be obliged to fill the role of provider of last resort that is incumbent upon other cluster leads.

The decision about which agency coordinates the shelter response is made in-country by the Humanitarian Country Team—a group of major UN Agencies and NGOs chaired by the UN Resident Coordinator that makes initial recommendations to the Emergency Relief Coordinator and IASC about which clusters require activation based on an initial assessment of damage and in-country response capacity. The Shelter Cluster provides predictable, timely, and effective coordination services in nonrefugee situations and focuses on areas where people experience internal displacement but have not crossed an international border or have a genuine fear of persecution. UNHCR is the internationally mandated agency, under the 1951 Refugee Convention, that is responsible for multisectorial coordination in refugee contexts (UNHCR, n.d.).

While the principles underpinning shelter coordination and leadership are relatively simple, the scope of work can be enormous. Recognizing that household-level recovery begins from the immediate aftermath of the emergency, the Shelter Cluster's work includes everything related to the provision of adequate housing following emergencies. This includes the provision of nonfood items (NFIs), emergency and longer term shelter support, housing construction and reconstruction, and settlement support such as site planning and urban planning, as well as protection, disability, gender, environmental, and market and other socioeconomic issues that inform shelter and housing recovery after disasters (Global Shelter Cluster, 2016).

Following the experience of the Haiti earthquake and Pakistan floods in 2010, the IASC revisited some of the earlier concerns about effective humanitarian leadership, especially in large-scale emergencies. The resulting Transformative Agenda aimed

to develop the concept of “empowered leadership,” limit the longer term impacts of disasters on development, provide a common basis for assessment and response preparedness, and develop “system-wide” protocols for responding to major emergencies or “Level 3 activations” (IASC, 2016). Importantly, the common, multisector needs analyses and funding appeal based on agreed response objectives has brought a more coherent early strategy and greater international donor attention and funding to large-scale, Level 3 emergencies. Through its emergency leadership, the Shelter Cluster plays a key role in providing the strategy, objectives, needs assessment, and link with early recovery envisaged in both the Humanitarian Reform Agenda and the Transformative Agenda.

While the cluster system is, in principle, simple and flexible enough to work in both small- and large-scale disasters, the major constraints are those of funding and participation. During Level 3 emergencies, recurring concerns have been raised by national governments from the Philippines to Vanuatu that the system-wide response can itself be overwhelming and detract from the ability (and visibility) of national authorities in managing the response. Conversely, however, the designation of Level 3 activation has brought additional resources to “forgotten emergencies,” such as the internal displacement crisis in the Central African Republic (ALNAP, 2016, p. 75). Smaller emergencies, however, struggle for funds as donors prioritize Level 3 activations and in the context of large-scale protracted crises, such as in Syria or South Sudan. Furthermore, funding remains driven by political considerations rather than humanitarian needs. If “forgotten emergencies” in Central African Republic, Niger, and Zimbabwe struggled for funds, the Libyan emergency appeal, which occurred at the same time, was 83% funded owing to strong geopolitical interest from the United Kingdom and the United States (Green, 2012, p. 319).

The “humanitarian system” reflects only a minority of responders most of which are Western aid agencies or affiliates. Many agencies—especially those able to raise their own revenue such as church groups—do not see the importance of collaborative, coordinated response. This is especially the case of evangelical organizations and the relief arms of political parties seeking to use crises to respond to the needs of a particular constituency or to further a political agenda. Similarly, private sector organizations are largely uncoordinated and, in countries with weak or corrupt government, are often reluctant to work too closely with national authorities or formal coordination mechanisms that exist to support government line ministries. Finally, humanitarian response may only reach a minority of those in need with processes of “self-recovery” and “resilience” little understood, especially in urban contexts where the role of cash and market mechanisms (which are well analyzed by livelihood experts) are not yet well analyzed in the context of shelter and housing.

Although there has been substantial experience of urban disasters over the last 16 years—Gujarat (India 2001), Bam (Iran, 2003), the Asian tsunami (multicountry, 2004), Pakistan (2005), Haiti (2010), Typhoon Haiyan (Philippines, 2013), Gaza (Palestine, 2014), and Nepal (2015)—this has not translated into wide-scale expertise in urban preparedness and response among traditional international humanitarian organizations. This systemic neglect of urban issues is based on common

assumptions that urban recovery is often too complex, expensive, and political, and that it is best left to longer term multilateral funding institutions such as the World Bank that have closer relationships with government. For aid organizations, many of which originated in response to rural emergencies, the role of the market and access to a money economy in urban areas can also alter perceptions of vulnerability. Here, urban populations are sometimes deemed “less vulnerable” owing to comparatively higher income levels leading to aid agency perceptions that urban populations are “more resilient” and have greater capacity for “self-recovery.”

The wider humanitarian system is also under strain owing to the enormous scale of refugee emergencies in the Middle East (the wider implications of the Syria Crisis), economic downturn in traditional donor nations, and relative “donor fatigue.” A further problem for the humanitarian system is that it remains largely Western, and local organizations, as well as new humanitarian donors (such as China or Saudi Arabia), are not integrated into a common international system for response coordination, funding, and reconstruction. Finally, as one of the few existing coordinated international systems, whatever its shortcomings, expectations on the humanitarian system are enormous and require it to respond to conflict, natural disasters, weak governance, and long-term development challenges. These expectations are not matched by the tools, resources, or mandates of humanitarian agencies themselves, which rarely have influence beyond the provision of immediate life-saving needs. With its roots still firmly embedded in Cold War agrarian crises and conflict in sub-Saharan Africa, the humanitarian system is under strain and, like those who fund it, has shown relatively little evidence of an ability to adapt to a rapidly urbanizing world marked by longer term complex crises and climate change.

While attempts to reform the humanitarian system since the Asian tsunami of 2004 have significantly improved the quality of response leadership and coordination, the rapidly changing complexion of crises, urbanization, geopolitical manipulation, the emergence of cash transfer programming (CTP), and the desire of emerging economies to be seen as donor rather than beneficiary nations strain a system that was never intended to go beyond the provision of short-term, life-saving relief. Given the diversity of emergency situations and needs and the equal diversity of ways of responding (from individual action to NGOs to the private sector), it may be misleading to speak of a “humanitarian system” at all. Instead, as a recent study points out, on a “spectrum of coordination” from organizations that act with complete autonomy to those that work so closely that they “merge,” most situate themselves in “communication” and “alignment.” That is to say, organizations involved in response periodically talk with each other and share information where necessary but remain otherwise independent (ALNAP, 2015, pp. 16–18). Rather than speaking of a humanitarian “system,” it may, in fact, be more accurate to refer to looser forms of association that are interconnected but not managed, such as “network” or “ecosystem” to understand the totality of response actors, including NGOs, private sector, local civil society, governments, military, and the affected population themselves.

RECURRING THEMES AND CHALLENGES IN COORDINATING DISASTER RESPONSE

RELATIONSHIPS WITH GOVERNMENT

In conflict, aid agencies can call upon the “humanitarian imperative” to deliver life-saving humanitarian assistance to respond to immediate needs despite government opposition or even in opposition to government action that may have contributed to a humanitarian crisis. However, in responding to natural disasters, government, whatever its capacity, remains the sovereign actor in the disaster-affected country. Shelter Cluster coordination consequently occurs alongside the appropriate government agency and ultimately under government direction. The official terminology for the Shelter Cluster in these situations is “co-lead” to the government “lead agency.” Its role is to support the authorities temporarily until the crisis is over and additional management capacity is no longer required.

However, few if any countries have a “Ministry of Shelter,” and the immediate task of the Shelter Coordinator is to find which government ministry best represents shelter interests. The appropriateness and capacity of the government ministry has a major impact on the effectiveness of the longer term response and the ability of shelter actors to advocate effectively at the highest levels of political decision making (i.e., cabinet). In most cases, shelter interests are divided between many different government departments, which can include social welfare, urban development, local government, trade and finance, infrastructure and public works, and the environment. Unlike, for example, the Health Cluster (co-led by WHO) that usually works with a clear counterpart in the Ministry of Health, the absence of a stable, recognized, and designated counterpart for the Shelter Cluster can fragment the disaster response. This can be a short-term advantage for the Shelter Cluster as it may facilitate advocacy and strategic decision making across a range of departments. However, the absence of a locally influential government lead agency means a lack of high-level advocacy and difficulties in handing over longer term recovery planning and coordination roles where there may be limited capacity to continue this function once the international system moves on or runs out of funds.

This can also be a challenge in terms of urban response as urban planning is frequently in the hands of local or city government, while the Shelter Cluster is usually lead by national government representatives, thus potentially limiting policy and advocacy influence at subnational levels.

ENGAGEMENT WITH LOCAL CIVIL SOCIETY ORGANIZATIONS AND THE PRIVATE SECTOR

While the cluster system is intended as an inclusive coordination forum based on principles of collaborative leadership and collective decision making, in reality it heavily favors international NGOs and UN Agencies.

In practice, in a large-scale emergency local civil society organizations, unlike their international counterparts, will be largely unfamiliar with international coordination mechanisms and funding appeals processes. There may be language barriers as well as cultural barriers to participation as the system favors tertiary-educated English speakers who are confident in their technical skills and ability to represent their organizations in public. International humanitarian actors, who are trained to be quick and assertive, frequently lack the ability to provide time, space, and support to representatives from local organizations to make meaningful contributions, despite the fact that local organizations frequently have greater access to affected people, respond first, remain active in the long term, and have in-depth understanding of local culture, languages, and politics. This systemic bias is reflected in global funding outcomes with a mere 1.6% of global humanitarian funding going to local actors (IFRC, 2015). An exception here is where local organizations are partnered with international ones and supported with greater resources and expertise than would otherwise be the case. As meaningful engagement of local NGOs is a key challenge for humanitarian leadership, so is engagement with the private sector.

Just as NGOs are extremely diverse in their size, capacity, and areas of specialization, private sector actors are equally nebulous. They range from high-profile corporate social philanthropy, to ease overseas remittances in times of crisis, to local chambers of commerce or shopkeepers providing relief items through market mechanisms. Crucial questions around the role of private sector organizations concern the quality and consistency of relief items provided in emergencies as well as the interaction of the international aid system with markets as humanitarian response increasingly comes to depend on CTP (Shelter Cluster Nepal, 2015a, p. 26).

PROTECTION, GENDER, AND DISABILITY INCLUSION

Shelter is frequently described as the physical embodiment of protection, and technical guidance on shelter programming often focuses on principles of social vulnerability and social inclusion rather than purely planning, architectural or engineering information. One of the ironies of the cluster system is that protection itself is viewed as a separate specialization, with its own cluster led by UNICEF, that forms a separate response strategy rather than something that is integrated more closely with other sectors.

Protection in the context of shelter considers both individual rights, including a “right to housing,” and broader social themes that impact the ability of a household to recover, as vulnerability in disasters is often the product of preexisting conditions (Barber, 2008, pp. 36–37). This may relate to class, socioeconomic status, ethnicity, sexuality, disability, and questions of “locational disadvantage” such as access to markets, jobs, and financial institutions (Shelter Cluster Nepal, 2015b). Specifically, poor building materials and weak construction practices mean houses are more prone to collapse. Geographic location and the absence of political representation in capital cities or at the level of national politics can mean resources do not reach the most vulnerable or disenfranchised communities. Further, “resilience” and “self-recovery”

are often dependent on social networks and connections. Those with fewer family, social, economic, or political connections—such as the elderly, people living with disabilities, or marginalized communities—are less likely to recover quickly.

Gender considerations inform all aspects of shelter programming and response and refers to the different socioeconomic roles often played by both men and women, some of which are contingent while others are embedded within cultural traditions. Different socioeconomic roles played by men and women influence access to power, resources, and the ability of the household to recover. As men and women are not uniform groups it is necessary to “disaggregate between different groups of women and men in terms of their diversity, their needs and vulnerabilities in a crisis, remembering that gender not only changes over time, but disasters and conflict can be triggers for changes in the roles and responsibilities that women, girls, boys and men have (i.e. gender roles)” (Global Shelter Cluster, 2013).

In urban response, this is further complicated by rapid processes of social and economic change, including gender roles, brought about by migration to the city. A major additional protection concern is around human trafficking and exploitation of young men and women, as well as children, for sex work and slave labor. Linking shelter, livelihoods, and a close understanding of local protection issues can promote recovery across the affected population (not just further support those who are already best placed to rebuild) as well as contribute to the prevention of human rights abuses and exploitation that can accompany disasters; however, intercluster coordination remains a weakness of the international system.

HOUSING, LAND, AND PROPERTY

Security of land tenure underpins every shelter response, is both an immediate and longer term basis for Shelter Cluster advocacy, supports timely recovery, enables longer term investment in disaster risk education, supports gender equity (as women and children are least likely to have formal land rights), and can contribute to the construction of peaceful communities by removing land ownership as a key source of communal tension. Disasters tend to exacerbate already existing social inequalities, and legal and regulatory barriers to land access and tenure can affect a household or community’s ability to recover from disaster. In many countries systems for managing land ownership and cadastral surveys are weak, limited, nonexistent, or subject to traditional jurisdiction (such as *wantok* systems of collective ownership in Melanesian countries in the Pacific). The availability of formal land rights in urban areas is especially difficult in the context of urban drift, the massive increase in many cities in developing countries of “informal settlements” or slums, and intense economic pressures on land values. While shelter agencies can advocate for the rights of those immediately displaced and for longer term settlement solutions that reflect sustainable access to livelihoods, continuing this advocacy requires a long-term presence, partnerships with government, local organizations, and international development institutions such as UNDP and the World Bank. As housing, land, and property (HLP) is essential, it is well beyond the influence of the humanitarian community acting alone.

Importantly, there is an increasing legal basis for the “right to housing” that underpins the advocacy role shelter agencies and the Shelter Cluster can play in addressing land tenure issues in disaster response. These include the “right to adequate housing” in the International Covenant on Economic, Social and Cultural Rights, as well as the conflict-related refugee and internally displaced person (IDP)-based Pinheiro Principles. These rights-based approaches underpin the shelter component of the Sphere standards that provides guidance for all humanitarian agencies on minimum standards and principles in humanitarian response (NRC/IFRC, 2016, pp. 6–7). The right to adequate housing is based on the right to live somewhere in security, peace, and dignity (and the right to nondiscrimination in this context).

There are seven criteria that make up the right to adequate housing. These are:

- protection against forced evictions and the arbitrary destruction and demolition of one’s home;
- the right to be free from arbitrary interference with one’s home, privacy, and family;
- the right to choose one’s residence, to determine where to live, and to freedom of movement;
- security of tenure;
- HLP restitution;
- equal and nondiscriminatory access to adequate housing; and
- participation in housing-related decision making at the national and community levels (UNHABITAT/OCHCR, n.d., pp. 3–4).

Crucially, these criteria also define housing—rather than shelter—more comprehensively, linking it with other core human rights such as freedom of movement. This underpins a core element of shelter programming and Shelter Cluster advocacy in general, which is that shelter and housing are embedded progressively within community rehabilitation and are not a product or commodity for distribution. This provides shelter agencies with an entry point for programming, policy, and advocacy, especially in urban settings (NRC/IFRC, 2016, p. 7).

CASH AND SHELTER

Cash is increasingly becoming the modality of choice for agencies responding to crises. CTP has been in long use by food security and livelihoods sectors, which have developed significant cash expertise, and has been used by shelter actors for some time, although not as systematically and with less sector-specific guidance (Dewast, 2016, p. 5). There are clear and significant advantages to using cash as well as some risks that are often overlooked in the rush to implement cash programs in emergencies.

These advantages include providing beneficiaries with choice, flexibility, and dignity while stimulating the economic recovery through a range of CTP options, including vouchers, cash for work, cash for rent, conditional cash, restricted cash, unconditional cash, and multipurpose cash. CTP also reduces the traditional reliance

on large-scale logistics and procurement that has made shelter one of the largest and most complex aid sectors. This in turn changes the aid dynamic between shelter agencies determining what beneficiaries need and beneficiaries themselves controlling the nature and scope of assistance. CTP can underpin broader Shelter Cluster objectives of supporting owner-driven reconstruction.

The provision of choice is seen as particularly empowering for households and communities. Guidance on CTP often recommends targeting women for cash distribution as women's priorities in emergencies tend to reflect better the immediate humanitarian priorities of households and communities rather than more individualistic coping strategies frequently employed by men. This can lead to progress in women's status toward gender equality but, in an emergency context with changing gender roles, can also come at the risk of increased gender-based violence that has to be carefully analyzed and monitored by aid agencies. When accompanied by financial inclusion programs, such as branchless or mobile banking, CTP has the potential to make significant long-term development gains in poor, marginalized, and disaster-affected communities. However, as Oxfam guidance on CTP notes "without a strong analysis of the social relations framework of communities, such opportunities to empower marginalised groups may be lost" (CaLP, n.d.). Importantly, remote or particularly marginalized communities may be excluded from CTP or may not have sufficient market access to appropriate relief items to justify the use of cash.

In practice, however, there are remaining concerns about cash that need to be addressed systematically. Given the potential to affect inflation, market monitoring and analysis is essential, although this usually only occurs in specific sectors rather than across the humanitarian response. Equally, cash—especially general purpose cash grants—can be used on anything and breaks down sectorial divisions among shelter, livelihoods, food security, health, education, and other response areas. Consequently, intercluster coordination is a vital but often weak dimension emergency response. Finally, CTP is not a substitute for quality, and shelter agencies need robust training and monitoring mechanisms to ensure that CTP is effective in catalyzing the recovery process in shelter and housing.

ACCOUNTABILITY TO AFFECTED POPULATIONS

Accountability can be described as "the process through which an organization makes a commitment to respond to and balance the needs of stakeholders in its decision-making processes and activities, and delivers against this commitment." Or, more simply, it is the "responsible use of power" and is based on the overarching principle that humanitarian agencies work in the service of, and bear primary responsibility to, people affected by disasters and conflicts. Accountability in this context has five key components:

- Value accountability throughout the shelter cluster.
- Share information with all stakeholders.
- A feedback and complaints system is in place.

- Affected populations take a lead in making decisions, with support from organizational experts.
- Accountability is integrated throughout the project cycle ([Accountability Working Group, 2013](#)).

While agencies and clusters are increasingly effective at communication, inclusion and participation (especially at the community level) are debatable to the extent at which affected populations are able to “take a lead in making decisions” in humanitarian programming and in overall response strategy development. Further, critically, the word “accountable” is perhaps more of an expression of idealism than a reality. In practical terms, decision making in aid agencies more often rests with back donors, national governments, and senior headquarters staff, who are more likely to hold humanitarian actors “to account” rather than with affected populations themselves. It is, however, the responsibility of aid coordinators, donors, and cluster lead agencies to ensure that decision making and agenda setting are done by those in whose interest humanitarian response works.

TRANSITION TO RECOVERY

A major issue faced by all agencies in humanitarian response is how long to stay involved. In natural disasters, recovery could take 5 years or more; whereas, in conflicts or protracted emergencies, life-saving humanitarian interventions can last decades. Transition (and exit) from an emergency depends on a number of contingent factors, including agency mandate, availability of funding, government capacity, profile of the emergency, and ongoing need. These decisions are inevitably context specific.

The point at which coordination structures exit or transition has moved. Initially styled as the “Emergency” Shelter Cluster, the intention of clusters was that they were surge support for 3–6 months following a sudden onset disaster. After this, in theory, development actors would begin to resume longer term programs. In reality, however, the emergency phase rarely fits within this time frame; development actors are frequently unable to adjust programs to link in with the end of emergency intervention and provide continuity past the early recovery phase. Further, government weakness (as well as the absence of formal line ministries dealing with shelter or housing) means that “handing back” responsibility to state structures only occasionally produces continuity in planning and management. In this context, clusters have begun to last well beyond the initial emergency phase—in some cases for up to 18 months after the disaster. In particularly disaster prone countries or regions, IFRC has been able to support preparedness clusters, which means that mechanisms originally intended for emergency coordination are now established on a more or less permanent footing.

Where there is a need for longer-term coordination of housing reconstruction, the Shelter Cluster often tries to establish a separate body to take on responsibility. This works most effectively where government takes a lead role—such as the Earthquake Recovery and Reconstruction Authority following the Pakistan earthquake in 2005.

There are few global agencies with the capacity and emergency coordination experience to take on this role. UN-Habitat's intensely bureaucratic structure, disengagement from the humanitarian sector, and focus on its own programs means that attempts to handover recovery coordination have been unsuccessful. Turf disputes between UN-Habitat, UNDP, and the World Bank are also unhelpful setting up longer term coordination platforms. The IOM is a major global shelter actor with leadership capacity but tends to view coordination as an additional activity to existing country programming. This "double hatting," however, can create the impression of bias and means that the specialized resources necessary for fully developing the recovery coordination role are not available (although this is also a shortcoming of donors who are often reluctant to fund coordination as a separate activity to programs).

A final disconnect is between the emergency cluster, the housing recovery platform (whatever form this takes), and multilateral institutions such as the World Bank. Housing recovery programs can take years to develop and fund and are often of questionable relevance to the local context. As a multilateral agency, the World Bank tends to engage with government and major international donors rather than NGOs and local actors, despite the fact that these organizations often have substantial available funding. In the Nepal earthquake response, NGOs in the shelter cluster represented committed and available funding of US\$ 350 million for housing recovery (more than a third of the estimated total needed under the World Bank's Post-Disaster Needs Assessment).

Frequently, however, the reality is that the only assistance disaster-affected people receive is what's distributed during the emergency response phase. If this is to change, there needs to be greater investment by longer term development agencies and donors in recovery coordination beyond the emergency phase and a more concerted effort by multilaterals to link in with the resources and strategies developed by NGOs.

CONCLUSION

This chapter has provided an overview of the some of the roles, responsibilities, biases, and challenges facing the "humanitarian system" generally and the shelter sector in postdisaster settings more specifically. Significant reforms have been achieved to ensure disaster response is more effectively and systematically led and that affected communities themselves have greater determination over how humanitarian agencies work. The relatively recent advances in CTP provide major opportunities to ensure that people whose lives have been affected make their own decisions about relief and recovery while humanitarian agencies have become more sophisticated at analyzing gender and protection issues within their programs.

Key challenges remain, however. In an urban world, most humanitarian agencies remain embedded in traditions of rural emergency response, while organizations that do have an urban focus are often development focused and have little expertise in disaster response. If urban preparedness, response, and a comprehensive approach to

HLP issues are to be more effective, this development/humanitarian distinction needs to be bridged. Similarly, in the context of rising incomes and government capacity in many developing countries, meaningful partnerships between international organizations, local actors, and urban-focused government are essential to mitigating the impact of urban disasters. Finally, there is a need for greater understanding of recovery processes in urban environments and how humanitarian agencies can and should interact with the market and the private sector to ensure effective response and recovery.

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Blakely Disaster Readings

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Rebuilding or Repositioning: Lessons for Sandy, New Orleans, and Elsewhere

5

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INTRODUCTION

February 7, 2009 is literally and figuratively seared into many Australian minds with graphic descriptions of conflagrations in the Kinglake hills and many other areas outside Melbourne that destroyed 2100 homes, killed 173 people, and came within hours of racing down the hills to encroach upon the City of Melbourne. When the embers were doused, then Premier John Brumby said “They [the dead] unite us all in the task of rebuilding. Because we will rebuild [sic]” (Blakely, 2009). He was, unfortunately, wrong. *We can never and should never rebuild what was because the old settlement geographic, economic, and societal position is no longer sustainable.*

Since Black Saturday there have been fires and floods in Australia of similar impact magnitude such as the Brisbane floods in 2010 that caused damages over \$1 billion killing 38 people along with subsequent well-known devastation in the Australia–New Zealand region, such as the Christchurch earthquakes of 2011, destroying one of the New Zealand’s most beautiful cities killing 185 people, some of whom were immigrant students caught in a freak accident.

Finally, but by no means complete is the tragedy that hits the American Eastern Seaboard in 2012 doing more than \$33 billion in damage that threatened Wall Street, the global trading center, with total closure. All these separate events have a common thread. They are in or near wealthy dense and economically important global centers. As a result, re-creating or rebuilding these places was never in doubt.

No matter how important these places are, serious questions regarding their rebuilding have to be asked, focused not on whether, but *how*, to rebuild. After a major urban disaster, we cannot, no matter how strong the popular or political rhetoric, go

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back to the past for superficial demographics and economic reasons. Urban systems, over the past 100 years, have sought to thwart nature and its associated processes. Urban planners and engineers facilitated the development of a regional land use pattern sprawling across the landscape. In these halcyon days, building *against* nature became a central tenant. Beginning in the 1920s and accelerating after the Second World War, urban nature-defying systems emerged, with infrastructure projects taking the form of bridges, channelization of water courses, levies, sea walls, and tunnels (to name a few) we use today. We now inhabit cities that are based upon seeking to on degrading, often wrongfully conceived infrastructure. Cities directly threatened by seas and rivers erected skyscrapers on landfill and erected sea walls and other treatments. At the same time, our regional demographic profiles are changing into an aging urban population in many developed nations, in parallel with many developing nations experiencing huge population growth and shifts to urban areas. Overall this has led to disproportionate numbers living in fragile areas that cannot sustain the increasingly severe weather regimes brought on by even small climatic changes.

Climate change, such as those evidenced by mountain glacier retreat and other indicators around the world, is devastating for agriculture and human settlement. As humans we resist the changes in our settlements that might help our current generation survive. And if we do not make the sacrifices required to adapt and improve current settlement patterns, there stands the very real risk of condemning future generations to having to live in unsustainable ways in increasingly fragile environments. Thus, catastrophes are compounded by our current building locations, spatial planning systems, and supply and transportation chains that date back to the post–World War II era. Post–World War II building assumed a different form of settlement pattern with low-density growth in extended suburbs, or in developing nations and Europe, it failed to meet the growing autooriented cultural demands. Volcanoes and earthquakes impacting upon settlements in Europe, North and South America, and most recently the Asian Pacific, “Due to their far-reaching effects on climate, food security, transportation, and supply chains, these events have the potential to trigger global disaster and catastrophe” (Gray, 2015).

Asia is particularly vulnerable to new earthquake and flooding because of the poor design of much older and some new infrastructure that disregards basic climatic change. China’s recent and continuing foods and buildings collapse in the wake of rains and severe weather and compounded by building massive dams and other infrastructure over sensitive habitat. Moreover, even well-planned and relatively dense European models adopted in other locations are now over seven decades old and require enormous investments to match rising urbanization levels and new lifestyles, combined with aging populations in central city areas. So the usual mantra from politicians to rebuild postdisaster is patently incorrect and dangerous. *We have to reposition not merely rebuild* (Lai, 2011).

WHY REPOSITION VERSUS REBUILD

My experience in disaster recovery, as an expert charged with the task of rebuilding in Oakland, California, New York, and New Orleans (Rebuild by Design, n.d.), is that

the “need” to get back to normal overwhelms the opportunity to move to a smarter future. Here are several issues worthy of consideration as we embark on rebuilding cities and regions around the world.

We have an increasingly diverse population that requires houses, jobs, and socio-economic equity and security. So, the issues are joined. Continuing major disasters presents an opportunity for the region to confront the need to reposition our regions to be genuinely resilient to meet the needs of many scenario futures and not simply replicating an unsustainable past.

Leading with Information: The impulse to get back to the “old days” is strong. As a result, important information about the community vulnerabilities and possibilities is not examined before political and community forces push to re-create a version of conditions that existed before the disaster event. This nostalgia is an important social response. But we have to present the community with information on who is living in the communities and region and what they are facing. Many communities’ demographics make single home rebuilding difficult in contemporary circumstances. In Japan’s horrific tsunami in 2011, the vast majority of residents were senior citizens in their 1970s and 1980s (Fig. 5.1), so what is to be rebuilt for them, individual or collective dwellings?

Residential populations over 65 are often reluctant to go through rebuilding processes that can take 2 or 3 years. Further, the new building standards often mean that costs exceed homeowners’ insurance. Moreover, evacuations in new events are extremely difficult for aging populations. In some cases, these seniors elect to move to new areas closer to relatives or health facilities. As a result, rebuilding often occurs with large numbers of vacant areas in blocks, making provision of services difficult and the leaving neighborhoods looking forlorn and incomplete for long periods.



FIGURE 5.1 Disaster Proof Housing San Francisco.

Author Photo: Multi-Family Podium Housing for Seniors and Modest Incomes in San Francisco above Flood level 2009, San Francisco North Beach.

Finally, some homes or apartments are simply situated in areas or built in ways that increase flooding and run off or cannot be protected from sea surge of high wind events. Relocating these units is painful, but it is necessary to protect other areas and residents. However, we are often held back by:

- **1:100 year Syndrome**—the belief that large-scale events occur only once in every 100 years; so why should we worry? If we just had an event, we will not have another one for 100 years, right? No, that is wrong. Here, 1 in 100 means a 1 in 100 chance that the event will occur in a given year. These data are revised periodically but are often not well understood by planners or residents. Cumulative impacts are particularly difficult when a zone is designated as a 1 in 100 zone without cognizance of the adjacent building that can be subsequently built well away from the planned suburb that will increase stream flows or cover over land masses that previously held or carried water. Moreover, many urban areas have networks of streams and waterways underground. Some of these were merely filled in like the waterways that flow under New Orleans. Several hundred years ago, what is now New Orleans was a network of islands. Over the years these islands were merged by ongoing land filling or creating a network of conduits to move water away from buildings. Both New York City and New Orleans Canal Street connote actual waterways built over a long ago. We are now at the point where rebuilding requires the resurrection or at least rethinking of how these natural systems should be used to prevent future damage and in some cases to actually improve the character of neighborhoods (Fig. 5.2).
- **Social and Economic Equity Issues**—are magnified after disaster. Communities that have few resources may be pitted against those that appear to have more resources. In many cases, this is more perception than reality. Nonetheless, some communities poorly located prestorm house more than their share of lower income, elderly or minorities. Early planning for recovery has to be sensitive to these issues. In some cases, these socially sensitive areas are the most vulnerable and relocations or other options have to be considered and handled carefully (Fig. 5.3).
 The Ninth Ward in New Orleans is among the most disadvantaged neighborhoods in the city. It is also an area extremely vulnerable to flooding as much of the area is close to many of the levees. The cost benefits of rebuilding some of the Ninth Ward communities made it hard to justify reconstruction. But the emotional issues are substantial and have real cost to families' mental and physical health as well as their long-term financial resources. Even if compensated for a lost home, a new place to live in a community with few affordable areas is difficult—not to mention the burden of reestablishing in a new neighborhood. As a recovery director, my team and I, as shown in Fig. 5.4, talked to locals working hard to find the best solution to this thorny problem. Several approaches were used in this case that can be used postdisaster in many places.



FIGURE 5.2 New Orleans Approach to Water Course Restoration.

Dutch Dialogue Public Presentation shared slides public property, New Orleans 2008.

- *Insourcing*—Rather than outsource work to large companies headquartered outside the city or even the country, we developed a process called insourcing or using local human and physical capital wherever possible. We created new rules for local neighborhood restoration by using local as the primary source of labor to restore local facilities in their community. We were creative in using community-based nonprofits as a vehicle to contract through to meet government accountability rules. This approach restored community pride as well as leading to many local innovations in replacing local infrastructure such as street lights, using nonpotable flood water for cleaning and other outcomes. Moreover, this process infused money and jobs back into the communities that desperately needed work.

Blakely Disaster Readings



FIGURE 5.3 Consultation and Problem Solving in the Ninth Ward.

Author Photos: Working with the Ninth Ward, New Orleans, 2007.

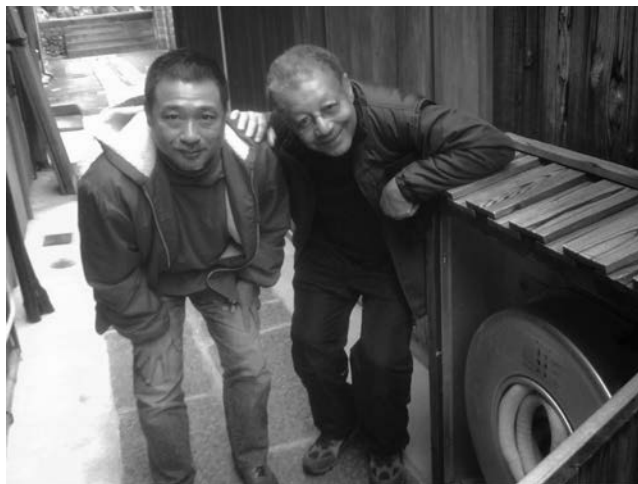


FIGURE 5.4 Kobe Local Emergency Preparedness.

Author at Kobe Safety and Survival Center, 2010, Kobe, Japan.

- *New Neighborhoods*—Since old neighborhoods in the low-lying areas were destroyed, we had to rethink what a resilient community would look like. We commissioned local planners and architects to rethink and design more resilient communities incorporating work centers, such as community cooperative stores and outdoor markets. We also realigned houses by allowing the reconfiguration of lot lines, so larger safer homes could be assembled on higher ground in certain areas. This process was complex, but we were able to craft local rules to permit this. This approach allowed many flood victims to return home earlier and accommodate other relatives in expanded homes in their old neighborhoods.
- *Re-creating Neighborhoods*—Since there was considerable abandoned property both prehurricane and posthurricane, we decide to leverage these assets by aggregating or moving abandoned homes onto new lots to generate more local density in communities, thus generating a large enough resident population to reach the thresholds to reopen stores and offer other civic amenities, such as libraries and reopen schools.
- **Recovery Amnesia**—sets in within the first 6 months. As the weather improves and normal life returns, the storm seems distant and the concern of residents recedes. More pressing local issues loom larger for residents, such as local elections and the like. Not only does the storm become less memorable, memories of it become increasingly distorted to justify all kinds of actions or inactions. One or two years after the event many people are in denial, so it is important to do as much as possible to change the frame of reference to long-term rebuilding as early as possible and act on delivery of cornerstone projects in place early. People want to go back home, so they place their memories of the past ahead of current realities. Once, most residents and businesses restart the events of the recent past fade and they rationalize that “we had the worst hit us, so it will be a long time before it will happen again.”

There are many ways to deal with this issue. The best is a strong continuing public education program such as the San Francisco Bay area. In the Bay area annual drills and exercises are held in cities to prepare and remind residents of their duties in case of disaster. Part of these programs are graphic reminders of past disasters with local failures in the response system. Japan has a national program, which incorporates local drills in the use of evacuation routes and shelters.

Finally, school programs are important because children born postdisaster have no recall. Again, the State of California and the Netherlands are very advanced in school-based resilience education as well as disaster response training for school age children. These efforts to prepare are just as useful in repositioning as other mitigations. Memorial buildings and statues are important, but they are static so that they do not carry continuing reminders that harness public consciousness.

REPAIR VERSUS REPOSITION

Quick repairs to restore power and essential services are important, but they should not undermine the fact that these services failed. So, very early on new alternatives

have to be raised in the public debate on how many public resources and some private ones might be repositioned in profound and effective ways. This means that new funding will have to be found, or other incentives such as tax breaks need to be designed to alter these vital delivery services. Other private resource deliveries, such as gasoline and food, also have to be reconfigured so that they have longer lasting supplementary power and related utilities via distributed energy, natural gas, or other forms of redundancy.

Future Proofing goes well beyond good environmental design. A future that includes a more diverse population in terms of residents' age and in parallel diverse building typologies in many neighborhoods will allow future change to occur more readily. The reasons for this are many, but the most important one is that this diversity brings younger and more able populations into communities, thus making them more stable by increasing local retailing and improving the chances of getting all ages out of harm's way in an extreme event.

Environmental design is critical. Mechanisms to facilitate neighborhoods become more self-reliant with local, decentralized water and power with insulated power producing housing, sometimes described as distributed systems (as opposed to more brittle centralized systems). Every community can and should have some food growing and food storage facilities, as well as inward evacuation systems using schools, churches, and local facilities as the first refuge for the able to sustain their inhabitants during large-scale catastrophes.

Rebuild by Design, which was created after superstorm Sandy, is a nationally financed effort challenging US communities to come up with creative solutions using natural or innovative processes to both rebuild but reposition and make communities smarter economically and more resilient to natural and man-made disasters. Rebuild by Design has captured the collective imagination of 141 cities and involved over 100 local, state, and federal government agency partnerships in coming up with collaborative processes that restore devastated communities by crafting projects that make them far safer for the present and alter the dangerous course of repeating past disasters ([Rebuild by Design, n.d.](#)). Another example is Japan, which has a network of national disaster preparedness and prevention centers that work with provincial and local governments to create innovative responses to the multitude of disasters that a great nation faces. Preparing and learning from world disasters allow Japan to preconfigure assets well ahead of disasters. Even with all of this preparedness the Fukushima Daiichi tsunami overwhelmed national capacities.

COMPETING RECOVERY VISIONS

There are competing visions of how to handle large-scale disaster events. Some proposals are entirely based on extensive environmental remediation, whereas others rely more on improved technology and engineering such as sea walls and

barriers. The Dutch approach is to use both soft and hard infrastructure where appropriate and to invest in more community-level programs so people can live with water using sensitive design. Dutch schools have an extensive water curriculum to educate future generations on water as a way of life, thus reducing the postevent amnesia that affects all of us as the lessons from a catastrophe recede in public memory.

Dueling Plans—In the New Orleans case, within weeks, local groups, architects, planners, and communities commenced replanning efforts. This is a good thing. However, in many instances the communities used different information bases for their plans, thus creating enormous confusion over possible futures. While getting as many ideas as possible on the table is important, it is also important to generate them from a common base at least. A common scale and scope for plans is also essential, as some plans actually disrupt other communities, generating new conflicts. So, to the extent possible, a regional planning framework that set common information and templates is a good idea. To the extent possible, planning information and community as well as local leader education/information should precede and be part of ongoing communications to act as a base for all plans. If possible, a common planning repository should be developed so that everyone at every level can keep track of the planning process (Fig. 5.5).

In New Orleans, we were faced with multiple neighborhood and regional plans. All these plans had good ideas about the needs of the past and restoration

New Orleans Target Areas



FIGURE 5.5 Target Area Zones Recovery Map, New Orleans.

Courtesy New Orleans Office of Recovery Management, 2008.

of places and communities, but few contained a holistic view of the entire city and region combining social, economic, and environmental visions. Eventually, we were able to fashion an overall plan incorporating aspirations with sound economic and environmental knowledge with considerable community input (Blakely, 2012).

ECONOMIC REPOSITIONING IN RECOVERY

Economic revitalization and repositioning are essential. A megastorm not only disrupts the current economy, but some firms also do not survive financially and physically. In many cases, small community-based and even regional firms lose too much of their customer base to continue. In addition, the world will move on of its own accord while communities recover. During national disasters and the associated long recovery periods, the central firms in the local economy may lose their competitive edge. For example, Kobe, Japan was one of the top five shipping cities in the world when it suffered a disastrous earthquake in 1995. By the time the city reached normality almost a decade later, it was no longer an important shipping center and many of the auto firms dependent on Kobe's port had relocated to other port cities. Two decades after the earthquake, the demographics reflect the manner in which change has occurred: only 40% of the residents in the city were living in the city at the time of the earthquake and few residents work in any prequake firms. Kobe, like many places, had to find a new economic base while it rebuilt. Another illustration is Aceh, Indonesia, where a Tsunami wiped out local fishing villages in 2004. Experts in the national recovery agency and international experts determined that the safest course of action was to build new villages a kilometer or so from the ravages of another tsunami. For the local villagers, this was untenable economically. Village fishermen needed to be close to the sea to insure catching their daily income. So, they moved as close to the ocean as they could. They knew the danger, but they calculated mentally and from old stories another tsunami would not hit for many years.

After superstorm Sandy in New York, there were fears that the New York Stock Exchange was located too close to the Harbor. While the Exchange has not moved its historic building, many of the functions and employees are now in far-flung locations across the Hudson in New Jersey and others as far away as Dallas, Texas.

REPOSITIONING OPPORTUNITIES

Disaster recovery means balancing the past with the future. It is important to show a new path to a better future, rather than suggesting options that fail to recognize preservation of the past as an important element of finding improved and more resilient communities. The way to deal with this is to create a new long-term direction to reconfiguring the rebuilt assets to confront new economic realities. Some sectors will have to rethink where they are going and others will be a position to add new value

to the economy. Health care and construction can use large events to develop better and smarter delivery systems reaching new populations, or with new products and services. New firms can arise in the emergency services fields with export capacity as well as new environmentally sensitive products and services, including food production and distribution. Transportation infrastructure along with telecommunications is a key sector for renewing with potential for new spin-offs. New Orleans is an apt illustration. During the recovery, a group of community leaders led a campaign to use the rebuilding of the city central district into a new modern biomedical center. New Orleans is now home to one of the US largest health and biomedical complexes. In this case the disaster created a new opportunity that the community seized—not without opposition and struggles—to transform the city's base economy away from tourism and shipping, which generated more well-paying jobs and revitalized the heart of the city (Fig. 5.6).

Underlying issues can often hamper recovery. Many communities have long-term issues with deep roots that need serious examination postdisaster. One of the most difficult and vexing ones can be the organization of local government(s). Local governance in the United States, for example, is quite fragmented, slowing responsiveness and limiting effectiveness both during and after a disaster. While issues of government may seem too hard, these issues need to be tackled at the time when the problems are most visible. Similarly, the apparent hydraheaded monster of utilities accountability and leadership needs to be addressed while it is fresh in the recovery process.

Several other recovery repositioning programs in developing nations are worth noting. Chile is a prime example of using postearthquake opportunities to upgrade slums and generate new housing finance and funding strategies that generated new construction methods that were quicker and more resilient than the former housing approaches. The Chilean model has gained international recognition and is now



FIGURE 5.6 New Orleans Downtown Hospital Complex.

Courtesy Veteran Administration Architects non-copyright public document.

promoted by the World Bank and donor agencies as the best approach to rebuilding the entire community and not rebuilding with the same social and economic inequities along with continuing one house at a time on the rebuilding approach. We see too frequently, in Chile over 12 months, a program was developed to create a series of temporary shelter villages, and a system of recovery housing subsidies were established; risk-based land use plans were conducted in various coastal areas; a finance plan was adopted; changes to the national emergency management agency were made; and rapid payment of insurance claims were completed (Siembieda, Johnson, & Franco, 2012).

While national governments are often highly engaged as Chile demonstrates, recovery is not free of the challenges associated with receiving national government money. Local agencies will usually have to form new structures such as public private partnerships to deliver rebuilding projects. Much of the long-term financing will require state and local as well as private matches. Moreover, issues from sea walls and some environmental mitigation will attract federal resources, but much of the local rebuilding will need local or state funding over a long and sustained period. California's building retrofit programs post-Loma Prieta Earthquake of 1986 required substantial building buttressing in public and private buildings, including incentives to improve home stabilization systems. California issued a large voter-backed bond financing scheme to achieve this informing citizens that it might take more than a decade to complete. Creative thinking in an antitax environment such as the United States is required. California is an illustration in which the public is prepared to fund items such as storm surge property removals, coastal and waterway restoration, and evacuation routes and home physical design security that insulate them from known dangers with visible, measurable progress and accountability as part of the package.

LESSONS

Based on direct lessons learned, this chapter aims to challenge the paradigm of "rebuild right now here in the same way things stood in the past." National legislation in many nations requires or strongly encourages rebuilding the same public buildings where they were, to serve the same mission they did in the past. In fact, the past is not prologue. In too many cases what was built years ago does not serve a new changed world. Moreover, older style building, which was led by engineers, has now often demonstrated itself to be environmentally destructive, so repeating the conditions that contributed to disaster is not only lacking sense, but it is also the precursor to new disasters based on a changed ecological terrain and climate change.

So, the intelligent thing to do postdisaster is to look to the future and mitigate environment, social, and community political issues that harm the area from moving forward. As described earlier, physical disasters frequently reveal cleavages in the social order that need to be dealt with so the community is truly restored to a more

robust functioning and health. In addition, building on disturbed earth systems will often lead to future hazardous events. Water systems will often find ways of doing damage unless new ways are found to live with and to accommodate it, rather than to try to conquer them above or below ground.

Repositioning we suggest has four elements:

1. Making peace with nature—Since political geographies do not define natural systems, a deep analysis of the geotechnical environment is necessary. The rebuilding strategy has to take the entire natural system into consideration before any structures are put in place or we are simply creating the path of destruction for the next disaster.
2. Repairing social structures first—Socioeconomic disparities are laid bare post-disaster. These cleavages in the social system will impede and perhaps destroy the rebuilding process unless they are dealt with head on. This means the people deeply affected by the tragedy must be directly involved in developing the options for the future. And where possible and feasible, local people should be employed in the rebuilding process.
3. Economic rebalancing—The local economy loses its competitive position after any disaster. Money moves away from damage. New trade routes are established and firms move away. So it is important not only to restore the old economy but also to find a new future economy. Repositioning the local assets in new way is critical to this process as we have detailed here.
4. Collaboration and competition—It is critical for damaged communities to regain their competitive position. When they are damaged, it is too easy to become a mendicant. There is not future in feeling sorry for the people or the place. Thus, new partnerships and collaborations have to be formed to move the community back into the main stream of regional and national and perhaps international participation. The world does not stop for any place.

FROM HERE TO WHERE

The case to reposition is clear. But before deciding to reposition, a region and its communities must have a firm grip on where they are with respect to their current geophysical system having assessed what needs to be changed for a more sustainable future. Similarly, regional economic and social accounts need to be undertaken to explore what options and opportunities exist for transforming the region in the future along with what strategies are required to get to a new economic regime. Thus, if the region (cities sharing a common geoeconomic shed) is already operating as a system, it has the capacity to implement needed changes postdisaster or incrementally according to some form of regional planning process. In essence, long-term well-informed plans are the bedrock of constructing and repositioned future after any form of calamity.

Planning for the future is the best antidote postdisaster. Plans are the glue that holds the community together and the springboard for constructive action. New York's *PlaNYC* was invoked after superstorm Sandy calming city residents and placing city leadership in a unique position to deal with longstanding capital infrastructure, economic, and social policy needs (The City of New York, 2016). Cities, regions, and communities that plan for a future can move quickly to rebound from disasters. Those that fail to design a future usually languish postdisaster for long periods because they have no common platform to deal with the present tragedy and run the risk of trying to get to the future by looking for the past.

Resilience is the new concept, which incorporates the ideas articulated here. It is a more useful and powerful construct than sustainable or smart because it deals not only with mitigation but also with the construction of new ways to build for the present and recover in the future.

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6

Finance, Insurance, and Facilitation of Recovery: Should the Role and Responsibility Assigned to Government Be to Assert Control Over Long-Term Planning?

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INTRODUCTION

It is well understood that the goals of disaster management aim to reduce or avoid losses from national and local hazards, to assure prompt assistance to victims, and to achieve rapid and effective recovery.¹ Recovery involves rebuilding the community and society, such as repairing or reconstructing housing, property issues, employment, and restoring essential infrastructure so as to return a system to a functional and less vulnerable state (Blaikie, Cannon, Davis, & Wisner, 1994; Coppola, 1999). Berke, Kartez, and Wenger (1993) stated that of these four phases, recovery is the least understood and perhaps the most challenging stage of the disaster cycle. An important aspect of effective recovery is taking the advantage of the “window of opportunity” for the implementation of mitigative measures that might otherwise be unpopular (Alexander, 2002, 2008). The effectiveness of response and recovery is eroded if performed in the absence of a comprehensive regime of preparedness and mitigation (Coppola, 2006). While there is a considerable amount of literature with significant focus on predisaster preparedness, postdisaster recovery and reconstruction have not received the same emphasis. Poorly coordinated and planned recovery can lead to long-term victimization and abandonment of the affected population. Recovery requires clear allocation of responsibilities, defined mandates, and

¹ Disaster recovery begins with stabilization and ends when a community has reestablished normal social, economic, and political routines. Disaster recovery encompasses multiple activities, some of which are implemented sequentially and others are implemented simultaneously. Attempts to define differentiated phases of disaster recovery are inherently limited in their validity, so researchers have generally been less concerned about time phases (e.g., short-term recovery vs long-term recovery) than about the specific recovery functions that must be performed.

the development of regulatory frameworks calling for close collaboration between professionals, agencies, and interest groups from a diverse range of disciplines and perspectives. Without smooth collaboration between them, recovery is likely to be slow and painful. Not long before the first Canterbury earthquake in 2010, Rotimi outlined a series of deficiencies, declaring that the statutory basis for coordination was inadequate with respect to the recovery legislation and supporting frameworks. Long-term recovery was not supported by legislative powers and consequently local authorities were to take the lead in recovery.

It is often the case that local government has responsibility for rebuilding public facilities and infrastructure postdisaster, while the private sector is generally responsible for rebuilding houses and businesses. It is the private sector, with the assistance of government, which usually is seen to have responsibility to restore overall economic vitality. The big issue remains how to establish a sensible way of planning for the recovery, postevent, both economically and politically. This is complex. The challenge for a nation is to work together regardless of the many differing agendas of various stakeholders and legislators, within both the private and the public sectors (Miles, 2016).

In this chapter the author explores the role of central government in the recovery process and to what extent it has taken control with respect to planning postdisaster after the recent Canterbury earthquakes in the New Zealand (2010–12). She concludes that the outcome of the recovery process has been less about the products of violent seismic events themselves than the result of political decision-making and the questionable actions of an “absent” government. She poses the question, how broad should the role and responsibility assigned to the government be, with respect to the control of long-term planning, postdisaster? She argues that the New Zealand central government failed in its responsibility to keep checking the growing inequalities, and it should have better protected its earthquake victims from corporate abuse and asset loss. The author examines requirement of the growing reliance on public–private ties from the central government if disaster management is to function well.

SITUATIONAL HISTORY

New Zealand experienced a series of devastating earthquakes between 2010 and 2012.² At 4.35 a.m., on Saturday, September 4, 2010, the first of a series of major earthquakes struck the Canterbury region of the New Zealand’s South Island and measured 7.1 on the Richter scale. Within seconds the Canterbury region was brought to a stark new reality for which it was woefully unprepared. On Boxing Day 2010, more than 24 earthquakes, including another large 4.9 quake, shook the city. Then, the *coup de grâce*—a second major, shallow earthquake struck, at 12.51 p.m., on February 22, 2011, measuring 6.3 on the Richter scale. It was said to be among the 10 strongest earthquakes recorded in the New Zealand. Extensive damage was caused,

² See <http://www.christchurchquakemap.co.nz/all>.

crippling Christchurch City and its suburbs.³ It struck close to the Central Business District, the heart of the city, in the middle of the day when people were at work. Many buildings, already weakened by the previous quakes, collapsed. Liquefaction⁴ immediately posed huge challenges for access and remedial work. This event cost 185 people their lives, with thousands more injured.

As of 2017 the Canterbury earthquake recovery is still ongoing. The main stakeholders involved in the Christchurch recovery are the government, the Earthquake Commission (EQC),⁵ Christchurch Earthquake Recovery Authority (CERA),⁶ Regenerate Christchurch (replacing CERA in April 2016), the Christchurch City Council (CCC), the insurers/reinsurers, the construction industry, businesses, and the affected population. The Civil Defence and Emergency Management (CDEM) Act 2002 and the National CDEM Strategy detail the management of hazards in the New Zealand. Accordingly, when a natural disaster affects a community in the New Zealand, in the first instance it is the Local City Council that is responsible for providing comprehensive and integrated emergency management.⁷ This involves preparedness, mitigation, response, and recovery. Christchurch City, before the earthquakes, had a strong mayor–council form of local government.

After the first earthquake, on September 4, 2010, recovery-related activities were undertaken according to plan. Soon after the earthquake, a state of “local emergency” was declared within each of the three affected districts (Selwyn District, Waimakariri District, and Christchurch City), and persisted until September 16, 2010. Two days later, Minister Gerry Brownlee was appointed as the minister responsible for the Canterbury Earthquake Recovery and tasked with “trouble shooting.” An ad hoc

³Christchurch is one of the New Zealand’s largest cities with a population of approximately 340,000 people. The City Council consists of 13 councilors elected from seven wards and is presided over by the Mayor who is elected at large.

⁴Liquefaction occurs when loosely packed; water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. Liquefaction occurring beneath buildings and other structures can cause major damage during earthquakes.

⁵The present EQC is a Crown Entity as defined by the Crown Entities Act 2004 and is governed by a board of eight commissioners who are responsible to the Canterbury Earthquake Recovery Minister. Just before the Canterbury earthquakes EQC had 22 permanent staff, all based at the Commission’s office in Wellington. The Commission’s primary objectives are to administer insurance against natural disaster damage as provided for under the EQC Act 1993, to facilitate research and educate the nation about matters relevant to natural disaster damage, to manage the Natural Disaster Fund, and arrange reinsurance. It designates itself as a public benefit entity and constitutes one of the Crown Financial Institutions that manage large funds at arm’s length from government—in this case the Natural Disaster Fund. Any deficiency in the Natural Disaster Fund to meet the liabilities of the commission is to be made up by the government by way of a grant or advance. The viability of the Natural Disaster Fund is critical for the effectiveness of EQC.

⁶Economic Recovery Program for Greater Christchurch: A foundation for economic recovery and growth in greater Christchurch. Christchurch: Canterbury Earthquake Recovery Authority (CERA).

⁷The Ministry of Civil Defence and Emergency Management (MCDEM) is responsible for disaster response and recovery at a national level but planning for an implementation of disaster response is through CDEM groups at the local level. Local authorities and their communities lead response and recovery. The CDEM act only addresses recovery during the state of emergency phase.

Cabinet Committee was established, and a process was initiated to develop legislation to assist in the management of aspects of response and recovery. Parliament enacted the Canterbury Earthquake Response and Recovery Act 2010 (CERRA) on September 14, 2010, assented to under extreme urgency. CERRA was rushed through Parliament on the basis that it was required to hasten a speedy recovery. Thus the government had “moved in” quickly and the population believed that assistance was well on its way.⁸ The CERRA was also created under CERRA, the week before the second major earthquake, in February 2011. CERRA was effectively a government department reporting directly to the Earthquake Recovery Minister.⁹ Initially the CERRA Bill received virtually unanimous support from the parliament. However, within a fortnight a group of 27 constitutional law experts from all six New Zealand university law faculties had issued an open letter detailing concerns about the breadth of the powers granted under CERRA, calling it a “dangerous precedent” as it abandoned established constitutional values and principles.¹⁰ The danger was said to lie in a poorly framed general power to regulate, with weak legislative oversight and limitations on the review of that power by the courts. It was later repealed by the Canterbury Earthquake Recovery Bill 286-1, 2011, which in turn, put in place certain checks to guard against the inappropriate use of the powers given to the minister and CERRA.

On February 23, 2011, a “national state of emergency” was declared. The New Zealand Prime Minister (John Phillip Key) addressed media stating that he had faith in the leadership in Christchurch, but national emergency status would “give more control to the government,” enabling the government to direct local, national, and international resources to achieve the “best possible response in the shortest timeframe.”¹¹ A national state of emergency provided the authority to suspend some normal functions of the executive, legislative, and judicial powers, and to order government agencies to implement emergency and rapid response plans. It was said that as soon as the civil defence emergency period ended, this authority would be exercised working in close support of and in cooperation with the Mayor of Christchurch and the Christchurch Civil Defence team. Earthquake response and recovery functions were to be transitioned out of the Emergency Operations Center. However, this did not happen and instead local government and provisions were quickly superseded

⁸ <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/canterbury-earthquake-2010/4674342/Govt-to-help-quake-homeless>; <http://www.stuff.co.nz/the-press/news/4096400/Earthquake-city-council-advisories>.

⁹ CERRA was presumably set up to enable a faster mechanism for recovery. The United Nations Development Program 2006 details what that new structure should focus on, including the formulation, implementation, oversight of recovery, the monitoring of progress, and the establishment of a permanent dialog and consensus space with civil society. Opposition parties, the private sector as well as international cooperation agencies maintain transparency, accountability, and good governance. Any new structure should have as its aim the avoidance of undermining already existing institutional frameworks or well-functioning good governance mechanisms.

¹⁰ For additional reading see Jonathan Orpin, *Constitutional Aftershocks*, *New Zealand Law Journal*, November 2010, pp. 386–388, and Dean Knight, *Canterbury Earthquake Response and Recovery Bill: Constitutional Outrageous, Fairness and Justice*, Victoria University of Wellington, September 14, 2010.

¹¹ www.stuff.co.nz/national/christchurch-earthquake/4693868/Key-announces-national-state-of-emergency.

by central government in the form of CERA.¹² Despite lines of responsibility having been thought to be clearly delineated, they became alarmingly confused and it was not long before the “cracks” began to appear in organizational processes.

In the Agenda Order Paper of the Canterbury Civil Defence Emergency Management Group Joint Committee (December 13, 2010), several issues arose in response to the local state of emergency. These included the coordination of information management problems at local and regional levels (which were also evident at a national level), and the manner in which the legislated and planned role of the Ministry of Civil Defence Emergency Management was to be diminished in both response and recovery. In addition, it was believed that the new legislation, the organizations, the processes and roles put in place, although intended to expedite and streamline response and recovery, actually interfered with and undermined arrangements that were previously put in place. Indeed, it seemed that the authority and the responsibilities of local government had been superseded by CERA.

CERA was given a mandate for 5 years. CERA’s special powers were to cease from April 2016, when the 5-year Canterbury Earthquake Recovery Act 2010 expired. During that period CERA has been continually criticized by the affected community for having had too many powers to intervene in local recovery.¹³ In the new arrangement, CERA is to be assimilated into the Department of the Prime Minister and Cabinet. The Christchurch City Mayor has publically thrown her support behind the government’s new plan, but hopes it will not take another 5 years for the CCC to regain full power.¹⁴ In July 2015 the City Council again sent the government a strong message that it no longer wanted to be a backseat passenger in its City’s recovery, “It is time for a transition back to local leadership and decision-making.”¹⁵ “Regenerate Christchurch” is now the new entity to take the city into the future, and a new law will be introduced to take over the management of the central city rebuild from CERA.¹⁶ In the recovery phase, the Mayor and City Council have attempted to take back some power,¹⁷ and it has been agreed that a more collaborative approach is required with the inclusion of the council’s development authority, Development Christchurch.

¹²CERA’s task was to lead and coordinate the recovery efforts of three councils, central government departments and crown entities, infrastructure providers, business, local community, constructions firms, and Environment Canterbury including reconstruction priorities and compulsorily acquiring land, entering premises and undertaking works, and demolishing and disposing of dangerous buildings.

¹³<http://www.stuff.co.nz/national/politics/78952664/Five-years-of-Cera-Success-or-failure>.

¹⁴ <http://www.stuff.co.nz/the-press/business/the-rebuild/69862124/new-legislation-to-replace-canterbury-earthquake-recovery-act>.

¹⁵ <http://www.stuff.co.nz/the-press/news/70503456/government-needs-to-step-back-says-christchurch-city-council>.

¹⁶<http://cera.govt.nz/news/2015/greater-christchurch-regeneration-bill-introduced-19-october-2015>.

¹⁷ <http://www.stuff.co.nz/the-press/business/the-rebuild/69943847/council-claws-back-rebuild-power>;

<http://www.stuff.co.nz/business/industries/68152533/christchurch-city-council-to-set-up-rebuild-agency.html>; <http://www.stuff.co.nz/the-press/news/70503456/government-needs-to-step-back-says-christchurch-city-council>; www.stuff.co.nz/business/rebuilding-christchurch/6170837/Earthquake-Minister-scolds-council; www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/6696503/Govt-poised-to-seize-control-says-Dalziel.

CERA and its minister, who are charged with earthquake recovery, have remained essentially unpopular throughout the post-recovery phase. CERA's command and control thinking has not sat comfortably with the population or the business community. There is also a strong sentiment among the population that the central government-managed recovery has "been left to the private markets" allowing the population to fall victim to private enterprise. Again this begs the question as what should be the central government's role postdisaster?

PERCEPTIONS OF GOVERNMENT

Immediately after the earthquakes, the New Zealand government adopted a traditional model for disaster response and then continued to progress this model throughout the recovery phase using CERA as its main vehicle. This model presupposes that government is the most reliable actor because societal chaos is likely to result after disaster and local government would have difficulty setting the priorities. The model imposes a strict organizational hierarchy and relies on "clearly defined objectives, a division of labor, a formal structure, and a set of policies and procedures to fulfill disaster and recovery operations" (Schneider, 1992). This is believed to simplify an otherwise complex process of policy-making. However, the weaknesses of this top-down model has been that it restricts the responsibilities of local government and it fails to allow people to participate in the process of recovery or to adapt to the imposed changes. The gap represented by public norms and bureaucratic norms is ultimately the key variable in determining how well the disaster is managed (Schneider, 1995).

Research has shown and it is now an established theory that a community with good social capital records the highest satisfaction rates for (new) town planning and has the speediest recovery rates. Societies with democratic governance, that is where civil society groups and non-profit organizations and other non-state actors can work both independently and in collaboration with the state/government, are those with higher potential for economic growth and better management (Brinkerhoff, 1999; Millen, 2011; Pelling, 2003; Vallance, 2011). The role of community leaders is prominent in utilizing existing resilience and social capital in the recovery process by facilitating collective decision-making (Nakagawa & Shaw, 2004). Where there is feedback from civil society, better policy develops and negative feedback from communities is useful because it forces policy makers and developers to rethink their assumptions. A failure to be heard, however, produces a sense of democratic disarmament together with a lack of transparency on part of the government, and it becomes a source of frustration, apathy, and hopelessness. There has been much feedback from Christchurch residents and the CCC about the top-down model imposed on the community in the form of CERA. These complaints did not have any impact. Instead, the focus of the government has been primarily a financial economic one, centered on restarting and facilitating business. A survey was carried out by the Christchurch Press, and the overwhelming view was that Minister of Earthquake Recovery had

“taken over Christchurch.”¹⁸ In the past the CCC was, and is, seen to be playing “second fiddle” to the government’s earthquake rebuild machinery. Many believe that there has been a general downgrading of the city and the regional councils. Wellington government seems unable to trust the regional councilors to come up with the outcomes; it presumably wants and has even threatened, if necessary, to sack “dysfunctional elected representatives”¹⁹ sitting on the CCC. Without proper consultation the government decided that it would revamp/rearrange Christchurch schools,²⁰ introducing privatization without a mandate to do so and in addition it sought to control the building consent process²¹ and priced the sale of city assets.²² These actions have fundamentally changed the Christchurch regional power base. The minister holds day-to-day power, and the final political and executive power rests with the Prime Minister. This present power constellation is a clear indication that there is a need to restore democracy to the city. Yet, as time passes, the population becomes more resigned to its apparent inability to have a say in the recovery process. Even city councilors complain that they are left out of “the loop” in discussions of cost sharing for the city rebuild, including who will pay in the long term for a series of “anchor” projects, mooted by the government.²³

SOCIAL COHESION

Over the years the New Zealand government has undergone a steady but perhaps little noticed transformation. Its traditional democratic processes and institutions have become marginalized and nongovernmental organizations are now more central to public policy. The consequences are that governments now assign many of the responsibilities of other models of governance, with those of private enterprise and with (non) profit organizations. These complex relationships have also caused a muddying of intergovernmental relations and made it difficult to determine who is responsible for oversight and who is actually making the decisions. In effect, over the last decades we have seen a steady “privatizing” by government. This produces an ideological misfit between obligations toward the care for the population and shareholder profit required by corporate operators. As a result, the government appears to be indifferent to citizens’ needs, and elected officials fail to exert sufficient control over corporate interests. Evidenced in the introduction of charter schools,²⁴ the selling-off

¹⁸ See Brownlee as clear No 1, *Christchurch Press*, May 4, 2013.

¹⁹ <http://www.radionz.co.nz/news/regional/269002/proposed-canterbury-council-structure-questioned>.

²⁰ <http://www.ppta.org.nz/index.php/-issues-in-education/charter-schools/2119-no-charter-schools-nz>.

²¹ <http://www.stuff.co.nz/national/8864976/Emergency-meeting-last-chance-for-quake-council>.

²² <http://www.scoop.co.nz/stories/AK1504/S00394/consultation-on-asset-sales-an-undemocratic-farce.htm>.

²³ <http://www.stuff.co.nz/the-press/news/5627660/Councillor-quits-felt-almost-irrelevant>.

²⁴ <http://www.stuff.co.nz/dominion-post/news/local-papers/the-wellingtonian/opinion/8551770/Charter-schools-disquiet-grows>.

of large numbers of state houses²⁵ and the compulsory acquisition of land²⁶ were demonstrated by an apparent lack of action directed at corporate interests, even when those interests were clearly contrary to the well-being of the catastrophe-challenged population. The result has been that in reality, the expectations of a disaster-stricken population remain rooted in a past that no longer exists. It is for this reason that local governments must become key players in the recovery. Local governments are the advocates for the populations they represent. Present day capitalism cannot be simply about accumulation of wealth, it must also represent societal aspirations— aspiring to produce a better and sustainable society, a healthy, fully functioning society. Free enterprise cannot roam without a regulatory framework beyond politics. There must be a middle ground. The free markets can solve many of our problems but only if they are operated responsibly and in a humanitarian way.²⁷ In Christchurch today, many feel that there has been a humanitarian versus cost-control conflict and the affected residents appear to be on the losing end.²⁸

In nations with small populations and strong central government, such as the New Zealand, there are often fewer decision-takers and they are placed at a higher level in the response hierarchy (Miles, 2016). They have a tendency to interfere and

²⁵ <http://www.stuff.co.nz/dominion-post/comment/editorials/69809849/Editorial-Governments-state-housing-sell-off-gets-stranger>; <http://www.radionz.co.nz/news/political/296918/govt-gets-power-to-sell-social-housing>.

²⁶ www.stuff.co.nz/business/rebuilding-christchurch/6831407/Compulsory-acquisition-could-reconfigure-Christchurch-CBD; <http://www.interest.co.nz/bonds/66066/high-court-rules-governments-red-zone-land-buyout-offers-not-lawful-brownlee-will-appeal>; <http://www.listener.co.nz/current-affairs/christchurchs-game-of-zones/>.

²⁷ Insurance firms must stop messing with our lives, Ross Williamson, Rangiora, Letters to the Editor, The Press, February 2, 2013; Clients lose plot at years of delays: Insurance anger leads to threats, as people with unsettled claims reach their wits' end, Cecile Meier, *Christchurch Press*, December 24, 2014; Repugnant insurance companies earn our distrust, Tom O'Connor, Letter to the Editor, *Christchurch Press*, January 19, 2013; CERA "using bully tactics" to get land, Martin van Beynen, *Christchurch Press*, September 7, 2014; www.stuff.co.nz/national/christchurch-earthquake/4919892/Cera-labelled-militaristic; Residents: Why are we still living like this? Blair Ensor and Georgina Stylianou, *Christchurch Press*, March 5, 2014; Housing dearth forces poor to sleep in cars, Fairfax Media, March 29, 2012; retrieved from [tvnz.co.nz/national-news/housing-dearth-forces-poor-sleep-in-cars-4804904](http://www.radionz.co.nz/news/national/101884/hundreds-sleeping-in-christchurch-airport-terminal); <http://www.radionz.co.nz/news/national/101884/hundreds-sleeping-in-christchurch-airport-terminal>.

²⁸ <http://www.stuff.co.nz/the-press/news/67483938/Council-warned-over-social-housing>; www.stuff.co.nz/national/christchurch-earthquake/6734583/Rental-shortage-State-must-step-in; <http://www.radionz.co.nz/news/regional/267010/christchurch-faces-big-rates-rise>; <http://www.stuff.co.nz/business/72002002/Only-1-per-cent-of-EQC-repairs-done-with-building-consent>; <http://www.stuff.co.nz/the-press/business/the-rebuild/72283618/extent-of-shoddy-quake-repair-work-exposed-in-reports>; <http://www.stuff.co.nz/the-press/news/10441327/Cheap-fixes-devaluing-thousands-of-homes>; <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/67919822/Christchurch-quake-survivors-and-the-long-road-to-mental-recovery>; www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/7074536/Red-zone-residents-threaten-UN-action; <https://thechristchurchfiasco.wordpress.com/2015/04/02/major-nz-companies-named-in-human-rights-claims/>; www.stuff.co.nz/business/rebuilding-christchurch/7683139/Laywers-called-in-over-red-zone-offers; www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/7412765/Zone-revaluations-deplorable; The EQC "waiting for us to die," Charles Anderson, *Christchurch Press*, March 15, 2014; Why is Alf still waiting, 92 year-old pensioner stuck in damaged home, Ashleigh Stewart, *Christchurch Press*, June 7, 2014.

micromanage the free flow of information and decision-making processes. They are slow to act, wanting to take control of all decisions and often have external agendas. The New Zealand has no “upper house” of government to provide balance in the democracy, and it is this single-chamber political system that decides through its public policy process what recovery will look like in many of the decisions, actions, or inactions it chooses to pursue. Yet, any initial disaster and recovery response *must* be focused at the local level, because of local intimate knowledge of the environment in which the emergency occurs and of the immediate and future nature of community needs. Without local level “buy-in,” recovery will be slow and the maintenance of public confidence among decision-making bodies is critical. Local knowledge has only sparsely been mobilized, and as a consequence recovery *has* been slow in Christchurch. In the wake of those policies in present capitalist society, which leave recovery to the market, a series of human rights violations have also taken place as a result of government failure to protect the interests of its citizens over and above the financial economic interests of corporates and big business.²⁹ If governments decide to leave a recovery “to the market,” then it is the population that carries the weight of that policy of noninterference. In Christchurch these circumstances have come to the fore in the six examples discussed further.

THE EQC³⁰

The earthquakes have depleted the natural disaster fund that underpins the EQC. In September 2011, the High Court of the New Zealand determined that EQC had financial exposure³¹ after each major earthquake. Many believe that these financial pressures have much to account for the delayed claim payments and slow land damage assessments. In the past, EQC did not participate in the emergency response or recovery to disasters nor had it envisaged multiple events within such a short timeframe. EQC’s operating environment changed markedly after the 2010–11 earthquakes, and it now has the responsibility for many recovery functions. EQC has come under

²⁹ <http://www.stuff.co.nz/the-press/business/the-rebuild/67535901/New-Brighton-neglect-is-moral-injustice-Paul-Zaanen>; <http://www.stuff.co.nz/the-press/news/70087549/Red-zone-discrimination-against-uninsured-says-city-council>; <https://www.hrc.co.nz/your-rights/social-equality/our-work/canterbury-earthquake-recovery/>; Authorities “ignore” most Maori post-quake, Shelley Robinson, *Christchurch Press*, September 23, 2014; <http://www.stuff.co.nz/national/health/76060300/Attempted-suicides-highest-in-Canterbury-twice-as-much-as-Auckland>; The EQC bosses meet Brownlee over plight of elderly victims, Fairfax NZ, *Christchurch Press*, March 8, 2014; Children the first victims, Olivia Carville, *Christchurch Press*, February 16, 2013; Quake-hit families still in squalor, Olivia Carville, *Christchurch Press*, February 29, 2013

³⁰ <http://www.eqc.govt.nz/>.

³¹ The New Zealand High Court was asked to resolve the issue of how EQC cover responds to homeowners who have made more than one claim for damage suffered in more than one earthquake, where such damage exceeds, NZ\$100,000 for dwellings (or NZ\$20,000 for contents). It was determined by the court that if, at the time of the subsequent earthquake, EQC had not yet paid in respect of the first earthquake, EQC is liable to pay up to NZ\$100,000 with respect to each earthquake, until cover is reinstated. See <https://www.interest.co.nz/sites/default/files/Earthquake%20Commission-1.pdf>.

harsh criticism from Canterbury citizens regarding its governance structure, lack of transparency, and operating systems. Despite this, it continues to fail to accept any responsibility or accountability for the harm it has caused as a result of systematic assessment discrepancies, delays caused by reassessment (apportionment), failure to pay tradespeople in a timely fashion, poor workmanship requiring re-repairs, repairs carried out without building consents, the use of introduced building standards (the Ministry of Business, Innovation, and Employment Guidelines) as a way of cost saving, failure to address mold and asbestos risks adequately, etc. EQC on behalf of the government is widely seen to be involved in a government-driven cost saving exercise at the expense of affected earthquake victims.

SOUTHERN RESPONSE³²

On April 7, 2011, it became clear that the insurance company AMI was in difficulty. AMI had more than 30% market share of the fire and general insurance market in Canterbury. The government assisted AMI with its financial difficulties, and Insurance Australia Group (IAG) agreed to purchase AMI, which the government declared was to “strengthen the Canterbury insurance market and reduce the Crown’s liability.”³³ The government-rolled AMI’s liabilities into a government entity (Southern Response) set up with the sole purpose of settling the remaining AMI claims.³⁴ A group action is now in place against Southern Response, and proceedings allege that Southern Response misrepresented the terms of the original policy, and that Southern Response is only meeting 40%–50% of the amounts claimed or due to be claimed, based on its own inadequate building reports. Southern Response is seen to be concerned solely with limiting its own financial exposure. Being a government entity, it is seen to be trying to save money (tax payer’s money) at the people’s expense. When it appears that a government is experienced at cheating its citizens, the state of the democracy is rightly questioned.

THE PRIVATE INSURANCE INDUSTRY

The slow progress in recovery has been in large part due to the private insurance industry and its lack of willingness to process claims within reasonable timeframes. Earthquake insurance is known to be particularly problematic (Kunreuther & Roth, 1998, pp. 97–124). There are still thousands of unresolved insurance claims and many disputes, meanwhile insurance profits soar.³⁵ Now, into the sixth year after earthquakes, sound prudential management of the industry is and was required, bearing in mind the need to restore economic activity and the need of citizens to return to

³²<http://southernresponse.co.nz/>.

³³IAG agreed to purchase AMI, which the government declared was to “strengthen the Canterbury insurance market and reduce the Crown’s liability.”

³⁴<http://www.stuff.co.nz/the-press/business/71470352/southern-response-class-action-launched.html>.

³⁵<http://www.stuff.co.nz/the-press/business/9000691/New-Zealand-disasters-boost-insurers-profits>; <http://www.interest.co.nz/business/68631/iag-posts-755-gain-profits-ahead-takeover-lumley>.

their homes. In addition, the insurance industry in the New Zealand is “self-regulating.” The emphasis is on “freedom, independence, and autonomy” with no or little government interference. This is sometimes a very convenient place for governments to sit. Yet, no freedom is unrestricted unless controlled by “accountability.” For self-regulation to be effective, it needs to be properly integrated into the overall regulatory framework—that is, it needs to dovetail with the law and the regulator’s policies and include regular direct oversight of the activities of the “profession.” Central government intervention was and is required in light of what has transpired in Canterbury with regard to the insurance industry (Miles, 2016).

Questions also arise around the influence of reinsurers³⁶ on government. A nation that is unable to finance its own natural disasters finds itself at the beck and call of the reinsurer, being careful not to step out of line for fear of being without catastrophe protection. One can only wonder about the conversations that have taken place behind closed doors (such as the New Zealand delegation rendezvous in Monte Carlo in September 2011), which ultimately have an enormous impact on a nation’s citizens.³⁷

THE RED ZONE AND FORCED MIGRATION

The red zone³⁸ is one of the major issues that arose as a consequence of government/CERA “pay-outs” on properties at property values based on 2007 quotable value³⁹ figures in Christchurch and its environs. The Minister of Earthquake Recovery disregarded advice from officials to give red-zoned Cantabrians full compensation for their quake-damaged properties. Instead, only half the ratable value was offered. These property values were then already 5 years old and unrevised. For many citizens, this package was not sufficiently equitable to allow them to buy an equivalent property elsewhere. In April 2012, CERA ruled out a review of the residential red zone despite homeowners challenging the decision to “write-off” their land. A group of red zoners fought the government’s “abuse of power” said to be “oppressive, disproportionate [and] contrary to human rights” in the courts.⁴⁰ This case marked a

³⁶Reinsurance is most simply described as insurance for insurance companies. It occurs when multiple insurance companies share risk by purchasing insurance policies from other insurers to limit the total loss the original insurer would experience in case of disaster. By spreading risk, an individual insurance company can take on clients whose coverage would be too great of a burden for the single insurance company to handle alone. When reinsurance occurs, the premium paid by the insured is typically shared by all of the insurance companies involved.

³⁷<http://www.stuff.co.nz/the-press/opinion/perspective/5665147/Brownlee-gives-reinsurers-the-facts>.

³⁸Being “red zoned” means that the land has been so badly damaged by the earthquakes. It is unlikely that it can be rebuilt on for a prolonged period. The criteria for defining flat land areas as residential red zone are where there is significant and extensive area wide land damage; the success of engineering solutions may be uncertain in terms of design, success and possible commencement, given the ongoing seismic activity. Any repair would be disruptive and protracted for landowners.

³⁹Quotable Value Limited is a state-owned enterprise that has the function of establishing land values for local authority rating purposes.

⁴⁰<http://www.stuff.co.nz/national/8946555/Complex-red-zoner-High-Court-case-opens>.

test of primary property rights in the New Zealand. The claimants sought a judicial review of the government's compensation policy for red-zoned land and won their case right through to the Supreme Court. The court found that the government's red zoning policy had left landowners out of pocket and ruled that the government had not properly considered the Canterbury Earthquake Recovery Act and its purpose of "social, economic, cultural, and environmental well-being" when making the reduced offer.⁴¹ More likely than not, one speculates that this land, now government land, will be made available once again for privatization.

THE ANCHOR PROJECTS⁴²

NZD158 million was earmarked by the government for 16 multimillion dollar "anchor projects" that include a convention center, a rugby stadium, and metro sports facility. CERA wished to acquire central city land for these anchor projects. The plan included buying some 840 "designated" properties in the central city, condensing the city's core, and creating a more commercially attractive center, streamlining development rules and dividing the city into precincts. The government had a rigid vision wanting an IT and innovation hub, underpinned by a master plan complete with a network of laneways weaving through a "public realm" space. In addition, it wanted the right to approve prospective tenants. Landowners in the city stated that the Christchurch Central Development Unit was making offers to them that are "off the planet." The offers were said to be below some people's mortgages and well below market value. In total, 92 properties were to be acquired.⁴³ Meanwhile, hundreds of damaged community facilities are said to be likely to go unrepaired due to the CCC's shortfall in funding.⁴⁴ The Mayor, Leanne Dalziel, declares that tough calls will have to be made on which community facilities in the city are to be rebuilt.⁴⁵ While people are still living out of their homes, many feel that these projects are an extravagance established too early in the recovery phase. The public urges restraint on big projects. A trade-off in decisions has been developed between spending on "anchor projects" and making sure that the city's infrastructure is sound. The community questions whether Canterbury is seeing "disaster capitalism" in progress (Klein, 2009).

DEREGULATION IN THE FORM OF RELAXED BUILDING REQUIREMENTS (MBIE GUIDELINES)

Before the Canterbury Earthquakes, the New Zealand construction industry was regulated by the Building Act 2004 and the associated Building Code. Soon after the earthquakes, the Ministry of Business, Innovation and Employment (MBIE) produced a set of MBIE guidelines "*Revised guidance on repairing and rebuilding houses affected by*

⁴¹ <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/67321207/Quake-Outcasts-win-in-Supreme-Court>.

⁴² <http://www.futurechristchurch.co.nz/central-city>.

⁴³ Bitterness at CCDU valuations, Georgina Stylianou, *Christchurch Press*, July 13, 2013.

⁴⁴ Cash runs short for repairs, Lois Cairns, *Christchurch Press*, May 8, 2014.

⁴⁵ NZD 30m aquatic center on hold, Lois Cairns, *Christchurch Press*, February 27, 2014.

the Canterbury earthquake sequences (November 2011),” indicating what would be considered acceptable repair strategies post-earthquakes. These guidelines were introduced to encourage “speedy recovery.”⁴⁶ The guidelines, adopted by EQC, have been used by builders, assessors, and engineers when qualifying and quantifying earthquake damage. As the years have progressed, the MBIE guidelines have had several revisions, each time to a lesser standard and further from the legislative national building standards. As the “goal-posts” for acceptable levels of damage have continued to move, the EQC’s and private insurers’ reassessments of property also moved, with their financial liability inevitably trending in a downward direction. Although the guidelines may be indicative of possible solutions to damaged dwellings, they cannot and do not override the provisions of any private insurance policy held with an insurer where damage is deemed to be above the quantum covered by the EQC,⁴⁷ nor can they override the requirements of the New Zealand Building Act 2004 and Codes. However, the private insurance industry has conveniently jumped on the bandwagon and also extensively used the MBIE guidelines and the expanded tolerances set out within these guidelines as justification for repairs which often, in their view, do not require building consents and which are treated as repairs rather than rebuilds. This ultimately saves the insurance industry hundreds of millions of dollars at the expense of the future integrity of building structures, and ultimately, the equity in and safety of policyholders’ homes. “Cantabrians are being asked to wear second-best fixes because anything else is too expensive.”⁴⁸ Today, the existence and intransigence of corruption in the construction and engineering industry is widely and publically acknowledged in Christchurch amid affected residents—ultimately should depend on local authorities—design permissions, foundations permissions, and occupancy permission. What has followed is a disproportionate number of newly built structures with building defects and repairs carried out shoddily, resulting in a poor quality housing stock as a result of a lack of building consent processes. Despite the government’s awareness of these issues, it has done nothing to remedy the problems and knowingly allowed both EQC, Southern Response, and the private insurers to cut costs at the expense of the future building stock of the city and the equity in people’s homes.

CONCLUSION

The primary focus by the national government with respect to the financial/economic long-term recovery of Canterbury puts the recovery of its population as a secondary concern. This has affected the overall well-being of many residents to a point that their human rights are seriously challenged. It represents an abdication of responsibility for the ensuing social disaster as well as permissiveness toward serious human rights violations.

⁴⁶ <https://www.building.govt.nz/building-code-compliance/canterbury-rebuild/repairing-and-rebuilding-houses-affected-by-the-canterbury-earthquakes/>; <https://thechristchurchfiasco.wordpress.com/2015/03/01/mbie-guidelines-sarabs-view-on-the-matter/>.

⁴⁷ EQC cover effectively operates as a “first layer,” with the upper layer, i.e., damage that exceeds the first layer known as “the cap,” covered by the private insurer.

⁴⁸ Who can we trust, John McCrone, *Christchurch Press*, March 23, 2014.

Early on in the process, Canterbury was judged by central government to be unable to manage a disaster of this magnitude alone. For this reason it was decided that the disaster needed a stronger command and control system than could be provided locally. CERA was put in place to oversee the recovery. The fact that CERA has become increasingly unpopular is because it has demonstrated little understanding of community development, little empathy or comprehension of what is needed to build on the resilience of the people and the social capital available. When comments are made to the extent that not all is well in Canterbury, the cries of distress have been/are minimized by referring to the earthquakes as “an unprecedented event” or “one of the largest insurance events in the world.” In international literature one will find an emerging consensus that the first priority of a government after a natural disaster should be the facilitation of the reestablishment of communities (Brigit & Hagan, 2007). To prevent people from leaving the area, government should empower local initiatives to keep local communities “in the loop” by bolstering social cohesion. A quick return for residents to their homes should be a prime goal in the recovery phase and if that is not possible, provisions such as temporary and transitional accommodation should be in place.

As demonstrated, declaring a disaster a “national emergency” has profound political implications. In the follow-on from managing the emergency and the rescue efforts, it is practically unavoidable that a further politicization of the event increases as the affected community moves from the emergency response through the recovery and the reconstruction phases. The immediate emergency response by any government is fairly predictable, as it should be, but, from a political point of view, the aftermath has proven to be uncharted territory, highly susceptible to the opportunities of the circumstances, and the political values and agendas of the day. The way a government perceives its political mandate, or is given opportunity to define it, is never more critical than in a recovery phase. The malfeasances of the private insurance industry and the construction industry as described above are cases in point.

Markets have no inherent moral character, and it is therefore arguable that it is the government’s role to decide how to manage them. In particular, after a major disaster, markets must be regulated “under emergency” to ensure that they are working for the benefit of the recovery of the majority of citizens. A political system of noninterference only serves to amplify the voice of wealthy corporates and fails to protect the ordinary citizen against corporate abuse. Money speaks in politics as it does in the marketplace. Any system of recovery must have rules and regulations operating within a legal framework. In a modern economy, the government has the responsibility on behalf of its population to set and enforce the rules of the game in the marketplace. This is especially true in the case of a major disaster where government takes the decision to be involved in the recovery process. In the absence of genuine government support, the extent to which a population can recover post-disaster is likely to be severely challenged.⁴⁹ What has characterized the recovery

⁴⁹ <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/9397762/Cunliffes-recovery-criticism-ridiculous>.

in Christchurch is that political decision-making has been in favor of the corporate and government stakeholders—the insurance industry and the construction industry. The policy of noninterference in the marketplace has been the cause of slow, painful recovery. The consequences of this approach have been sorely and visibly felt by the affected population. In many instances this has resulted in a series of serious misunderstandings about the way forward between national government, the CCC, and its population. It is imperative that government has a directive role on how the industry intends to operate postdisaster, and therefore it must communicate more effectively with the parties involved and align policies and implement strategies together. Without a comprehensive alignment in policy and the allocation of responsibilities and the development of a regulatory framework, those directly affected by a disaster will continue to be victimized long after the event itself. Had government goodwill been forthcoming and this preparatory work taken place, or been an already established part of policy/legislation and understood by all parties, the timeframes for citizen recovery would have been shortened, particularly in relation to insurance claim resolution even in the absence of legislated standards for the industry.

Confidence and certainty around citizens' futures in a devastated community is vital in the recovery phase. After 6 years the continued delays in insurance settlements have led to widespread uncertainty, causing unrest and desperation among a few.⁵⁰ This development in itself will ultimately have an enormous impact on how those individuals perceive their city and their government. The public perception of clear and authoritative leadership whether in planning or in housing assistance is important and requires special attention at any time. In this respect, there still remains a mismatch between residents' expectations and the decisions that are made by CERA and other governing bodies including the CCC. There is a need to build transparent governance, citizen/state trust. Where citizens feel the most distance from decision makers, these are the communities that experience the slowest and the most confused of recoveries (Aldrich, 2012). Societies where citizens can access decision makers and processes have their opinions heard, and where required, alter state policies to a significant degree, are societies in which recovery will take place more smoothly. There is a close link between the ability of citizens to have their voices heard and broader trust in their government. In a society where citizens have low efficacy and believe that their collectively accepted ideas and desires are not permeating into actual policy, there will be a diminishing trust in government. This has its immediate effect on the duration of recovery, and, unfortunately the recovery of Christchurch after the 2010–11 earthquakes demonstrates this clearly. In that respect the story of Christchurch is a story of a missed “window of opportunity” as governmental financial interests took precedence over public well-being in the interests of profits and cost-savings.

⁵⁰ <http://www.stuff.co.nz/the-press/business/the-rebuild/78233527/Housing-repairs-will-create-hIDEOUS-conditions>.

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Blakely Disaster Readings

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From Recovery to Prevention: The Swiss Avalanche Program

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INTRODUCTION

Rapid urbanization and climate change are strongly aligned with the likely increase in numbers of natural disasters in the near future (Wamsler, 2014). Therefore, there is a strong need to realistically assess them and find ways to improve existing settlements or develop new prevention mechanisms to minimize the negative impacts of disasters. Typically, all activities, programs, and measures occurring before, during and after a disaster event are addressed through disaster risk reduction (DRR) practices, which aim to avoid or minimize disaster impacts, and aid the recovery of affected areas (Vasilescu, Asmatullah, & Himayatullah, 2008). These activities, although often intertwined, generally follow the cyclical nature of a disaster and addressed in the four phases or stages: Prevention, Preparedness, Response, and Recovery (PPRR) (e.g. Clary, 1985; Godschalk & Brower, 1985; Haddow, Bullock, & Coppola, 2011; Mileti, 1999; Quarantelli & Kreps, 1972). Disaster events occur between the preparedness and response stages, both of which are short term insofar as they are oriented to response actions in the short term—even while preparation itself might occur on an ongoing basis. The recovery stage, however, includes short- and long-term actions, including those related to urban planning. Immediate recovery also includes the so-called “window of opportunity” stage, allowing professionals and specialists from the field to intervene in existing practices and perhaps to implement more appropriate and far reaching measures that may not have otherwise been palatable. The desire of the affected stakeholders to return to the “normal” state of operations as soon as possible usually limits the timeframe of the window of opportunity, and, as a result, recovery actions often lead to rebuilding of affected areas in a manner similar or the same as the predisaster stage (Haigh & Amaratunga, 2011). However, active and effective use of the window of opportunity has the potential to address the need to improve or change existing prevention mechanisms.

This chapter provides an insight into effective employment of the “window of opportunity” using the case of Swiss avalanche practice. For the context of this chapter, only snow avalanche is discussed, which is understood as a large snow or

rock mass rapidly moving down a mountainside. It is usually triggered by heavy snowfall, rain, defrost, or physical disturbances, and contains rocks, soil, or ice (Alexander, 1999; Chapman, 1999; McClung & Schaerer, 1993; Schweizer, Bruce Jamieson, & Schneebeli, 2003). Snow avalanches are common in the populated parts of mountain regions or in the regions with increased winter levels of activity, such as tourism. Compared to some other natural disasters, the area of the potential avalanche formation can be predicted relatively accurately as they require critical snow mass and sufficient slope for the movement. As such, the most dangerous slopes are in the range of 25°–40° as they allow collection and movement of the critical snow mass (Alexander, 1999; International Association of Hydrological Sciences & International Commission on Snow and Ice, 1981; McClung & Schaerer, 1993).

Switzerland is the leading country in avalanche prevention and response programs. While the unique topography of this country results in the presence of a number of hazards, the combination of unique topography, high density, and high demand for the mountain tourism places avalanche as the major hazard in the country (Federal Statistics Office, 2012; Gillet et al., 2006; Laternser & Schneebeli, 2002). The history of the first recorded avalanche in Switzerland dates back to 1449, when—according to the available data—this natural hazard destroyed four buildings and killed 11 people. Over the centuries, such records became more frequent and detailed (Schneebeli, Laternser, Föhn, & Amman, 1998), allowing for more accurate studies, and subsequently, more accurate predictions of this hazard (Frutiger, 1970, 1980). Recently, snow avalanches, landslides, debris, and rock falls have become more frequent and with higher amplitude, possibly due to the increasing development activities, forestry practices, land misuse, and climate change in the mountain areas (Pudasaini & Hutter, 2007), indicating a need for greater attention to, and additional measures against, avalanches.

This analysis follows particular events of the avalanche season of 1951, also referred to as “Winter of Terror.” These events were chosen as a trigger point for changes in the avalanche prevention approach in the country, which revealed the complexity of agents involved in and forces influencing decision-making, leading incrementally to the changes to hazard planning over the following decades. The chronological overview presented of the events leading to and following the “winter of terror” describes the governance associated with the integration of urban planning and DRR disciplines, and indicates the importance of the roles of stakeholders in the processes. This unique approach and general cultural acceptance of the role of authority in Switzerland is suggested as one of the reasons for stakeholders’ behavior, as well as demonstrating the potential of clearly established governance in influencing community behavior. This case also demonstrates how economic imperatives influence residents’ appetite for change and their propensity to modify their attitude toward enforced avalanche zoning. Data for this are collected through secondary sources by using document analysis. In addition, upon the initial write-up of the case, semistructured interviews with key professionals in the field and observations were used to fill in gaps in the data and confirm or enhance the initial findings of authors.

LAND USE CHANGES IN SWITZERLAND IN THE FIRST HALF OF THE 20TH CENTURY

A shift from an industrial to a mainly service-based economy in Switzerland in the early 20th century and post World War II, combined with its climatic conditions and topography, resulted in rapidly developing tourism, particularly in winter sports such as skiing (McClung & Schaerer, 2006). This shift resulted in decreasing land values for rural purposes in connection with decreasing farming activities in the country in the first half of the 20th century and subsequent mass movements of farmers to larger cities and urbanization, resulting in loss of land values in mountain areas. At the same time, the rapid growth of mountain tourism attracted foreigners and investors to the country. Vacant land has been sold to private owners with the main purpose of building second or holiday houses. The majority of new buyers were foreigners, who had inadequate knowledge of avalanche threats in the area, which attracted land speculation. Moreover, as disastrous avalanches have relatively long return intervals (McClung & Schaerer, 1993), the “living memory” of such events faded and even local residents were not always aware of possible threats. As a result, some of the newly purchased land and constructed houses were in avalanche risk areas (Frutiger, 1970, 1980).

The situation came to a head in 1951, when a series of avalanches occurred across the Alps and resulted in a significant damage to the whole region. Also known as the “Winter of Terror”, the season of 1951 brought two catastrophic avalanche cycles to the Alps region. Excessive snow levels lead to 649 avalanche events across the whole region, causing severe economic and environmental damage with deaths of 98 people in Switzerland alone and 265 people across the entire region (Frutiger, 1970, 1980; Gilg, 1985; Lateltin & Bonnard, 1999; Margottini & Casale, 2003; Swiss Disaster management Professional, 2013; The Swiss Federal Institute for Snow and Avalanche Research, n.d.; Wilhelm, Wiesinger, Bründl, & Ammann, 2001).

Impact of these events led to conflicts between landowners and public authorities responsible for the welfare of inhabitants, which includes damage from avalanche events (Frutiger, 1970). Conflicts resulted in dramatic increases of both civil lawsuits between sellers and buyers, and public legal actions between landowners and local authorities (Frutiger, 1970, 1980; Lateltin & Bonnard, 1999). The reaction of the public and local authorities was expressed through increased appetite for change; yet, there were no immediate actions from the government at that time. Instead, federal government issued additional guidelines that were intended to provide for the application of the Federal Acts of December 6 and 19, 1951 (Frutiger, 1980). Aimed at increased effectiveness of avalanche defense mechanisms, these acts did not include avalanche zoning and remained silent regarding the land speculation rife in regions prone to avalanches. They discussed the need for additional help in regions affected by the Winter of Terror with afforestation and avalanche defenses (Frutiger, 1980).

Upon development and implementation of the first avalanche plan by the SLF for the community of Wengen, Canton of Bern ([The Swiss Federal Institute for Snow and Avalanche Research, n.d.](#)), the first avalanche zoning map was developed in 1961. As a response to the growing avalanche risks, the Federal Bureau of Forestry raised the need for avalanche zoning plans for the communities prone to this disaster. They proposed insurance as a tool restricting the growing numbers of developments in areas with high avalanche risks. While the political structure of the country did not allow confederation to enforce these rules upon cantons due to the political structure of the country, it still released relevant guidelines in article 32 of Executive Ordinance to the Federal Forest Law of October 1, 1965 ([Frutiger, 1980](#)). This tactic also illustrates how economic incentives can be used to change the development patterns in risk adverse areas. It also highlights the fundamental importance of support being provided by the background rules of the system and decision makers in achieving integration processes of DRR and urban planning.

LAT¹ AND LAND USE CHANGES

Land speculation continued to occur at a greater rate over the following 18 years, forcing cantons to request intervention from the confederation. The main challenge that impeded efficient problem solving was significant differences of building laws and codes between different cantons ([Frutiger, 1980](#), p. 319). This is because Switzerland is a federation with 26 cantons or states. Central authorities have jurisdiction only in the domains outlined by the federal constitution while remaining powers automatically revert to cantons or communities. Cantons are sovereign, and each has its own government, which is a constitutional entity issuing laws and regulations in accordance with the framework outlined and defined by federal laws. Management and prevention of all natural disasters, including avalanches, follows the same regulations ([Lateltin & Bonnard, 1999](#)).

The avalanche disaster events affecting the country in 1968 and 1970 resulted in a number of interventions and disputes being taken to the parliament, resulting in postulates and discussions between officials about the need of reducing risks in the development areas. At that time, the 12 cantons and communities across the country had already started making progress toward introducing avalanche zoning ([Frutiger, 1980](#)), demonstrating the power and benefits of grassroots approaches.

As a free enterprise society ([Gilg, 1985](#), p. 319), the Swiss Constitution establishes that each and every property owner, both private and public or communal, has absolute power over their land and its development. Until 1969, this principle was stated in the first paragraph of the constitution and was obstructing the progress of planning practice in the country. In 1969, when the 22nd article was restated, it provided power “to the confederation or canton to make a provision for the expropriation or restriction of land ownership with compensation” ([Gilg, 1985](#), p. 319). This was a first step toward the

¹ Loi sur l'aménagement du territoire.

introduction of zoning and planning principles. The level of local autonomy provided by these articles allowed for place and context-specific decisions to be made by local people and agencies, replacing wider scale maps that were more generic and not necessarily applicable to the area, which were developed by national officials (Frutiger, 1980).

The first draft of the Federal Act, highlighting the need for urgent changes in land use planning, was presented by the Federal Council in 1972 (Gilg, 1985). This draft responded to the need for landscape protection, which did not include the avalanche hazard zones at this time. Upon being heard in the Federal Assembly, this deficiency was addressed and the law stated that:

Some organizations considered it advisable to pay attention, in addition to environmental protection, to the restriction of building activity in areas endangered by natural hazards. Some memorials would like to oblige the Federal Council to take precedence over negligent cantons and, if necessary, to designate the areas to be protected and act in their place.

Switzerland (1972, pp. 644–648)

Furthermore, the law ordered all cantons to urgently designate “e) areas which are known to be endangered by natural hazards” and emphasized that “. . . the Federal Council will, after unheeded warnings, itself take measures against cantons, communes or other disloyal bodies” (Switzerland, 1972, pp. 644–648). These measures were enforced for a limited time and were replaced by the permanent Federal Law for Land Use (LAT) (Frutiger, 1980).

The Federal Forest Law and the Federal Law on Flood Protection introduced and applied across all cantons in 1991, places emphasis on preventive measures for natural hazards, including avalanche (Lateltin & Bonnard, 1999), establishing land use planning as central tool alongside hazard assessment itself. Following these laws, cantons were required to develop maps and registers for endangered areas and consider hazards when land use guidelines are being established (The Federal Assembly of the Swiss Confederation, 1991). These are supported by LAT that requires all cantons to develop a master plan that must include hazard mapping relevant for each individual canton. It is further scaled down to the communal level, and detailed plans specific to the place and hazard type are further requested by local authorities from communes (Frutiger, 1980; Lateltin & Bonnard, 1999). In areas exposed to avalanche hazard, such maps are resented in the avalanche zoning tool.

AVALANCHE ZONING—PURPOSE AND TECHNICALITIES

Avalanche zoning, or avalanche zone plans, is a prevention tool, enforced by the Swiss law and regulated by local officials. This tool identifies avalanche risk levels and applies relevant land use planning restrictions when required. Following principles of land use planning, it places restrictions based on spatially defined zones and specifies types of construction allowed in these zones (Frutiger, 1970; McClung & Schaerer, 1993; WSL Institute for Snow and Avalanche Research SLF, n.d.-b).

Areas exposed to the hazard are based on avalanche mapping—large topographic maps outlining potential areas and paths of this snow hazard. This mapping is a tool of building authorities, and it does not have a direct legal status (Frutiger, 1980), whereas zoning does have a legal status.

Avalanche zoning is an example of the integrated efforts of diverse range of professionals, which was developed and implemented as an outcome of the long-term recovery process initiated after the disastrous 1951 events. Its development consists of a number of steps, understanding of which is important for the understanding of the overall process and for the discussion provided further on the role of citizens in the process. The first stage is the hazard assessment, in which the potential avalanche path is identified to recognize if and where any development, infrastructure, or other facilities are planned in mountainous terrain. Furthermore, these areas are subdivided into zones according to the risk levels, and finally, development restrictions are applied in these areas (McClung & Schaerer, 1993).

Avalanche zoning has four zones, each of which is assigned a color identifying danger level and development restrictions. The red zone is assigned to areas with the highest risks of avalanche and it bans all new development, requires reinforcement of all existing constructions and structures, and requires that evacuation plans and paths are ready at all times during the avalanche season. The blue zone allows some new development, but it must strictly follow regulated and standardized protection measures. Development type is also restricted in the blue zone to buildings not attracting large crowds of people, meaning that public facilities, such as schools, or mountain tourism amenities, such as lodges and lift terminals, are not permitted. The yellow zone has lower hazard levels and generally allows for all types of development with appropriate structural measures. The white zone has no avalanche danger and does not apply restrictions to the development (Frutiger, 1970; McClung & Schaerer, 1993; WSL Institute for Snow and Avalanche Research SLF, n.d.-a).

Despite a strong emphasis and enforcement of measures aiming to reduce risks associated with avalanches, by May 2013, at least one-fourth of hazardous areas in Switzerland were not assessed and treated by zoning in relevant maps. While Gilg (1985, p. 329) suggested that the initial 8 years provided for cantons to develop land use planning under LAT were rather challenging due to the lack of professionals, land speculations remain another potential reason for certain level of reluctance between local officials. The introduction of LAT and enforcement of hazard maps placed restrictions on land use and reduced land value. For example, as specified by the interview subject, the price of land per square meter in the least restrictive white zone in Davos in 2013 was about USD \$2,000, while price per equivalent land in the most restrictive red zone was about USD \$20–25 (Swiss Disaster Management Professional, 2013). Combined with the lack of adequate federal subsidies and cantons, this shift led to hesitation on the part of local authorities in introducing hazard maps (Frutiger, 1980; Lateltin & Bonnard, 1999). This example again demonstrates the importance of consideration of economic forces and a need for thorough understanding of all stakeholders and their vested interests on DRR processes, including urban planning.

ROLE OF STAKEHOLDERS IN MODERN AVALANCHE ZONING PRACTICES

The history of Swiss avalanche zoning and prevention tools and mechanisms demonstrates that successfully integrated DRR relies not only on the quality of prevention mechanisms but also on stakeholder involvement and managing productively their vested interests. Following Arnstein's ladder of participation, the discussion of community involvement demonstrates how after initially being the group to trigger change, the community accepted roles of being informed only.

By "informing," we refer to the ladder of participation first presented by Arnstein in 1969 and further amended and discussed by a number of scholars (Arnstein, 1969; Kloman & Arnstein, 1975). Table 7.1 is developed from a synthesis of Arnstein (1969) and the International Association for Public Participation (2003) as a referral point for concepts of participation used in this chapter. It is suggested as a practical approach, as the spectrum of IAP2 (2003) appears to be most appropriate for the investigation being carried out in this research thesis. Arnstein's (1969) ladder adds additional critical descriptive levels of participation, which categorize instances in which government enforces opinion on citizens. Although such an approach does not allow participation for the citizens, it is assumed that in some planning cases such an approach might be appropriate, despite the difficulties associated with this. In addition, Table 7.1 includes some examples of common participation techniques.

As the Swiss Confederation requires an appropriate hazard map to be developed before statutory processes taking place, it is left to cantons to decide which hazard should be assessed and then mapped. Hazard maps are developed by professionals from relevant fields and further integrated in relevant practices, including urban planning. Only relevant professionals perform both processes and, as a result, updated hazard zoning is developed. On completion of zoning maps, local government makes decisions regarding their implementation. The relative freedom of officials and professionals to execute plans and zoning maps can be considered as empowerment being allocated to professionals and technical bureaucratic officials. As part of the implementation process, local governments and professionals work with potentially affected communities (Swiss Disaster Management Professional, 2013); however, the lack of a universal protocol for such work does not determine whether interests of landowners are considered in full, or whether instead an informative approach is taken and the consequences of not applying rules and regulations are provided to affected parties.

Despite there being greater communal power and authority to make significant changes in Switzerland compared to many nations, citizens are restricted in their rights to develop in the avalanche-zoned areas. Citizens can vote on the plan; however, their right to appeal against the hazard map itself is restricted to only those directly affected. The right of environmental agencies to intervene and appeal remains. Citizens' appeals are initially carried out at the canton level and, if case is not resolved, they are addressed at the confederation level. In either case, courts consult or refer back to urban planning and disaster professionals to seek for the

Table 7.1 Degrees of Participation, Their Goals, and Tools

Participation Degree	Goal	Method
Manipulation and therapy	Provide public with information on the chosen plan, no channel for feedback, aims to gain public support	<ul style="list-style-type: none"> • Public and community meetings • Public hearings
Informing	Provide public with adequate information to facilitate their education about existing problems and issues, alternatives, and solutions; public is informed	<ul style="list-style-type: none"> • Websites • Fact sheets • Local newspapers, newsletters • Progress reports, direct mail • Meetings • Public hearings • Surveys and questionnaires • Focus groups
Consult	Channel for feedback from public on analysis, decisions, and alternatives; opinion of public is considered but not necessarily included in the decision-making process	<ul style="list-style-type: none"> • Face-to-face interactions • Delhi process • Focus groups • Public meetings and hearings • Surveys and questionnaires
Involve	Work with public through the planning process to ensure clear understanding and consideration of their concerns and ideas, including opinions on the planning process, and informing public regarding the decisions	<ul style="list-style-type: none"> • Workshops • Brainstorming • Charrettes • Games • Deliberative pooling
Collaboration or partnership	Creation of partnership with public in the decision-making process, direct advice from the public is incorporated in the decision-making process to the greatest possible extent	<ul style="list-style-type: none"> • Advisory committees • Consensus building • Participatory—decision-making • Policy communities
Empower	Final decision is given to public	<ul style="list-style-type: none"> • Ballots • Citizens' juries • Delegated decisions • Studies of impact assessment

Developed from Adams (2004), Arnstein (1969), Beutel and Dalton (2001), Bishop and Davis (2002), Healey (1997), Innes, 1995, 1996, 1998, International Association for Public Participation 2 (2000), Kloman and Arnstein (1975), and Sanoff (2000).

professional advice ([Swiss Disaster Management Professional, 2013](#)). As rights to appeal do not mean that any opposition will be effective on citizens' part but rather it is an opportunity for professional to react or reflect on the accuracy of mapping process, this can fluctuate between involvement and consultation participation types. This is of a particular interest as the initial trigger for change came from the community members.

However, the community is substantially involved in DRR processes on a daily basis. Citizens are informed about the risks of potential hazards in the area, and each household receives bulletins and hazard information; evacuation paths in the community are clearly marked and identified. Moreover, some local residents are involved in various emergency services such as fire brigades or rescue teams, and the community itself is the first response team in the case of a disaster event. If required, further aid is sought from a canton, and the confederation assistance is sought only when canton's forces are not efficient enough. Remaining highly successful ([Swiss Disaster Management Professional, 2013](#)), this practice demonstrates a more bottom-up approach, which occurs when a community is properly educated with regards to the broad spectrum of matters relevant to DRR.

Moreover, from citizens' perspective, an "informing" approach has been favored in the Swiss case over time, since the bulk of participation here is oriented to informing the entire community of proposed plans. There is no real redistribution of power, and option to appeal is limited only to those directly affected by hazardous zoning.

While some consultation processes can be observed at certain stages of development of maps, final decisions are yet to be undertaken by professionals. Despite what some might consider "false participation", this approach appears to be successful in this case and has reduced risks associated with avalanches, demonstrating a high level of acceptance of the role of professionals and their expertise by communities. While, in future, more in-depth research is required to identify all potential reasons for the roles of stakeholders, based on the data available a conclusion is made that a rather authoritarian approach to power distribution and clear regulation of responsibilities influences residents' acceptance of DRR measures. Moreover, it appears that a prolonged history of practice in the country has led to greater levels of acceptance of DRR tools being executed by the community members.

CONCLUSIONS

The history of the Swiss hazard mapping shows the potential for several dramatic events to influence increased awareness of potential disasters and to allow implementation of changes to relevant measures. As such, while the disaster events of the avalanche season of 1951–1952 in the Alps lead to significant changes in DRR practice of the country, two other disastrous events of 1968 and 1970 were necessary before parliament saw fit to intervene and restrict development in hazardous areas. Moreover, despite the Federal Law for Land Use (LAT) that was issued in 1978 requiring all Cantons to develop a Master Plan reflecting relevant hazardous territories, they still were not implemented completely by 2013–2014. This potentially demonstrates some level of resistance among officials and, perhaps, residents. It is proposed that there might be a range of potential reasons for this—political influence, areas of exposure, etc.; however, additional research is required to analyze and understand these in depth.

The Swiss case is an example whereby devolving control to the cantonal level and using experts' knowledge led to considerable certainty being reached regarding DRR outcomes, particularly with appeal processes allowing the possibility of mistakes to be identified and rectified. In other words, professionals with sufficient data and depth of understanding of threats and risks associated with disaster events were allowed to take actions significantly reducing risks. This case also demonstrates that an educative approach to residents and facilitation of their knowledge result in communities being rather resilient to disaster threats, suggesting favoring of this approach that privileges professionals over simple distribution of knowledge among residents. Moreover, response actions taken by the community and local officials demonstrate that community members are capable of coping with disaster situations and responding to them accordingly.

Avalanche zoning in Swiss areas appears to be highly formalized in its basis and has developed over the period of almost 30 years and tested favorably in several legal cases. It remains an example of regulatory planning as one of the main phases of implementation of necessary means for DRR. While cases leading to the legalization of avalanche zoning included a range of relevant professionals, legalization itself remained an urban planning, whereby hazard maps were added as a legal "bundle" in support to draw together key information and evidence.

While financial schemes are outside of the scope of this chapter, yet it is acknowledged that the Swiss case has the potential to be cost-effective, compared to other practices. It might be less costly for government to include DRR through existing means and process and go through the approval process once, rather than issuing two separate documents and going through the approval processes twice. This also means that fewer expenses are put toward other related expenses, such as hiring facilities and staff. These, however, are assumptions requiring separate investigation.

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Reconstruction of Informality: Can Formal Reconstruction Re-create Informality?

8

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INTRODUCTION

Informality is increasingly seen as a key feature of urban planning and development in many cities of the Global South (McFarlane, 2012; Miraftab, 2012; Roy, 2005). This feature, as argued by Roy (2009b), creates a certain “territorial impossibility of governance, justice and development.” In this chapter, I examine this proposition by focusing on the urban reconstruction process in two disaster-affected cities. Urban reconstruction is characterized as the “compression of urban development activities in time” (Olshansky, Hopkins, & Johnson, 2012). Therefore, informality is expected to be entangled in urban reconstruction policies and planning, and to be more conspicuous given the momentum for urban transformation after disasters. I argue that different actors involved in reconstruction activities, including planners and nongovernmental entities, must learn to work with the realities of cities of the Global South, including informality.

Recent scholarship (Alsayyad & Roy, 2006; McFarlane, 2012; Miraftab, 2012; Roy, 2012) theorizes urban informality beyond traditional conceptions of unregulated economic activities or settlements in cities (McFarlane, 2012). Instead, informality is understood as continuous and arbitrary shifts between what is formal/informal or legal/illegal within a continuum of formal and informal. In this sense, urbanization is taking place in a context where the law is often “rendered open-ended and subject to multiple interpretations and interests” (Roy, 2005). This state of deregulation and arbitrary decisions creates the impossibility for urban planning and governance in the sense of achieving the intended outcomes.

Looking at the two earthquake-affected cities—Bhuj in India and Bam in Iran—this chapter seeks to address the understudied question of how informality played a role in the transformation of urban environments during the reconstruction phase. My goal is not to evaluate postdisaster reconstruction policies and planning in these two cities but to highlight some of the distinctive challenges

and paradoxes that informality presents for “building back better.” In particular, I focus on a common theme that emerged from these two case studies: the dispossession and displacement of marginalized groups from well-located urban land and the accompanying production of new or perpetuated landscapes of risk following urban disasters. I explain who was displaced and how, and which legal, extralegal, or market-based mechanisms are to be challenged by disaster grassroots organizations, planners, and independent humanitarian actors for averting such displacements. These mechanisms, I will argue, can be challenged by a strategic use of informality and adopting a rights-based agenda, which highlights the role of location in realizing human rights in cities.

The chapter draws primarily on field research I conducted in 2010–12 in Bhuj and Bam to investigate their long-term recovery after the earthquakes of 2001 and 2003, respectively (Tafti, 2015). The selection of the two cases was based on similarities in the nature of the disasters, population size, the relative contemporaneity of the two events, similarities in housing reconstruction policies, and the role of the state as the major actor in urban reconstruction. My intention is not to compare and contrast the reconstruction in these two cities but rather to undertake a cross-case analysis where the experiences of one context can deepen our understanding of the other. I draw on 20 interviews with the chief planner and senior bureaucrats in central or state governments and heads of departments who are directly responsible for postdisaster reconstruction, examining policy documents and internal or published reports of the relevant institutions (in particular, the Housing Foundation of Iran (HFIR) for the case of Bam, and the Area Development Authority (BHADA) and Gujarat State Disaster Management Authority (GSDMA) in the case of Bhuj), and 95 semistructured interviews with disaster-affected people in both cities.

The rest of the chapter is structured as follows: It first presents a brief review of the recent debates on informality in cities of the Global South. Disaster and reconstruction efforts in the context of the two case studies are explained, and the ways in which urban informality played a role in the displacement of marginalized groups and in shaping or reshaping landscapes of dispossession and risk after the disaster are assessed. The chapter concludes with a discussion of possible ways to restore the rights of marginalized groups through a strategic use of informality.

INFORMALITY AND THE PRODUCTION OF URBAN INEQUALITY

The “Southern turn” in urban studies (Rao, 2006) has opened up new theoretical avenues for understanding and interpreting urbanization (Robinson, 2006; Watson, 2009). Integrating diverse experiences of urbanization from cities of the Global South to mainstream urban studies has not only provoked more reflection on, or reassessment of, existing perspectives and theories but has also highlighted the necessity of developing a greater range of theoretical frameworks and starting points to interpret processes of urbanization in diverse contexts (Parnell & Robinson, 2012).

Urban informality, as one of these starting points, is increasingly considered as a key feature in urban planning practices and scholarship (Miraftab, 2012; Mukhija & Loukaitou-Sideris, 2015). The resurgence of informality in urban studies has been accompanied by a new conceptualization of this notion. Earlier accounts of informality were mainly concerned with the deep inequality in access to urban infrastructure and services within the cities of Global South (Kudva, 2009). In particular, they focused on two dimensions of informality (albeit mainly separately): first, entrepreneurial activities and creative ways that people devise to survive and move forward; second, the spatial manifestation of informality that emerges through self-help housing backed by sweat equity and incremental consolidation (Ghertner, 2014), taking place on urban land, often without formal, registered tenure. Urban informality, in this sense, has often been considered as a response to structural problems such as poverty, and the inability of the state and market to respond to the needs of an increasingly urbanized population to adequate housing, jobs, and services. These responses are often characterized as flexible, pragmatic, calculated, and autonomous actions and as attempts to redefine and renegotiate urban space (Bayat, 2007; Kamel, 2014).

Recent theorizations of urban informality have gone beyond a focus on these autonomous activities of survival and their spatial manifestations (McFarlane, 2012). Informality, instead, is seen within a formal–informal continuum, where formality and informality are not fixed and are subject to the arbitrary decisions of different actors, including the state (McFarlane, 2012; Roy, 2009b). The arbitrary interpretations of what is formal or informal, legal or illegal makes the law open-ended (McFarlane, 2012; Roy, 2009b). As a result, the use, purpose of, or access to urban infrastructure, resources, and land can hardly be “fixed and mapped according to any prescribed set of regulations or the law” (Roy, 2009b). This state of deregulation presents a challenge for urban planning and governance in terms of achieving intended outcomes.

This more recent perspective locates urban informality not only in the domain of the urban poor but also with that of the elites and the state. Urban informality, in the form of unfixed and ambiguous practices of naming, managing, governing, and producing urban development, is seen as an integral part of the territorial practices of the powerful segments of the society (Roy, 2009b). Informality in this sense lays down “the rules of the game, determining the nature of transactions between individuals and institutions and within institutions” (Alsayyad & Roy, 2006). In fact, underlying the issue of informality are differences in access to economic and political resources (Mukhija & Loukaitou-Sideris, 2015). The state in particular, by placing itself outside the law and making arbitrary decisions on what is formal and informal, plays a key role in creating a “particular form of elite urban development,” and maintaining an unequal urban development (Ong, 1999). As noted by Altrock (2012), the task before us is then “to track the different ways in which informality and formality are put to work as resource, disposition, practice, or classification in the production of urban inequalities.”

BHUIJ EARTHQUAKE AND RECONSTRUCTION

On January 26, 2001, Gujarat State in India was struck by an earthquake measuring 7.7 on the Richter scale. In Bhuj (Fig. 8.1), a city with a population of around 130,000, approximately 7000 people died. Most casualties were living in high-density, old urban fabric—a walled city—where 50% of the buildings were destroyed (Balachandran, 2005). Around 11,036 houses collapsed and 27,617 were partially damaged. Before the earthquake, 40% of the population were tenants, mostly residing in the old urban fabric (Burns & Tiwari, 2008).

The State Government of Gujarat formulated a recovery program, funded by two loans of US \$771 million from the World Bank and the Asian Development Bank. For Bhuj, the newly prepared urban development plan suggested a combination of in situ



FIGURE 8.1

Location of Bhuj in Gujarat, India.

building and relocation for the reconstruction of the city. The state government allocated a disproportionate amount of the reconstruction funds to the reconstruction of Bhuj and modernization of its urban infrastructure, maintaining that Bhuj would set an example for future urban projects in the state.¹ Pursuing this modernization project, a land pooling and readjustment mechanism was used to reorganize 12,000 small and irregular-shaped parcels of land in the walled city to provide land for roads and amenities (Ballaney, 2008). Furthermore, the new development plan restricted the height of buildings and the permissible floor space index. These changes implied a horizontal expansion of the city. Three relocation sites were accordingly developed outside the walled city on government-owned land to accommodate approximately 5500 households. Relocation to these sites was voluntary, but the allocation of 100 m² plots—bigger than most plots in the walled city—at desirable locations encouraged relocation.

Policies of financial assistance distribution to households were mainly concerned with housing reconstruction for homeowners. The owner-occupiers of destroyed houses (6402 homeowners) could receive a maximum of US \$3225 for building a 45 m² house. Renters could receive subsidized land in relocation sites or could wait for the decision of their landlords on the reconstruction of their rental units by state assistance. In 2004, the negotiation of Abhiyan (a regional NGO) and a local community-based organization resulted in introduction of a new policy for low-income renters who could not afford the cost of land and housing construction. Under this policy, 450 households received a house built by Abhiyan in a site known as GIDC (Gujarat Industrial Development Corporation). The site was initially allocated for temporary housing outside the city and later accommodated those without a housing recovery option such as low-income renters and squatters.

BAM EARTHQUAKE AND RECONSTRUCTION

Two years after the Bhuj earthquake, on December 26, 2003, the historic city of Bam (Fig. 8.2) in Iran was affected by an earthquake registering 6.6 on the Richter scale. With a population of 104,469, Bam lost 23,503 people—almost one-fourth of its population. More than 80% of buildings in the city and around 24,598 urban housing units were severely damaged (World Bank, 2010). Before the earthquake, around 18.8% of the people were renters (Ghafory-Ashtiany & Mousavi, 2005).

Postearthquake policy responses were formulated by the central government. Financing the recovery program relied primarily on public funds and a US \$220 million loan from the World Bank. The new development plan of Bam suggested an in

¹In line with what is known as the general bias toward urban areas in Gujarat's overall development strategy, a substantial portion of financial resources and efforts were concentrated in cities and particularly in Bhuj. The reconstruction and renovation of urban infrastructure (in 14 towns and cities) received US \$147 million, over one-third of which (US \$51 million) was allocated to reconstruction of infrastructure in Bhuj. For more details on the modernization of infrastructure in Bhuj, see <http://bhujada.com/galleries/bhada-gallery/>.

**FIGURE 8.2**

Location of Bam in Iran.

situ reconstruction for the city. Unlike the recovery programs in Bhuj, which focused on economic growth, in Bam the economic recovery of the city was almost totally overlooked (World Bank, 2010), and officials narrowly interpreted recovery as the reconstruction of damaged buildings. Like Bhuj, policies of assistance distribution to households were mainly concerned with housing reconstruction for homeowners. According to these policies, property owners were eligible to receive a maximum of US \$17,647 for building an 80m² house, for each damaged house they owned. Two years after the earthquake, renters—in addition to new couples—became eligible for receiving a grant, provided that they bought a plot or could build a second unit in their extended household's plot.

POLITICAL AND SPATIAL PRACTICES OF INFORMALITY IN RECONSTRUCTION

This section maps the ways in which the mutually constitutive political and spatial practices of informality played a role in the transformation of urban space in Bam and Bhuj after the earthquake. These practices deepened urban segregation and shaped and

reshaped landscapes of dispossession in the form of new patterns of informal living in inner urban areas and a new or thickened layer of poverty at the urban periphery. The foregoing examples are not meant to focus on the plight of individual dispossessed households or particular cases of corruption or mismanagement in reconstruction activities. Rather, my intention is to unbundle some key driving forces that resulted in the displacement of marginalized groups and the challenges and complexities of pursuing a “build back better” agenda where political and spatial practices of informality are entangled in planning and reconstruction activities. These forces drive groups such as low-income renters, sharers, squatters, and migrants to reshape or shape new landscapes of dispossession and risk both inside and outside the city.

In both cities, the state-led assistance distribution and the arbitrary decisions regarding what is formal/informal tenure, who is counted as disaster-affected, and who is eligible/ineligible for receiving public assistance were the key driving force for the displacement of low-income renters, sharers, and squatters. Both reconstruction programs initially rejected any direct allocation of assistance to renters, purportedly due to the often informal nature of tenure arrangement practices in these cities. Another reason for excluding the renters and squatters from public assistance was the conceptualizing of disaster impacts solely based on damages incurred to private endowments. Neither the reconstruction program nor the market-driven process of reconstruction could supply affordable housing at least until 10 years after the earthquake. Firstly, low-income landlords were struggling with their own housing reconstruction. Secondly, the reconstruction of rental units was a rational investment only in areas with higher real estate value, where the higher rent could provide a return on investment quickly. Furthermore, in Gujarat and Bhuj, the policy of assisting landlords to rebuild their rental units providing the restitution of the preearthquake renters was practically abandoned. In this city the reconstruction of rental units was further constrained by much lower regime of development rights in the new urban plan. All these factors made the reconstruction of affordable rental units a very slow process. Ten years after the earthquake, in Sonivad, one of the most affected neighborhoods of Bhuj, only one newly built rental unit was found.²

In both cities, the later changes in assistance allocation policies made renters eligible to receive assistance provided that they could afford buying a plot in the city. Access to resources, therefore, became the criterion for establishing eligible/ineligible disaster-affected citizens. The latest policy announced in Bhuj, 7 years after the earthquake, acknowledged that “many” renters could not submit their rental receipts or contracts to benefit from the previous policies. Renters, under this policy, were eligible to buy a 50m² plot at the GIDC site. However, at the time of the last field research in 2012, the policy has still not been implemented, ostensibly due to delays in fixing the land price by the local authorities.

The case of informal settlements in Bhuj is the illustrative of the law becoming open-ended and subject to multiple interpretations. Before the earthquake, 42% of the total urban population were living in informal settlements ([Environmental Planning](#)

²This house and two other small rental rooms that survived the earthquake were the only rental units in Sonivad, which were found with the help of community leaders and neighbors.

[Collaborative, 2002](#)). The recovery program considered assistance allocation and a redevelopment project for the squatters whose houses collapsed due to the earthquake. While, according to the urban development plan, most informal settlements located within the walled city were destroyed ([Environmental Planning Collaborative, 2002](#)), the state-led damage assessment considered these houses as damaged and not collapsed. As a result, none of these households received assistance.³

RECONSTRUCTION OF THE LANDSCAPES OF INFORMALITY IN INNER URBAN AREAS

Having no housing options, low-income renters, sharers, squatters, and migrants who came from surrounding areas for construction jobs shaped new landscapes of dispossession and risk both inside and outside the city. Inside the city, they resided in the cracks and gaps of the formal city. In Bhuj, these households erected tents and makeshift housing on vacant lots belonging to the state or private landowners ([Fig. 8.3](#)). Some of them began to incrementally change their *kachcha* (temporary) huts to houses with more permanent materials, albeit without the state-led technical support program for safe construction.

In Bam, the new landscapes of dispossession were observed in the backyards of single-family housing. Given that the average size of plots in Bam was large, homeowners kept their temporary housing in their backyards and rented them to



FIGURE 8.3

Households are living in makeshift houses on government or private lands in Bhuj.

³From approximately 70,000 people living in informal settlements, only 25 households, whose houses were pulled down for construction of new roads, received a plot in GIDC site outside the city and housing assistance.

those who could not find a place to live, including preearthquake renters. Real estate agents in the city are still trading these temporary units. People living in the backyards of their relatives' houses have already started building unpermitted second units, using traditional and unsafe construction methods. Furthermore, like Bhuj, vacant plots provided a space for informal living in the city (Fig. 8.4). Unlike Bhuj, however, these households had to pay rent for living in tents or makeshift units in vacant plots, while having inadequate access to basic services such as water. These plots were mainly palm groves, deliberately left untended with a view to a future land-use change. Residents of these tents and makeshift houses are mainly migrant households who came to the city seeking labor jobs. According to the 2011 census (SCI, 2011), 1112 households live in this condition in different parts of the city. Of this, only 68 people are living alone (migrant workers) and the remainder are families.

RECONSTRUCTION OF THE LANDSCAPES OF INFORMALITY ON URBAN PERIPHERY

Apart from inner urban areas, the urban periphery also saw new landscapes of informality emerge, shaped by renters, sharers, squatters, and migrants. In Bhuj, as noted, a site in the urban periphery, known as the GIDC site, was designated for temporary housing after the earthquake. Preearthquake renters, sharers, squatters, and immigrants moved to this site, bought or rented these temporary units from homeowners, whose housing construction was finished. As mentioned, 450 houses were later built at this site for low-income renters with the help of a regional NGO, while the rest of



FIGURE 8.4

The abandoned palm grove is rented out to migrants in Bam.

renters and squatters remained in rudimentary housing built as temporary dwellings more than a decade ago. These groups have been dispossessed of the diverse forms of urban life in the walled city including access to jobs, services, and their social network in the face of inadequate rental units and rising rents. These households are living in a limbo condition, or “permanent temporariness” (Yiftachel, 2009), waiting for the implementation of the policy introduced in 2008. Given the 7 km distance from this site to the walled city and inadequate social infrastructure, some⁴ of the “beneficiaries” sold or informally rented out their new units and moved to squatter settlements located closer to the city and to job opportunities.

In Bam, finding a housing solution in the urban periphery was driven by the policy that allocated assistance to nonlandowners—e.g., renters, shares, or new couples—provided they could buy a plot. Those who could buy a plot outside the city’s official boundaries could receive a lower amount of assistance (assistance for housing in rural places). The prohibitively high rent in the city and the lure of receiving public assistance forced these households to look for a foothold where land was more easily available—in an administrative no-man’s-land, outside of municipal boundaries. The newly built houses outside the city (as shown in Fig. 8.5) are located next to the earthquake fault zone and do not have adequate access to utilities and services. These houses were built without the state-led technical support program for safe construction.

INFORMALITY AND STRUGGLES FOR URBAN SPACE

In both cities, arbitrary decisions over what is formal/informal—and hence eligible/ineligible—also led to the dispossession of those with lower economic and political power from the diverse forms of street life they seek to maintain for their livelihoods while directing public funds to the most powerful groups. In both cities the old bazaar was the center of this informal politics.

In Bhuj, planning for the reconstruction of the walled city was revised in favor of the major and powerful merchants and traders in the old bazaar. Simpson (2008) notes that this group campaigned successfully to exempt the bazaar from the road-widening prescription of the new plan, a campaign that was backed by many local politicians with the same caste-base or political-base affiliations. As a result, a compromise was made to cut off just half a meter on average from each shop (Simpson, 2008). The whole project was finished in 40 days and inaugurated by the Chief Minister of Gujarat. As Fig. 8.6 shows, partial demolition of the buildings without any structural strengthening provisions left buildings in this part of the city even more vulnerable to a future earthquake.

At the same time, on pursuing the aim of creating a “modern and clean” city, the new zoning regulations in Bhuj considered “unclean activities,” like the Mutton Market, a small local market for selling meat, chicken, and fish, to be

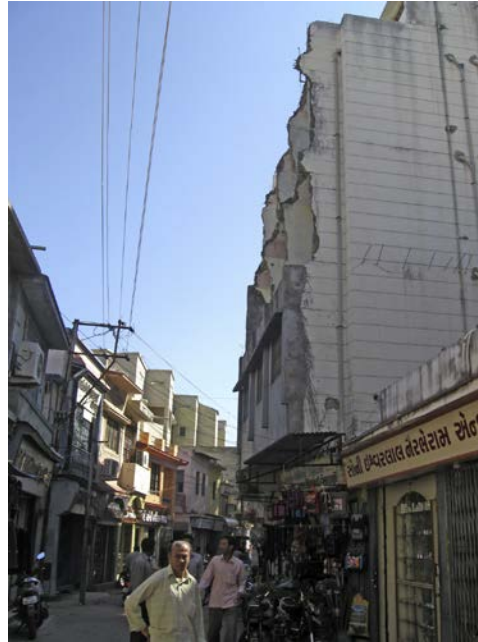
⁴In one section of the site with 92 houses, 53% of the beneficiaries rented out their new houses.

Blakely Disaster Readings



FIGURE 8.5

The formation of new landscapes of informality in urban periphery in Bam. Left: Bam in 2004. Right: Bam in 2014 ([Google Maps, 2014a](#)).

**FIGURE 8.6**

Partial demolition of buildings in the bazaar in Bhuj.

relocated outside the walled city. Shopkeepers, however, resisted this decision and rebuilt the market themselves with temporary materials. Another process that displaced and dispossessed the small retailers in the walled city was the inflexibility of assistance policies that impeded the reconstruction of buildings with mixed commercial and residential use. Some retailers built small structures in their previous trading places to continue their businesses. At the same time, new commercial units were built in the city through public–private partnership arrangements, which were unaffordable and were bought by traders who already had shops in other parts of the city.

In the Iranian case, Bam, the reconstruction of the old bazaar and the commercial center of the city was heavily subsidized and commercial units were built in a state-led development project, almost entirely with public funds. Meanwhile shopkeepers used shipping containers that are brought to the city as temporary working places and shops, for trading, some for nearly 10 years after the earthquake (Fig. 8.7). During these 10 years, local authorities attempted to close down these shops using various methods such as cutting off electricity and water, or even forced closure. These struggles ended in 2013 when local authorities removed almost all these shipping containers from the city.



FIGURE 8.7

Shipping containers used as shops. These containers were removed from the city 10 years after the earthquake.

DRIVING FORCES OF THE DISPLACEMENT

What emerges from the two cases of Bam and Bhuj is “a tangled and confused web of informal and formal actions” (McFarlane, 2012), which played a role in shaping a fractured pattern of urban recovery and new landscapes of dispossession. In many cases these landscapes of dispossession overlap with the new geographies of risk in these cities. Research on urban informality deals with unsettling practices of categorizations such as legal/illegal or formal/informal. In both cities, integrating disaster risk reduction measures—which in the case of earthquakes are often expensive, engineering requirements—with reconstruction activities was consolidated by regulatory instruments that linked and justified legality/illegality based on safe/unsafe construction practices. At the same time, the state-led technical assistance did not cover the informal, self-help construction activities. These seemingly rational and apolitical regulatory instruments, on the one hand, became the subject of interpretation and clientelistic practices, such as the case of the old bazaar in Bhuj, and on the other hand, drove the urban poor back to a fragile built environment.

In both Bam and Bhuj the three major contributors to the displacement and dispossession of marginalized groups were assistance distribution programs, planning and building regulations, and land governance. Informality was entangled in these policies, regulations, and practices, exacerbating the condition of the urban poor.

ASSISTANCE DISTRIBUTION PROGRAMS

In both cities, the centrality of housing tenure—in the form of registered ownership—in counting and recognizing urban citizenship, drove lower income renters and squatters into homelessness. In both cities, informality, in the forms of interpreting policies (for instance, in defining who is eligible/ineligible for housing assistance), or suspending policies (such as allocating land for squatters in Bhuj), worsened the consequences of these policies for lower income groups. This conditional defining of citizenship based on property ownership is not limited to the cases of Bam and Bhuj. Reviews of recent disasters and housing assistance programs (McCallin & Scherer, 2015) have highlighted the wholesale neglect of lower income renters, sharers, and squatters as a recurrent and persistent problem. Leaving the housing recovery of low-income renters to market forces directed them to self-help solutions or pushed them to ownership in peripheral locations with inadequate access to jobs and services, leading to a downward spiral of poverty. No technical assistance was offered for the self-help construction activities of these households. In short, the idea of “build back better” was never actualized for these households.

PLANNING AND BUILDING REGULATION

The new urban plans in both Bam and Bhuj largely repeated the common problems of urban planning in the Global South (Watson, 2009). In Bhuj, for instance, under new planning and building regulations, land parcels could be developed under a much lower regime of development rights compared to preearthquake conditions. Examples of such regulations were building setbacks and a limited permissible floor space index, where a high proportion of plots in the walled city were less than 50 m² (e.g., 61% of plots in the Khatri Falia area). These measures considerably lowered the residential space in well-located urban areas and representing what Tibaijuka (2006, as cited in Watson, 2009) has criticized as planning that sweeps the poor away.

Furthermore, neither city considered an initiative for securing land and supplying affordable housing for marginalized groups. Interestingly, in the case of Bhuj, the town planning scheme in Gujarat had the regulatory capacity to allocate land for this purpose through its land pooling and readjustment scheme (Ballaney, 2008). This capacity, however, was not utilized in the reconstruction process. Instead, the new town planning scheme ignored the preearthquake presence of those informal settlements located in prime locations in the walled city. The new development plan of the city simply stated that “most of the slums in the walled city have been affected badly due to the earthquake and have suffered a lot of destruction. There are hardly any people living there now” (EPC, 2002, p. 152). The state-led rubble removal process facilitated the expulsion of the squatters from the walled city.

LAND GOVERNANCE

Reconstruction in both the case of Bam and Bhuj was accompanied with land speculation; the local government turned a blind eye to, encouraged or even initiated, land transfers after the disaster. In Bhuj, the new urban plan introduced three new suburbs

in prime locations and housing assistance policies encouraged people to move to these suburbs. As a result, in highly affected areas of the walled city the local government, land speculators, and “higher” caste communities become the major landholders. The local authority faced difficulty in selling its plots in these neighborhoods, and land speculators only started to construct new houses around 8 years after the earthquake. As a result, 39% of plots in Sonivad were still empty in 2011. In Bam, land use change and subdivision of palm groves, which covered 70% of the city area, was banned, partly due to pressure from UNESCO, which considered these palm groves as a part of the cultural heritage of the city. In the absence of any mechanism for protecting these groves, those located in inner urban areas were abandoned with a view to the future land use change (Fig. 8.8) or were subdivided and sold out for residential purposes. In both cities and as a result of this speculative urbanism, large portions of well-located urban areas remained without any good use, while the poor were pushed to the urban periphery or to live in the inner city’s “gray spaces,” where they “are neither integrated nor eliminated” (Yiftachel, 2009).

CHALLENGING THE DISPLACEMENT DRIVEN BY INFORMALITY THROUGH INFORMALITY

Bam and Bhuj were similar in being relatively well-resourced cities after the earthquake. Therefore, the displacement and dispossession of marginalized groups was not a result of inadequate resources but their inequitable distribution. Informality exacerbated and mediated this inequitable distribution. In this final section, I explore the possibilities for averting these displacements and dispossessions in the aftermath of disasters when the state is unwilling or unable to do so. I explore these possibilities in particular by focusing on the role that planners, humanitarian actors, nongovernmental and grassroots organizations can play. In cases of major disasters, the presence of international institutions and the media can arguably open up new opportunities for these groups to hold the state and donors accountable for the dispossession and displacement of the urban poor.

Recent debates in urban studies (McFarlane, 2012; MirafTab, 2012; Roy, 2005; Watson, 2013) seek opportunities to use informality strategically by grassroots movements and their key partnership with other actors within or outside governmental organizations. Watson (2013) posits that informality need not always be negative; it can be strategically utilized to frame policies to counteract the dispossession and displacement of the poorest of the poor from well-located areas in cities. What is missing from these debates, however, is a clear direction for such practices. Urban informality often—as was the case in Bam and Bhuj—takes the form of interpreting, extending, and suspending policies and regulations. This makes its transformation difficult (Gilbert & De Jong, 2015). I argue that a rights-based agenda would offer a clear direction for challenging extralegal measures that result in the displacement of the urban poor and would place an empowering agenda on the table for holding the state and donors accountable. A rights-based agenda also fits well with the nature

Blakely Disaster Readings



FIGURE 8.8

Loss of palm groves in Mahd-e-ab 8 years after the earthquake (right) compared with the condition before the earthquake (left) (Google Maps, 2014b).

of many humanitarian agencies and is already embedded in their discourses, policies, and practices (Cornwall & Celestine, 2004). Adopting a rights-based agenda, however, requires a clear articulation of rights in the way that it reflects the urban context and the settlement-based expressions of the denial of human rights. Parnell and Pieterse (2010) offer a rights-based urban development framework, which is grounded in an understanding of the locational and settlement-based determinants of the realization of rights. They define these rights as the second and third generation rights⁵, with the second generation being linked to household-based rights, such as housing or access to water, and the third generation being settlement-based entitlements, such as access to social amenities and infrastructure. This framework captures the often-overlooked role of location- and settlement-based factors in the impoverishment of the urban poor and offers a moral platform for sustained political pressure and a strategic use of informality from progressive interest groups.

The subsequent paragraphs reflect on the application of three methods that use informality in counteracting the dispossession and displacement of the poor after disasters. While these methods can by no means transform the inequitable distribution of resources after disasters, they represent a series of attempts to advance a rights-based agenda in disaster reconstruction activities.

POLITICS OF INCLUSION

Politics of inclusion (Roy, 2009a) has attracted attention in field of planning and development studies, albeit with different terminologies such as “civic governmentality” or “deep democracy” (Appadurai, 2001). This burgeoning concept in urban and development studies is inspired by the work of organizations such as Shack/Slum Dwellers International in utilizing tools for producing knowledge, including self-enumeration, self-mapping, and self-documentation, by the marginalized groups. This generation of knowledge can present a platform for partnership with state agencies (Appadurai, 2001) and more importantly can be instrumental in advancing the rights-based agenda.

Official interviewees in both Bam and Bhuj noted that renters, sharers, and squatters were overlooked in assistance allocation programs primarily because of the often undocumented nature of their tenure. Squatters account for one-third of the urban population in cities of the Global South (UN-Habitat, 2007); in Bhuj the proportion is 40% of the urban population (Mukherji, 2008). Furthermore, tenure arrangements for low-cost rental units in these cities are often oral and undocumented. Under this circumstance, requesting formal tenure documents for counting and recognizing disaster-affected population implies a wholesale neglect of the poorest of the poor (and many more without sufficient documentation). One way of making these groups visible and less likely to be overlooked is by producing knowledge about them. This can be done even through informal mechanisms such as the testimony of neighbors and mutual identification (Appadurai, 2001). Humanitarian agencies are well placed to initiate, assist, and facilitate these processes as a part of their damage assessment operations. This can enable the poor to negotiate support and access to different

⁵First generation rights are the individual rights to health, education, etc.

external sources including technical assistance. There are limited reported precedents in utilizing this approach in the disaster reconstruction context. In Bachhau, India, a city affected by the 2001 Gujarat earthquake, a local NGO was involved with the community enumeration and mapping for squatters. Based on this information and advocacy, the authorities agreed to regularize plots and support retrofitting of their buildings (McCallin & Scherer, 2015).

INFORMAL POLITICS

Miraftab (2012) highlights the importance of informal politics and innovative practices through which “subordinate groups renegotiate their social spatial relations.” The case of Bhuj presented one example of such informal politics. As noted, the negotiation of a group of different organizations with the local authority secured land, basic services, and housing assistance for low-income renters, albeit at the urban periphery and for a limited number of renters. Similar instances were reported in Turkey and Indonesia. After the 1999 Marmara earthquake in Turkey, a cooperative was formed for renters and squatters to procure land for housing projects by government loans. It was, however, only in 2011 and after a court decision, that they were granted land with infrastructure (Arslan & Johnson, 2010). Likewise, in Aceh (Indonesia) after the 2004 tsunami, it was advocacy and lobbying by NGOs that led to the allocation of cash assistance and land to renters and squatters 2 years after the disaster (Steinberg, 2007). However, despite these initiatives securing land and housing for renters and squatters, they could not preclude the displacement of these groups from well-located urban areas.

These examples highlight the necessity of adopting a rights-based urban development agenda in informal politics. Humanitarian agencies have shown an inadequate knowledge on the complexities of urban vulnerability when it comes to land-related issues (Pantuliano & Elhawary, 2009) and the role of access to jobs and services in the urban poor’s day-to-day life. As a result, their responses to urban displacement have failed to address the issues of land rights and access to jobs and services in a systematic way (de Waal, 2009). The idea of “shelter” as a human right, without considering land and access in urban areas, has long been challenged by the urban poor with their feet by moving from poorly located donor or state-built housing in the periphery to the areas closer to urban centers.

SCALE JUMPING

Roy (2005) introduces the idea of scale jumping as “a strategic engagement with and utilising the resources and tools available at the global scales.” She uses the example of Narmada Dam in Central India, financed by the World Bank. In this case, activists pressured the World Bank, rather than focusing solely on the Indian government, for accountability toward resettlements standards. This process led to changes in the World Bank’s safeguards in its next projects. Such negotiations, she argues, indicate “the possibility of pursuing issues that are stymied and silenced at the local level” (p.155).

In disaster reconstruction processes, such as those in Bam and Bhuj, where policymaking is articulated at the national or state level, outside pressure might be viewed as an intrusion. A closer look at these policies in Bam and Bhuj, however, demonstrates that they were, in fact, highly influenced by the flow of knowledge and funding through transnational networks of donors and the humanitarian community. One example of such influence is the adoption of the owner-driven model of housing reconstruction in both cases of Bam and Bhuj, a model that is strongly promoted by the World Bank (Tafti & Tomlinson, 2015). The power of a rights-based discourse can highlight the responsibility of the donors for the negative impacts on people flowing from projects they funded. This is particularly the case when the World Bank, as the major funding source for reconstruction in major disasters in the Global South including Bam and Bhuj, views itself as being “in a position to influence post-disaster reconstruction policies” in these countries (Jha, Barenstein, Phelps, Pittet, & Sena, 2010).

International institutions, however, have made slow progress in innovating and adapting their responses to the particularities of urban environments (Pantuliano, Metcalfe, Haysom, & Davey, 2012). While the World Bank’s loan safeguards show considerations for issues such as development-induced involuntary relocations or the importance of location in rural areas, they have not yet grasped the role of location and settlements in realization of rights in cities (Parnell & Pieterse, 2010). Another problem with scale jumping is that international organizations and donors are often inert in making changes in general and in particular in cases of politically sensitive issues. For instance, in Bam the international entities were aware that women without land rights⁶ did not have any alternative for housing recovery. The UNDP (2008) briefly noted that the government asked them to contribute to the housing reconstruction of female-headed households only if they owned a plot in the city, and as a result, the UNDP excluded nonlandowners from its program.

CONCLUSION

In this chapter, I examined the uneven geography of urban reconstruction in two cities—Bhuj and Bam—and highlighted some of the distinctive challenges and paradoxes for “building back better” in cities of the Global South. In these two case studies, a focus on urban informality, as McFarlane (2012) suggests, served as a form of urban critique in that it sought to expose the ways that claims of what is formal or informal mediate the access of different social groups to resources including aid, urban land, and services. Such critique, however, cannot present the whole picture. The informality perspective highlights how different interpretations or suspensions of policies added complexities and challenges for achieving the intended outcomes, but it is less engaged with the question of whether those intended outcomes are desirable and for whom. In Bam and Bhuj, assistance

⁶Widows, according to the civil laws of the country, could not inherit land from their deceased spouses.

distribution policies, urban planning, and land governance were mostly tailored to the benefit of the more powerful segments of the population, and the informality entangled in these policies, regulations, and practices exacerbated the condition of the poor. The result was the dispossession and displacement of renters, sharers, and squatters from well-located urban areas and formation or re-formation of landscapes of informality and risk inside the city and on the urban periphery.

Also in practice, informality is difficult to challenge, given that it often takes the forms of interpreting, extending, or suspending policies and regulations. Researchers recently discussed how informality, in the forms of politics of inclusion, informal politics, and scale jumping, can be strategically utilized in the struggles of the urban poor. I argued that in adopting such strategies, there is a need for a mobilizing agenda and suggested that a rights-based approach, which recognizes the role of location in realizing human rights in urban areas, can offer a common ground for humanitarian actors. Avoiding and minimizing the involuntary relocation of property owners in reconstruction or development projects has already been included in the safeguards of international organizations such as the World Bank. Extending this idea to minimize the displacement of people without a formal ownership title, from where they live or work, however, remains a political endeavor that involves planners, humanitarian, and grassroots organizations.

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Reconstructing Vulnerability After the 2013 European Floods: Oil Damage and Recovery

9

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INTRODUCTION

An increase in disasters around the world has been observed in the past decades (UNISDR, 2015). In the Indian Ocean, in New Orleans, in Haiti, in Japan, on the east coast of the United States, and, in 2013, in Europe, there have been disasters caused by tidal waves or floods that have led to the destruction of housing and infrastructure, environmental pollution, evacuation, waves of refugees and death (Munich Re, 2015a, 2015b).

In the aftermath of these disasters, the same questions arise (cf. Gaillard et al., 2014; Kammerbauer, 2013; Rodriguez, Quarantelli, & Dynes, 2007; Sipe & Vella, 2014): why does the affected population not succeed in quickly reconstructing and returning to their homes? Or may it actually be appropriate to return to places that are at high risk at all? We take the areas of Fischerdorf and Natternberg in the Lower Bavarian city of Deggendorf, Germany, which were strongly affected by the 2013 European floods, as a case to address these questions.

We assess how local and regional emergency management and urban planning institutions, volunteer initiatives, and the impacted population have contributed to and influenced the reconstruction and inherent adaptation processes. What implications did and do the 2013 floods have for them, was risk reduction achieved, and does vulnerability play a role here?

The assessment is based on a literature review, interviews with 10 key informants, a survey,¹ participatory observation,² and site visits carried out (independently) by

¹A quantitative questionnaire survey with a sample group of 55 individuals was held in 2014. It made use of the snowball method to identify potential participants (Flick, 2012). Questions asked built upon the insight gained through the interviews with key informants and dealt with potential vulnerabilities, degree of damages of housing, insurance, and adaptation measures undertaken.

²Participant observation took place during two public events: the “Symposium Stadt Land Flut” of the BYAK (Bayerische Architektenkammer = Bavarian Chamber of Architects) on September 25, 2013, at the “Haus der Architektur” in Munich and the “Baufachtag Dingolfing,” the Building Expert Meeting of the LVS Bayern (Landesverband der Sachverständigen Bau = State Association of Expert Surveyors in Construction) on November 15, 2013, at the City Hall in Dingolfing, Bavaria.

the authors during 2013–2014 to gain an understanding of how the affected communities have rebuilt and adapted after the disaster impacts. At this point in time, the recovery process is still ongoing. Many former residents were either still in the process of rebuilding their homes or had not yet returned. Possible trauma needed to be considered to address ethical concerns of field research (O’Mathuna, 2010). Purposeful sampling was used to select the interviewees. They were approached according to their activity as representatives of particular groups, members of key organizations, or experts of a particular field of action (Flick, 2012). The written notes and transcripts served as a basis for a qualitative content analysis (Flick, 2012).

THE 2013 FLOODS IN EUROPE

In May and June 2013, a steady downpour with rainfall levels up to 300% above the monthly norm led to extremely high water levels in Germany, Czech Republic, and Austria. Germany’s Elbe and Danube rivers caused massive damage across the country. Six eastern and southern German states were hit especially hard. An emergency was declared in a total of eight federal states of Germany and 56 municipalities, leading to evacuations of 80,000 people from their homes. According to the German Insurance Association, there were 180,000 insurance claims, totaling 2 billion euros. The German Ministry of the Interior estimated damage totaling nearly 1.5 billion euros to private households and residential buildings in the federal states affected (Federal Ministry of the Interior, 2013).

As a result of the floods and the damage caused, the German Federal Government and the federal states entered into agreements on immediate assistance to implement measures in support of private households. These were to be supplemented in the medium term and also in the long term by financial grants for reconstruction. Aid for the reconstruction of damaged buildings has been administered and paid by the federal states. This is jointly financed by the federal and state governments under the Reconstruction Aid Act and through a special fund totaling 8 billion euros. The portion borne by the Federal Government for private households and residential buildings is almost 600 million euros (Federal Ministry of the Interior, 2013).

THE CASE OF DEGGENDORF: FISCHERDORF AND NATTERNBERG AREAS

After a dike failed, water levels rose in Deggenndorf to a record-breaking 8 m. The town flooded, and in Fischerdorf, Natternberg, and the abbey village of Niederalteich, buildings were 2 m underwater, with oil-contaminated water lapping at second story windows. In Fischerdorf, it took 6 days for the peak level to be reached, stretching over an area of 7×6 km. The town of Deggenndorf was no longer accessible from the motorways, as these were also flooded and had to be closed to traffic. Five thousand people in this area were asked to voluntarily evacuate their homes. Some

evacuees (with working social networks) went to stay with relatives and acquaintances, whereas others found temporary accommodation in emergency shelters (for example, civic centers or sports centers in the region). Those evacuated had to leave their pets and possessions, including items of sentimental value, photographs, and valuables, behind. There was also temporary accommodation for helpers from the Federal Armed Forces and the Federal Police. The crisis response was coordinated at the Deggendorf federal police barracks, and attempts were made to repair the breach in the embankment at Fischerdorf as quickly as possible (Kallus, 2013a, 2013b, 2013c, 2013d).

The scale of the disaster surpassed the fears of everyone involved, and it became apparent that the flood resulting from the breaching of the embankment was not the only problem. While the water was able to flow away in Niederaltaich because of the sloping topography at that location, the floodwater in Fischerdorf and Natternberg could not be pumped away until 11 days had passed. Some houses in these areas were submerged up to their roof levels. Household fittings were consequently damaged beyond repair.

To make things worse, the floodwater was mixed with heating oil and petrol from burst tanks and with animal carcasses and waste, similar to the “toxic gumbo” that caused great distress in New Orleans after the devastating Hurricane Katrina. In the case of Deggendorf, heating oil tanks had been ripped away from their anchors in residential buildings, so that the oil was spilled and spread over the surface of the water. As of now, this toxic layer can still be seen on shrubs and trees. In addition, because of the long period that the flooding lasted, heating oil penetrated the materials of the surrounding buildings. The strong odor of oil is also still perceptible in some houses. Nearly 1000 houses were affected in the wider district of Deggendorf, 600 of them in Fischerdorf and another 90 in the settlement of Natternberg. Particularly in Natternberg Siedlung, houses were predominantly built in the 1950s; the typical porous cinder block used in construction at that time is particularly susceptible to oil intrusion.

EMERGENCY ASSISTANCE

The people affected have received assistance not only from state institutions but also from nongovernmental organizations (cf. Kammerbauer & Wamsler, 2017; Wamsler, 2016). Considerable numbers of volunteers were deployed to assist the residents on the scene and to collect donations, including the “Freunde durch Helfen” (“Friends Through Help”) campaign of the Straubinger Tagblatt/Landshuter Zeitung group of newspapers, the “Deggendorf räumt auf” (“Deggendorf Cleans Up”) campaign organized by students or the citizen-led “Deggendorf Hilft” group (“Deggendorf Helps”). In addition, the Malteser relief agency staff met at the chapel in Fischerdorf every week for coordination purposes. Social media were used in particular to organize volunteer helpers and invite donations. Nonprofit organizations and charitable associations collected donations totaling more than 100 million euros, which also included financial and material compensation for wrecked household effects.

The clear-up of apartments and houses began in the second week of June 2013. Staff from the Fire Brigade, the Federal Agency for Technical Relief, and Bavarian Red Cross helped to pump away the water and clear up the debris. This work was done house by house, including removing dirt and oil. In this context, homeowners were also given assistance by the many volunteers.

The spilled heating oil covered floors, walls, and ceilings on the inside and outside with a thick, slimy coat. It took 6 weeks until oil and dirt had been removed from surfaces. As a result of the damage, complete renovation was often necessary, and buildings were possibly at risk of collapse. One thousand homes in the district had been affected, and at least 500 in the Fischerdorf and Natternberg areas were impacted (Kallus, 2013a). In addition, because of the extent of heating oil pollution and the depth to which the oil–water mixture penetrated into the affected building structure, more houses than originally hoped for were deemed inhabitable and had to be or would have to be demolished. Upon the request of homeowners, cases had to be assessed individually by expert surveyors.

RECONSTRUCTION

Regarding the financing of the reconstruction, the federal and state governments agreed to pay 80% of the reconstruction costs incurred by homeowners without insurance coverage resulting from flood damage. This financial support is provided for a period of 3 years. Money from donations was used to contribute to meeting the remaining costs and was coordinated by a local charitable donation board. In addition, there is also a hardship fund to allow complete support to be provided to those in need, managed by the administrative district office (Landratsamt Deggendorf), a regional agency that is also responsible for emergency management.

The administrative district office, the city authority of Deggendorf, and the Rural Development Office (ALE) as representative of the Free State of Bavaria coordinated their planning activities to assist those affected during reconstruction. The Rural Development Office had been involved in a project on the development of settlements in Fischerdorf, Natternberg, and Altholz before the flooding occurred. The administrative district office, as the authority responsible for disaster management, has 15 administrative officers. After the disaster, some of them have specialized in particular consequences of flooding, such as demolition of residential buildings, household effects, etc. Demolition approvals were issued and planning applications were made as early as July 2013. In addition, the city authority's building department (Stadtbauamt) was involved in surveying building reconstruction and supporting required adaptation measures.

The widespread oil pollution made the reconstruction process particularly difficult. In Fischerdorf and Natternberg, all but one of the residential buildings was heated with oil. Because of the spatial distribution of oil within the flooded area, it was not only the buildings with oil tanks that were affected but the spreading of heating oil combined with the floodwater also led to pollution in surrounding buildings.

A meeting of experts was held in Deggendorf to discuss the oil contamination in July 2013. In addition, the rural development office organized consultation and a preliminary inspection of the buildings affected, for example, to establish their structural stability. In the case of renovation, specific measures to address oil pollution are necessary, irrespective of where oil pollution occurred. Experts were appointed to advise those affected after the floods. The town of Deggendorf shared in the funding of this advisory activity, and related technical cooperation with the administrative district office began at the end of July. However, there were major problems in making personnel and time available to deal with the preparation of expert assessments, which the homeowners paid for. In addition, testing samples as part of an expert assessment can take several months.

There was a widespread need to remove layers of plaster contaminated with heating oil in Fischerdorf. Initial decontamination measures were rapidly taken internally and externally by some of those affected. In this initial action, plaster was stripped and floor, wall, and ceiling coverings were removed. However, in many cases, brown stain patches appeared through the newly applied plasterboard or plaster, which indicated persistent heating oil pollution. Quick responses taken by residents thus proved in many cases to be their disadvantage, causing additional personal and financial distress and frustration.

Professional testing of hydrocarbon content based on test drillings, which started later, was supposed to show whether pollution exceeded values posing a danger to health. If this was the case, people's entire work with clearing of debris and mud, cleaning, partial demolition, decontamination, and reconstruction had been in vain. Demolition is then the last remaining option, if possible followed by new construction on the same plot of land.

A specific condition set by the federal state to be met for new construction measures after the disaster was that replacement buildings were to be of equivalent kind and use, and 75% of the former basement area could be added to the living area. Thereby, the construction of a basement, which would contribute to the risk of flooding, should be avoided. In addition, sleeping rooms were forbidden at ground floor levels. The administrative district office as the responsible authority on site for disaster management had to ensure that the principle of equivalence is put into practice, while the city authority dealt with the authorization of the building applications.

After demolition, questions arose regarding the disposal of contaminated rubble. Refuse separation is necessary here. Demolition material polluted with heating oil is recyclable, but the costs are five times higher than for untreated building rubble. In the case of a detached house, this means that 60,000 euros must be spent on treating the building rubble. On-site visits provided evidence that this worst case scenario affected many residents. In many places, the new buildings erected after the floods already had a roof structure by the end of the year 2013. By spring of 2014, the first houses had already been completed. However, there were many vacant buildings, such as large apartment blocks or plots of land already cleared, alongside which there were heaps of demolition material. According to the regional district administration, at least 25 families who had rented their apartments had been known to have left the region.

VULNERABILITY

The assessment of the emergency and reconstruction processes has revealed different vulnerability factors, which have translated into people's (high or low) capacity to recover and adapt to future risk,³ such as:

- time availability and capacity (e.g., language skills) to deal with administrative procedures,
- social networks (friends and family) for temporary accommodation and support,
- health conditions necessary to actively engage in the recovery process,
- access to insurance and/or state compensation,
- financial assets (cash) available for rebuilding purposes,
- forms of living (being house owners or tenants),
- contacts/linkages with construction firms or other (help) organizations, and
- linkages with governmental and nongovernmental organizations and associated power structures.

The process of application for reconstruction support was sluggish among eligible uninsured homeowners. There was a great uncertainty over the future among those affected. Rumors and false information began to spread regarding who would receive funding. Residents were irritated by funding decisions, e.g., if their neighbors received assistance: “why did they get a lawn mower and we didn't?” In certain cases there were problems in submitting applications. As a result, in some cases no applications at all were made, although funding would have been possible. The application process was complicated, to such an extent that people were not able to fill out forms without help. In particular, elderly people and people with different ethnic backgrounds than the majority German population were initially quite passive in searching for assistance or even rejected financial help. Filling in applications by themselves proved problematic for many senior citizens or citizens with language difficulties. As described by one individual: “Especially elderly or people with migration backgrounds did not know how to access recovery assistance ... how to fill in the forms” (cf. [Wamsler, 2016](#)). Helpers (both from the city authority and volunteers) therefore offered support, in particular, to this group of people. In addition, practical assistance was given in everyday life, for example, driving elderly people to the shops or photocopying documents for financial support application processes. Beyond that, many of the people affected received help from family members, whereas others complained about an absence of family support. Furthermore, there was consequential harm in the form of physical and mental illnesses (including suicides), both caused directly from the disaster impacts and indirectly through the recovery process. Several residents therefore abandoned the goal of reconstruction and stayed in contaminated houses or abandoned the wish to return and moved away.

³ Similar factors have been discussed in literature by Birkmann (2006), Bolin (2007), Bürkner (2010), Cannon (2008), Cannon and Müller-Mahn (2010), Nelson, Adger, and Brown (2007), Oliver-Smith and Hoffman (2002), and White and O'Hare (2014).

However, most people affected did not make any complaints at public events, which can be seen as a sign of their resignation or mistrust in the offered assistance.

Not everyone affected was insured since some areas were not covered by insurance, or insurance policies were too costly for the inhabitants. However, it turned out that there were a surprisingly large number of people insured. At 30%, Bavaria has a relatively low degree of insured homeowners compared to other federal states, such as Baden-Württemberg. Having insurance meant that people could not apply for financial compensation from the public purse and had to wait for the insurance to pay, a process that generally took much longer. Consequently, having insurance resulted in slower recovery, leading to widespread frustration and conflicts between those affected. Insurers appeared to prefer renovation to demolition and rebuilding, so that there were borderline cases due to the contamination with heating oil, and there were cases where the insurance payouts were not sufficient to renovate a building.

Furthermore, there was a shortage of building and construction firms for reconstruction and, consequently, people were competing for their services. The costs of tradespeople and building activities rose. As described by a resident:

The waiting times presented a real hindrance in people's efforts to recover ... since processing damage analyses and compensation was slow. The analyses of the oil contamination and damages took several months... People did not know if they needed to demolish their houses or not, if they could renovate, ... and if yes, how ... And after several months of waiting, all construction firms were already contracted by others, and there were hardly any skilled labour available... This led to increased tension between all sides and stress to citizens, until today (July 2014).

cf. Wamsler (2016).

It was surprisingly found that even building firms from Passau came to Deggendorf, a town that was also badly affected by flooding. People also mentioned that assistance was not always distributed equally, especially when staff of voluntary organizations also included some of the affected population.

The problems in reconstruction faced by the owners of buildings also had consequences for tenants. Temporary alternative accommodation was needed for tenants during reconstruction. Tenants moved away and found new places to rent in the region. However, rental costs still rose after the flood. In addition, the problem emerged as to where those who decided to remain in Fischerdorf would move to. They mostly relocated within the rural district of Deggendorf, for example, and locations at higher altitudes were chosen because of the experience of flooding, while other properties were left empty.

A “virtual” tour through Fischerdorf can illustrate the differentiated vulnerability of the reconstruction process. There is an apartment block where a tenant on the ground floor has already moved away. One person is still living on the first floor of another block but intends to move to stay with his sister. The two residents of a neighboring detached house are affected by oil leaking from another building. Both are senior citizens, one of the couple being in need of care. Two neighboring families

from an ethnic minority are extremely grateful for the support given by volunteer helpers in submitting an application for a reconstruction grant, although it took them some time to gain confidence in the process. An elderly gentleman is living on the first floor of another detached house. The basement and the ceiling above are affected by oil pollution. Tests for possible heating oil penetration were performed with three test drillings per storey. The outcome was that parts of the outside wall of the basement and the ceiling above the basement room had to be demolished. While the demolition work is in progress, the owner is living on the upper floor of the house while being exposed to potential health risks due to oil contamination. Finally, there are some residents who are fully engaged in the recovery process, with little time for other duties, being both affected and volunteering for (or employed by) different organizations, including governmental and nongovernmental organizations.

The described differences in vulnerability translate to different levels of capacity to deal with hardship, financial and health impacts, administrative matters, and the ability to cooperate and engage in city–citizen collaboration for recovery and more long-term adaptation but have not been taken into account by the assistance offered.

PLANNING STRATEGIES

Planning for recovery after disaster comprises a complex field of social and spatial interrelations where an interest in betterment of existing conditions is key to reducing risk, enhancing resilience, and enabling climate change mitigation and adaptation—yet, results may be uneven (Filion, Sands, & Skidmore, 2015; Olshansky & Chang, 2009; Pelling, 2003; Vale & Campanella, 2005; Wamsler, 2014). Also in Deggendorf, attempts were made to reduce risk and to deal with the recovery problems faced. However, these did not address the identified vulnerabilities described above. There were calls for creating “green” or ecological compensation areas for new construction, developing renaturation projects, and stipulating landscapes as nature protection areas. In addition, natural gas was to be used for heating instead of oil. Reference was made to the “Flächensparendes Bauen” (“Land-Saving Construction”) alliance, with a call for greater densification and avoidance of extensive urban sprawl or large car parks for commercial estates. New urban developments and construction were seen increasingly problematic due to the resultant reduced capacity for drainage. Another result was the rural development program “Flussaue” (“Floodplain”) to upgrade the Danube waterway, and for this a sum of nearly 3.5 million euros was made available by the Bavarian State until 2017.

In general, “better” urban planning was demanded, without much specification of what this entails. There were calls for new building typologies or temporary uses that reflect risk reduction or adaptive urban planning measures in architectural terms. However, mechanisms to deal with the historic built heritage and related preservation issues were not discussed. Villages like Niedertaich, which reflect a long history of settling in these riverine landscapes, are almost entirely located within the floodplain. Some experts were more specific with their suggestions: a rethinking process is

considered necessary for building components and materials, as floods occur repeatedly. To support this process, the Bavarian Association of Experts (“Bayerischer Landesverband der Sachverständigen”) is planning to formulate rules to identify and remove heating oil damage due to flooding.

In addition, a new resolution adopted by professors of hydraulic engineering and engineering hydrology at German universities from June 2013 (Schumann et al., 2013) was concerned with the requirements to be met by structural flood protection measures in Germany. It was pointed out that settlements along rivers could not be left without engineered flood protection structures, even if they could not be fully implemented. An appeal was made to those affected to take responsibility themselves. At the same time, a professional debate was initiated: “What risks are we willing to take in the future?” In terms of technical measures, a combination of improved embankment structures and controllable polders or retention areas for floodwater was aimed for. However, this seems only appropriate transnationally, in turn necessitating parallel related governance structures. However, many residents objected to these plans. Farmers and municipalities in the Oberpfalz area formed a protest alliance with the head of the district authority and the district assembly. There was criticism that, as a result of designating polder embankments for flood protection, there would be a threat to the drinking water supply and to stable flood protection. In addition, it was feared that affected plots of land would decline in value, against the background of an increased demand for scarce land.

CONCLUSIONS

As the example of Deggendorf, Fischerdorf, and Natternberg shows, characteristics, such as age, ethnic minority status, state of health, and questions as to who is the owner of the building and who is the tenant, who receives funding or has good contacts and who does not, are empirically of great significance to how individual reconstruction proceeds. This inevitably becomes an issue of urban planning and inherent adaptation processes, which is, however, not yet addressed in practice. In the case of Deggendorf this issue was to some extent identified and addressed through cooperation between local and regional actors and nongovernmental organizations. Yet, an active participation of citizens is seemingly absent. The institutional and policy landscape as well as operational interventions to mitigate, respond to, and recover from hazards generally do not involve mutual support through collaborative arrangements between cities and their citizens.

Although vulnerability plays a major role in reconstruction, it is rarely discussed in official documents. It does not appear in documents on flood risk management in Bavaria (State Ministry of the Environment, 2013a) and is equally absent in the floods handbook of the federal government (Federal Ministry of Transport, Building and Urban Development, 2013), in the report on the June 2013 floods issued by the Bavarian State Office for the Environment (State Ministry of the Environment, 2013b) or in the cabinet report on the 2013 floods (Federal Ministry

of the Interior, 2013). It is necessary that in future more attention will be paid to this in dealing with the planning aspects of the consequences of disasters, as intended by the European Union in disaster risk management and urban planning in the context of adaptation mainstreaming (European Environment Agency, 2012; Wamsler, 2014, 2016).

Vulnerability as an important factor in urban planning is gaining in importance, when an increase in the intensity and frequency of hazards and disasters necessitates combining goals of reconstruction with aspects of adaptation. It was shown that institutional assistance for recovery can obstruct, discourage, or support citizens' efforts to recover and adapt to future risk, which involves vulnerability reduction. Whether rapid disasters or slow climate impacts—the way in which societies and cities deal with risk is essentially informed by vulnerability in a world of dwindling resources, even in developed industrial nations.

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Blakely Disaster Readings

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The Opportunity for Improved Regulations After the 2009 Victorian Wildfires¹ in Australia

10

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INTRODUCTION

The “usual” practice of the postdisaster recovery is unfortunately rebuilding in a way similar to predisaster conditions. Lately, however, more nations and communities are actively using the so-called “window of opportunity” timeframe immediately postdisaster events to implement changes in disaster prevention and risk reduction practices, including those relevant to urban planning. While it can be argued that one event is not sufficient for significant changes in decision-making, there is some evidence of gradual implementation or “buildup” of a scientific base for new regulations and the use of a disaster as a catalytic event to implement them. Using a case study of the post-2009 Victorian Bushfire season, this chapter provides an overview of relevant changes to the bushfire planning practices in the state and focuses on roles of political voices in the decision-making.

Commencing with a discussion of wildfires in Victoria, this chapter sets out the context for wildfire risk management being increasingly oriented toward urban planning and building controls over time. A description of building codes first introduced in 1991 and their eventual integration over time into urban planning mechanisms is provided. It describes the changes in these fields and raises number of political, community, and agency-related issues associated with them, particularly the opportunity for relatively rapid change. This chapter goes on to describe the interactions of state and local politics, and the interactions between these processes with technical and planning processes. To begin, the chapter commences with a description of wildfires in Victoria, Australia.

¹ In Australian settings *bushfire* is used to refer to *wildfire*; thus these terms are used interchangeably in this chapter.

WILDFIRES IN VICTORIA, AUSTRALIA

The Australian Charcoal Database demonstrates the influence of fire over a long period, beginning even from when the continent itself was first formed. Bushfires have been part of the country's ecosystem for millennia, suggesting that the country and its ecosystems have been shaped in large part by fire (Bradstock, Williams, & Gill, 2012). Thus, the likelihood of fire events in most vegetated parts of the country is a question of "when" rather than "if." More recently, the climate of Australia has become more extreme: the frequency of droughts has been increasing and cities are facing severe water constraints (Hennessy et al., 2007). Despite the fact that other natural disasters, such as floods, may take more human lives, bushfires in some regions of Australia are one of the most devastating hazards, with one of the highest economic impacts on communities in several states with the potential to destroy towns and settlements, and surrounding wildlife (Gangemi, Phillips, Stewart, Martin, & Marton, 2003; Hennessy et al., 2007; Packham, 1992). Located in the southeast of the country (Fig. 10.1), Victoria is one of the most wildfire-prone areas in Australia, and indeed the world (Australian Emergency Management Institute, 2006). Wildfires in this area are annual events, which often have significant impacts on humans, their

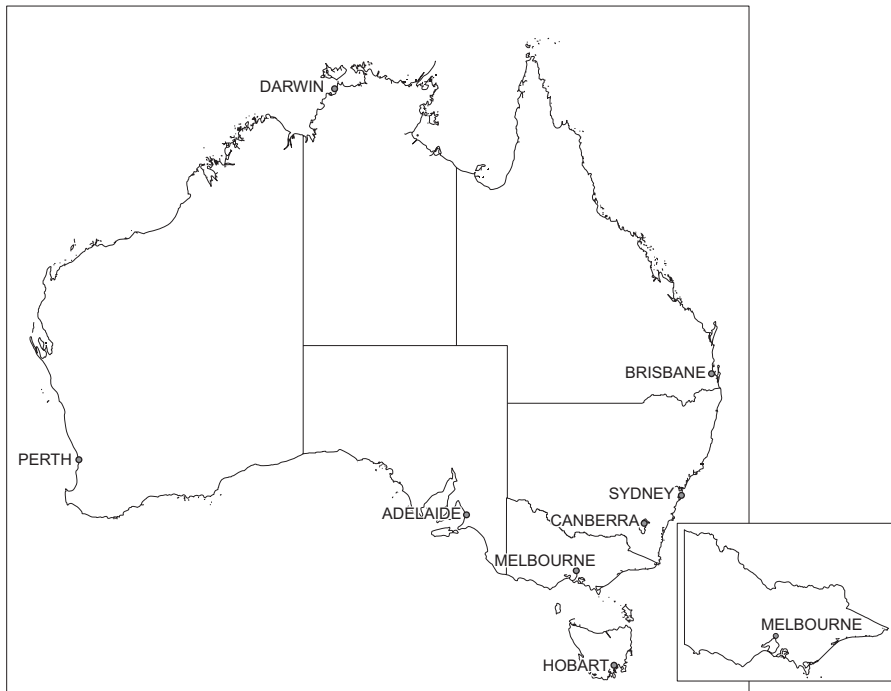


FIGURE 10.1

Map of Australia.

assets, and the environment. Over the past 110 years, for example, there have been 260 recorded bushfire events that have resulted in 825 civilian and firefighter fatalities (Blanchi et al., 2014).

BEFORE THE EVENT: THE WILDFIRE MANAGEMENT OVERLAY

For a country with such a rich fire history and significant impacts on human settlements and assets (Blanchi et al., 2014), formalized urban planning and building policies and requirements that deal with wildfire are relatively new practices, which partially explain some of their shortcomings. In 1991 Australian Standards introduced building standards, AS 3959, for construction in the bushfire prone areas (BPAs), which specifies requirements for timber-based constructions, oriented to dwellings. These standards were optional at the time of introduction and were developed by a group of science and building professionals, with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) as a leading research group included in both development and adoption of the standard. Working solely on the scientific side allowed professionals here to be separated from political and interest group aspects of this problem and to seek proper applications of science to these building and planning policies. This approach generally allows the CSIRO to stay neutral in regard to policy reform processes. Since 1991, there have been two updated versions of AS 3959, and the third undertaken after the devastating events of the 2009 Victorian Bushfire season.

This building standard became mandatory in 1994, when some bushfire risk areas were mapped, requiring all new development within the delineated areas to comply with AS 3959. These areas were named BPAs. According to a bushfire building professional interviewed, the BPA is:

a building regulation matter. So if you are in a bushfire prone area you need to then design your building to suit the particular area you're in. So depending on what the risk is. So back in [19]94 when it was first introduced, there was a strange standard and if you were in the bushfire prone area you had to design to the standard.

Professional 5 (2015)

The process of the BPA development is explained by a building professional:

The latest information we had at the time and all the science and all the details and all of the considerations had all been put in there. And that standard will continue to be updated. So we introduced that. So any new home built to the standard can now comply with the new standard. And the new standard requires you to assess the site if you're in the bushfire prone area, if you're not in the bushfire prone area don't do anything. Bushfire prone area you assess the site, establish where your bushfire attack level is, know what the level of risk, and then you apply that on the standard. The standard, whatever is the level, applies the construction requirements from the standard to your design. That is how you build a house.

Professional 5 (2015)

The BPA itself makes no provisions or requirements for landscaping or planning permits for structures (Professional 2, 2015). Moreover, the only planning regulation at the time, which partly addressed bushfire, was the Special Building Overlay (SBO). The SBO was simply a mapping-based trigger to assess a number of potential disasters and was considered somewhat ambiguous by council planners. Accordingly, to address these concerns, bushfire risks were later addressed in the Wildfire Management Overlay (WMO), which replaced the SBO in October 1997 under Clause 44.06 (Gibson, Carew, Dwyer, Jerome, & Mitchell, 1997).

The policy basis of the WMO aimed to ensure development achieved fire protection objectives that development did not increase potential threats to human lives and assets. Fulfillment of these aims was ensured by the introduction of various fire protection requirements, e.g., sufficient water supply, access to emergency vehicles, design of structure, vegetation controls, and defensible space, which serves as an area for defending the building envelope from fire front, allowing to retrieve the structure when needed (Victoria Planning Provisions, 1997). While the WMO was also map based as a “trigger,” it integrated building standard approaches with planning and urban design approaches on the basis of individual site assessments.

Implementation of the WMO was individual for each municipality in consultation with Country Fire Authority (CFA) professionals. Local councils were required to accept all conditions and objectives suggested by CFA professionals. Therefore, the guidelines provided by CFA became crucial for application and provided more details on decision-making tools for bushfire risk assessment (Victorian Bushfires Royal Commission, 2010c). This approach allowed the tailoring of mapping based on the level of risks in the given area, but it also meant that the process itself was rather costly and time-consuming; by 2009 only 35 of 82 local authorities had the WMO in place, and most of these were not extensive areas.

The WMO was applied to progressively larger mapped areas in the time period between 1997 and 2011, after which it was updated and renamed as the Bushfire Management Overlay (BMO). In the period 2006–09 the number of permit applications referred to the CFA was 2,866, with only 24 receiving objections, 88 accepted without change, and 2754 approved with permit conditions (Victorian Bushfires Royal Commission, 2010c).

THE 2009 FIRES

In 2009 the southeast region of Australia suffered the most devastating bushfire disasters among those recorded. The total amount of individual fire events reported to the CFA during the bushfire season of that year is 39,987 (Victorian Bushfires Royal Commission, 2010a) with the deadliest and most severe events occurring on February 7, 2009. Also referred to as “Black Saturday,” on that single day fires directly affected 78 communities, burnt a total of 365,020 ha of land, killed 173 people, and destroyed 2056 houses (Country Fire Authority, 2012; Victorian Bushfires Royal Commission, 2010b).

Seeking to understand the causes of such severe impacts and to develop recommendations for new practices, policies, and mechanisms to minimize risks in unavoidable future disaster events, the Australian government established the Victorian Bushfire Royal Commission (VBRC). The investigation determined that on one side of the disaster, there was a “natural” cause of fuel high levels of formation (a prolonged and severe drought in period 1999–2009, lack of sufficient rainfall, and a prolonged heat wave in the last week of January 2009) and natural causes of ignition² and vast spread of fires across the state on the day, although man-made assets were acknowledged to exacerbate fire intensity (Victorian Bushfires Royal Commission, 2010a).

In terms of the human and built environment aspects of the 2009 fires, detailed investigations revealed that urban planning and building controls applied in the state before these events were inconsistent, potentially affecting risk levels in individual communities. For example, the most severely affected townships of Kinglake and Marysville did not have the WMO in place at the time of the disaster, and most of the structures in these communities were well below modern standards in terms of bushfire risk management. As a result of the investigation, 19 of 67 recommendations were made regarding planning and building standards and were aimed toward increased consistency in mapping exercises, risk levels, and application of the policies and mechanisms across the state. Two standards that were directly challenged by the VBRC were the WMO including its accuracy and application, and building standard AS 3959.

Investigations identified a number of flaws in WMO policy and suggested revision of the overlay and policy to address them. More particularly:

For areas mapped before 2002 the WMO was applied more restrictively [meaning smaller spatial areas] than BPAs and was applied only to areas where controlling a high-intensity fire would be difficult, rather than to all areas where bushfire was likely to pose a threat to life and property;

Since July 2002 the criteria for mapping the WMO have been the same as those used for BPAs, but there has been no systematic re-examination of the WMO mapping completed before that time;

DSE [Department of Sustainability and Environment] initially opposed applying the WMO to public land – a matter that was not resolved for some time. In December 2005 the Minister for Planning approved application of the WMO to public land, but DSE notified only councils that were in the process of amending their planning schemes at the time, so this criterion was not applied to all planning schemes.

Victorian Bushfires Royal Commission (2010c, p. 219)

²With the exception of arson cases reported in the media investigations (Farnsworth, 2012; Russell, 2013).

Other identified flaws included a lack of clear bushfire objectives with a particular focus on management of native vegetation. Moreover, the WMO failed to acknowledge the availability of areas where the safety of people requires clearing land around dwellings. The WMO did not adequately allow site-tailored risk treatments and did not recognize different bushfire risk levels and behaviors in different areas. It was also suggested that water supply requirements specified for the WMO be revised due to the failure of reticulated systems in Marysville ([Victorian Bushfires Royal Commission, 2010c](#), p. 219). A lack of planning requirements for bushfire bunkers was also considered another flaw of policy because important features such as siting, defensible space, access, and egress to such bunkers are not specified. It was also recommended that there be a review of permit triggers and exemptions in relation to whether current uses that require a permit are appropriate and whether small-scale alterations to the dwelling should require permit ([Victorian Bushfires Royal Commission, 2010c](#)).

Inconsistency among municipalities regarding the use of the WMO and its relatively limited application pre-2009 is reflective of typical implementation processes in the state, which requires a series of steps. The most basic of these are mapping, ground truthing, public consultations, public panels to hear any objections, approval to proceed, council decisions, and ministerial approval. Time, costs, and unpredictability of application outcomes of the WMO in planning processes were proposed to be eliminated by introducing a single bushfire hazard mapping tool and apply it to the entire state once mapping is finished ([Victorian Bushfires Royal Commission, 2010c](#)).

Despite the flaws of the control, the WMO was nonetheless a good demonstration of a shift from using solely building code fire prevention practices in Victoria, to a more comprehensive and integrated approach, which included planning controls. While there have been some problems identified with application of the WMO, the fire events of the 2009 Victorian Bushfire season demonstrated that houses where the WMO was applied had a significantly lower rate of loss when compared to those that were not ([Holland, March, Yu, & Jenkins, 2012](#)). The WMO included slope, topography, and native vegetation in its assessment criteria, demonstrating the application of evidence or scientific base in planning mechanisms. AS 3959 provides additional information on the flammability of materials used for construction in BPAs. Research conducted shortly after the events of the 2009 Victorian Bushfire season also demonstrated that the WMO appeared to have had positive impacts on bushfire protection of houses. Loss of houses was significantly lower in areas that had undergone risk treatment as per WMO requirements, as compared to those that were not assessed and treated under earlier planning and building regulations. Data were collected in five communities: Kilmore East—Murrindindi; Churchill—Jeeralang, Delburn, Beechworth, and Bunyip. The total number of dwellings both within WMO and outside its boundaries is 4288, of which 1632 (38.06%) were destroyed during 2009 Victorian Bushfire season. Furthermore, the number of dwellings within the fire area and WMO was 1412, of which 569 (40.30%) were destroyed ([Holland et al., 2012](#)). These data demonstrated the potential of the WMO as a planning tool to reduce risks associated with fire disasters, while also demonstrating that the WMO, on its own, is not capable of providing absolute protection of dwellings; hence, additional prevention mechanisms are required.

CENTRALIZATION AND WIDESPREAD APPLICATION OF THE WMO

The effectiveness of the WMO was questioned by the VBRC authorities after the 2009 bushfire season, and this response has been widespread across the state. As a result, more rigorous and accurate mapping was developed and the WMO was updated including a new overlay introduced on May 18, 2011. The BMO is a set of planning regulations that trigger the need for planning permits in areas with increased risks for human lives from bushfire disasters ([Victoria Planning Provisions, 2013](#)).

The BMO, in contrast to the WMO, was applied in a way that resulted in a more simplified and “one-size-fits-all” manner. This resulted in some areas being deemed as highly risky but allowed for quicker, arguably less expensive and consistent applications across the state. While some might see it as a band-aid solution, the overall mapping exercise was rigorous and the tool is considered more effective compared with the WMO ([Professional 2, 2015](#)). Another difference between the two were the stated objectives. Compared to the WMO, the BMO is both more precise and also includes broader urban planning goals, such as assisting in strengthening community resilience to bushfire and identification of hazardous areas requiring special measures; ensuring location, construction and design of development considers implementation of bushfire protection measures; and ensuring priority of safety to both human life and property by reducing bushfire risks to an acceptable level ([Victoria Planning Provisions, 2011](#)).

According to the interviewed bushfire planning professional, despite some differences in “a nutshell”:

WMO to BMO is pretty much the same thing. That's all it is. It's a trigger for planning. After Black Saturday they [the state government] declared the whole of Victoria in the Bushfire Management Overlay. So if you were in Melbourne, CBD, you were in the BMO. That was just a knee jerk reaction to government.

Professional 2 (2015)

The similarity between the two tools supports the argument that the BMO remains an integrated tool of planning and building controls. However, the separate processes of BPA and BMO mapping also demonstrate a level of disparity between planning and building institutions as there is still no single map that can provide a more holistic approach and a set of solutions that BMO delivers. As stated by the interviewed bushfire planning professional, there is a need to ensure that there should be:

just one map for all Victoria, [...] and there should be the bushfire planning, [there] should be building, [there] should be prescribed burning or burning up, [there] should be community, and all of that should be one map. That's the ideal, which is not happening right now³. Which is what you've got is they're all in complete isolation.

Professional 2 (2015)

³Comment made in May 2015.

This statement demonstrates the disparity of all institutions involved in the “ideal” of integrated practice, which would include both planning and building controls. It further highlights the need to find ways to integrate these relevant institutions. The disparity between these is partially addressed when the changing roles of the agencies are analyzed, as below.

THE BMO AND REALLOCATION OF ROLES

After the 2009 fires, bushfire planning in Victoria was in a state of flux, not just in terms of regulation but also in terms of roles and institutions. A shortage of experts with knowledge in both planning and bushfire engineering science led to the employment of fire responders as the key consulting experts in the post-2009 planning assessment processes. This was later considered inappropriate, when many parties expressed the opinion that the agency was “not fit for purpose” as noted by a bushfire manager interviewed (Professional 2, 2015). Established in 1850 (CFA, 2012) the CFA is not a policy writing or advice agency, but rather they are agents “whose job is to fight fires, who have a deliberately risk-averse structure...we would never under any other circumstance go to the fire brigade and say ‘how fire safe do you want the community to be?’ because their answer will always be ‘as safe as we can imagine’” (Professional 4, 2015). Therefore, it is not only “not fair to ask the fire brigade to put risk of a bushfire in a broader policy framework” (Professional 4, 2015) but it also resulted in the development of policy that was a somewhat extreme execution of the precautionary principle, possibly breached the constitutional rights of residents and ultimately led to a backlash against the policy (Professional 2, 2015; Professional 4, 2015; Professional 6, 2015). Under the new BMO regulations, the referral authority for planning site assessments was the CFA. This resulted in a many ongoing conflicts, as the CFA’s main goal is to ensure that properties and lives are minimized, and they have rather conservative views on the risk assessment. In contrast, planners and other professionals involved sought to balance out risks with many other facets informing decision-making.

THE CHALLENGES OF APPLYING SCIENCE

Another issue associated with the new regulations was the lack of a sufficient science base for the standards applied. As discussed above, the BMO by and large is a precautionary tool, which lacks more detailed and tailored risk assessments for individual areas, particularly in light of the latest science in this area. It (the BMO) implies that levels of bushfire risks are of similar intensity across the state despite diverse conditions of the vegetation, weather, and topography. Yet, it does allow for more detailed site assessments if considerable expertise and resources were able to be applied via provisions for “alternative methods,” suggesting the potential for lowering of risks where appropriate. However, AS 3959 is required as the main requirement for development under the BMO, which in itself does not comply in all cases with the latest science.

The post-2009 development of AS 3959 illustrates the influence of power distribution on decision-making, and, more importantly, the consequences of its

unevenness. In this case, power distribution is mainly with the representatives of the timber industry (Professional 1, 2015; Professional 2, 2015; Professional 4, 2015), which has led to the self-removal of the core scientific agency from the process of development of bushfire protection solutions. Taking a step further, this example supports the idea that when two or more institutions are integrated, there is a need to address power relations (Jepperson, 1991; Meyer & Jepperson, 2000) to ensure that power, including the decision-making, is appropriately distributed. Moreover, according to the bushfire professional interviewed:

[AS3959] is a risk based assessment, which is good. The problem with AS3959 is that it's a very complex document and there's a strange standards for AS3959. On that standard you've got industry people, you've got fire service people, you've got fire scientists, you've got planners, you've got all these what we call lobby groups and none of them get on. So the people that represent the timber industry will go down a certain path because they want to make sure AS3959 doesn't affect their business. So what we do is we've got this really complex mismatch document that confuses everyone.

Professional 2 (2015)

This evidence demonstrates the strong importance of power distribution in decision-making and the need to find ways to ensure more democratic approaches toward integrated disaster risk reduction (DRR) in the ways it is actually implemented.

The CSIRO professionals involved, however, found another avenue to ensure that scientific evidence is applied in an acceptable manner from their perspective. New building controls for steel framed construction in bushfire areas were introduced in the NASH standard in May 2015 (NASH, 2015). While it is applied using similar decision and testing approaches in parallel with AS 3959, it is predicated around the use of steel framed construction rather than wood. So while the planning methods used remain the same as for AS 3959, this standard “provides a completely new position in design outcome, robustness redundancy and cost effectiveness” (Professional 1, 2015). This example also demonstrates that alternative routes should be sought for applying the latest evidence to ensure a diverse set of views and potential outcomes.

BETWEEN RISK AND POLITICAL REALITY

The allocation of CFA to the role of main consultant agency resulted in a disparity not only between perceived and real fire risks in the state but also in differences between planning and fire engineering perspectives. CFA professionals and volunteers have highly developed professional and practical knowledge of bushfire risks. While their direct involvement in the decision-making process of assessing permits under WMO appears to be logical, their knowledge varied across the state, often not reflecting accurately the overall strategies, and may have hindered balanced risk assessments. Accordingly, permits or refusals issued might not follow overall planning goals and targets that balance out risks.

Another significant drawback of the observed disparity between risks assumed under new policies and community realities was the effective sterilization of large areas of land and the inability of many residents to develop on their land. This has been considered by many as a breach of their human rights (UNISDR, 2015) leading to a significant backlash from the community. This ultimately led to some relaxation of BMO regulations under amendments presented in 2014 and discussed further in this chapter.

Importantly, the need for a permit is exempted when schedules to an overlay such as the BMO specifically state that it is not required. This includes alterations or extensions to existing dwellings less than 50% of floor area; buildings used for accommodation (excluding dwelling and dependant's person unit), which is less than 25% of the existing building area; and buildings with floor areas less than 100 m² along with the dwelling used for accommodation (Victoria Planning Provisions, 2011). This exemption, intended as a way of allowing preexisting structures to be maintained without excessive burdens on owners, also appears to be used as a "loophole" by many residents in areas with higher risk levels, meaning that ongoing development is occurring without being subject to bushfire controls. The outcome is that in many cases structures are becoming riskier over time, rather than improving.

THE GROWTH OF GRASSROOTS AND A BACKLASH

While the community backlash in this case is mainly a result of strict new policies that felt punitive to residents, the lack of community involvement in the policy development processes is another potential reason. This argument is based on the recurring comments made by interview subjects that the community was not provided with an explanation of the new policies or residents were not educated on risks and consequences of noncompliance. Another flaw of the new policy was a perceived lack of public consultation and a lack of rights to object or amend the policy to address risks in more realistic manner.

It is possible that the type of consultation undertaken plays a role in community perceptions. Some consultations were undertaken as a part of the long-term recovery stage, when the VBRC carried out 26 community consultations in 14 locations that were significantly affected by fire events. Overall attendance in the period of March 18 and April 9, 2009, was about 1200 people. These consultations aimed to provide firsthand description of people's experiences during events and gain insights as to how DDR practices could be improved. Aside from consultations, public submissions were open to the VBRC for any individual or organization with relevant information. These submissions were extended not only to the country level but also to the international level (Victorian Bushfire Royal Commission, 2009). These consultations, however, were not continued, and the community remained "in the dark" regarding risk levels and development of the detail of statutory policies. As discussed in Chapter 14 by Kate Cotter, community reaction to the policies "pushed" the minister to implement some amendments to the policies after a little more than 3 years of existing in its original form.

After increasing levels of resident opposition and activism in rural electorates, particularly in marginal voting areas, and with a looming election, on July 31, 2014, the Minister for Planning, Matthew Guy, approved further changes to the Victorian bushfire planning laws. The changes were referred to as “practical reforms for building in bushfire designated areas” (State of Victoria, 2014) and sought to ease the process of preparing planning applications affected by the BMO for landowners and to facilitate the process of assessing them for planners in local councils. The changes made to the BMO in 2014 removed some of the more stringent aspects of controls and provided more freedom and performance-based approaches to bushfire risk assessment, its prevention, and mitigation.

The explanatory report of Amendment VC109 outlines that the provisions were meant to:

allow landowners to build a new single dwelling on infill lots within an existing subdivision zoned: Neighbourhood Residential Zone, General Residential Zone, Residential Growth Zone, Urban Growth Zone, Low Density Residential Zone, Township Zone and Rural Living Zone; and replace or extend an existing dwelling in an extreme bushfire risk area. In these circumstances, applications will be required to meet an improved bushfire construction standard, but will not be assessed against the broader landscape hazard

Government of Victoria (2014, p. 2)

This and other reasons for change, however, were not considered “truthful” by an independent bushfire engineer, who stated:

So BMO 2014 was a political, directly political response to a lobby group’s opposition to BMO 2011. And the problem with that is that BMO 2014 is a less rigorous, less logical document. So for example you get, you get a discount for having a private bushfire shelter. So you say okay we’re going to look at the risk of design the house to withstand that risk. If you put a bushfire shelter in you can actually line that back one. It’s completely illogical.

Professional 4 (2015)

This statement suggests that there might be underlying reasons for some aspects of the detail of the amendments and changes to the BMO in 2014. The rationale for such assumptions can also be found in political and personal influences in planning practices and outcomes, which are set out in a range of wider scholarly literature (Flyvbjerg, 1998, 2001; Hillier, 2002; Stretton, 1989). Ideally, on identifying the reasons for changes in the BMO, implications, both real and possible, should be studied and analyzed to understand positive and negative sides of the process and suggested outcomes. However, due to the limited timeframe of the policy and need in additional development time for it to become evident, it is proposed to create models of possible scenarios of the development under BMO.

The significant changes made to all Victorian planning schemes referred to above as VC109 were introduced using a clause of the Planning and Environment Act (1987) known as Section 20(4). Thus a clause allows the minister to make changes

without consultation or opportunities for submissions or appeal, if he/she considers the matter to be of “state significance.” These changes were considered to fall into that category due to the impacts that were argued to be affecting the integrity of the planning system in terms of residents’ and experts’ faith in it.

Table 10.1 demonstrates changes across the three overlays relevant to the study. As it can be noted, there has been a rapid change between 1997 and 2011, with stricter regulations in the latter edition, while 2014 regulations are more relaxed compared to 2011, yet more detailed than 1997.

As can be seen, the changes made in VC109 could be described as minor when compared to the relatively radical changes that were made to facilitate the introduction and widespread application of the BMO after the 2009 fires. However, certain

Table 10.1 Comparison of WMO, BMO 2011, and BMO 2014 Versions

Policy	WMO	BMO 2011	BMO 2014
Defendable space	Not specified	Outer and inner	Inner
Planning integration with other practices	Some	Some	Some
Landscape type as a precondition of level bushfire defense necessary	Not specified	Yes	Yes
Vegetation control	Yes	Yes	Yes
Slope control	Not specified	Yes	Not specified
Equity of application processes	Not specified	Yes	Residential areas have simplified processes
Water supply	Yes	Yes	Yes
House specifications/ design guidelines	Some	Some	Strong policy base
Siting of a dwelling	Specified	Specified	Specified with exemptions
Life span of policy and reasons for change	1997–2011	2011–14	2014–Till date
Consistency of application	No	Yes	Yes
Building to flame zone	Not specified	No	Yes
Role of professionals	Not specified	Veto right and refusal of application	No
Total ban of development	No	Yes	No
Right to appeal	Not specified	Limited	Increased
Alternatives (e.g., bunkers)	Not specified	No	Yes

Developed by Maria Kornakova.

key features are noteworthy insofar as they illustrate political and institutional aspects of this planning provision. First, the new controls were introduced rapidly and with consultation only between limited numbers of stakeholders within key agencies, with the exception of one prominent outspoken activist. This “haste” could be attributed to the government’s desire to deal with the highly unpopular matter before impending state elections. Furthermore, the amendment included a number of inconsistencies and minor drafting errors that suggest the normal checking processes were not followed.

In essence, the changes made by VC109 modified key variables in the bushfire tests applied to new developments so that it could no longer be said that the BMO had “sterilized” land. Where previously some townships had many sites on which it was highly difficult or prohibitively expensive to build, VC109 facilitated development on previously subdivided land in high risk areas. This reduced considerably the ire that many rural township residents felt about planning controls that they considered unneeded or inappropriate. This meant that politically, the government had considerably reduced the potential for election campaigns to be run on this basis in country areas.

CONCLUSION

This overview of wildfires in the context of the state of Victoria demonstrates the significance of this natural hazard for the area, outlining some reasons for decision-making oriented to urban planning and building code changes. As stated in the introduction, this chapter shows that postdisaster recovery processes do offer significant opportunities for reforms in certain contexts. In this case the planning and building regulations that were triggered by disastrous events of the 2009 Victorian wildfire season were investigated. Widespread changes were brought about but were primarily the application of existing approaches and understandings of science that were previously underapplied. The 2009 event provided an opportunity to significantly improve the use of these factors, using them in conjunction with a number of other reforms oriented to integration and partial retasking of the activities of a number of agencies. However, these changes were not unproblematic and highlight a number of political, community, and agency culture issues.

The chronological overview of policies and regulations before and after the 2009 Victorian wildfire season provides an overview of changes that were implemented. The development of AS 3959 was the first attempt to formalize and standardize the quality of building structure in the bushfire risk areas. At the time, this standard was developed in the collaboration with CSIRO. This lead Australian agency, however, left the committee in the post-2009 review of the standard as they believed that the decision made was rushed to meet political imperatives and did not comply with the most well-developed science at the time. The development of the BPA introduced the concept of different wildfire risk levels in the state; however, these regulations were still targeted only toward building control.

The implementation of WMO in 1997 was the first exercise of planning controls dealing with wildfire risk areas in the state. While it might seem that community tailored application of this mapping exercise would have been a positive exercise, the reality of the costs associated with it resulted in its inconsistent application and lack of relevant regulations in place when disaster hit the state in 2009. The response of the VBRC to the events resulted in more rigorous and far more widespread application of a simplified version of this approach via bushfire risk area and implementation of statewide planning policies.

Subsequent development and application of the BMO was undertaken as an expert-driven approach that subsequently led to a significant community backlash, in conjunction with CFA officers being required to take on assessments that were often beyond their abilities to judge acceptable risks in a wider way. The subsequent grassroots backlash brought about ministerial intervention as a form of “adjustment” that found a middle ground to ensure communities could continue to grow without excessive impediment.

Overall, the Victorian case and the changes that were implemented is not only an example of disaster as a trigger of change but also can be considered a relatively successful example of how the political processes can be used as adjustment mechanisms for planning.

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Toward Sustainable Disaster Recovery by Seeing It as “More Than a Roof Overhead” *

11

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MORE THAN A ROOF OVERHEAD

Disasters present extremely challenging circumstances to humanitarian agencies and professionals. The tasks of postdisaster reconstruction and recovery are demanding and include a wide range of activities as clearing and sorting the vast amounts of debris and rubble for possible reuse; reestablishing water, power, and waste services; ensuring temporarily housing the severely displaced; and planning their long-term homes while dealing with the intense grief and psychological traumas of the disaster victims. These challenges continue to become more complex with the ongoing global changes of urbanization, environmental degradation, and climate change. What constitutes *the* “disaster,” however, should not be seen as limited to just the physical and financial damage left by the increasing number of floods, tsunamis, earthquakes, and typhoons, such as that we have witnessed globally since the 2004 Indian Ocean tsunami, one of the most severe disasters in recent history, which again brought a global focus on these events. Underpinning these impacts and, indeed, exacerbating them are sources of social and physical vulnerabilities, such as systemic poverty, political neglect, inappropriate zoning, altered land uses and landscapes, and a lack of long-term investment in adequate health and educational infrastructure. Such factors are critical in framing both the problems of, and successful approaches to, rebuilding vulnerable communities.

The impacts of an extreme (un)natural disaster are most commonly measured in terms of lives lost, houses damaged and destroyed, people displaced and homeless, and the consequent financial cost (UNISDR, 2015). With shelter being an immediate need, housing—from emergency to transitional and permanent shelters and homes—is a primary and early task for humanitarian and recovery workers. Unfortunately,

*The case studies in this chapter were drawn from a book by the authors (Charlesworth & Ahmed, 2015). The research for the book was originally funded by a Future Fellowship awarded by the Australian Research Council to Charlesworth in 2011.

and very often, the housing that results is often inappropriate in design, unlivable in terms of local climatic conditions, built with inappropriate and often imported materials, fails to provide employment for displaced people during construction, and neglects the services and industries needed for long-term recovery (Haiti Grassroots Watch, 2014; Sadiqi, Coffey & Trigunarsyah, 2012; Schuller, 2016). This is despite copious advice on policies and strategies for building resilience during recovery and guidelines for sustainable community development and housing construction issued by international agencies and academic researchers (Davis & Alexander, 2016; IFRC, n.d.; Lyons, Schildermann & Boano, 2010).

The term “more than a roof overhead” is taken from Newman (2002) who argued that the provision of housing for marginalized and displaced people, indigenous ones in his case, should seek to provide both shelter and nonshelter outcomes, with the latter including opportunities for family stability, improved health and education, and employment. Acquilino (2011) uses the term “beyond shelter” to connote the same meaning, whereas Davis and Alexander (2016) uses the term “holistic and integrated recovery.” This chapter extends Newman’s metaphor to argue that postdisaster recovery should aim to provide not only shelter but also the built, social, and economic infrastructure to mitigate preexisting vulnerabilities and support successful long-term recovery—the dual goals of “building back better.”

This chapter uses two case studies to illustrate how addressing the intersection of the sources of vulnerability and the impacts of a disaster can frame the processes of recovery. The case study communities, a village in Sri Lanka and a city in the United States, were both severely impacted by (un)natural disasters after long periods of poverty and neglect. The case studies have been selected to demonstrate the complexity of housing reconstruction and the importance of approaching reconstruction challenges through the lenses of “more than a roof overhead.” This, perhaps, is what sustainable disaster recovery means.

The case studies suggest that success will be limited if the recovery of vulnerable communities focuses solely on rebuilding houses without adequate attention being also paid to rebuilding the social and physical infrastructure of a community. When reconstruction projects achieve sustainable outcomes—that is, when communities and not just buildings are rebuilt, when infrastructure needs are considered at the same time as housing needs, and when people make genuine input into the design of their homes and communities—these are the types of projects that can offer valuable lessons for action following future disasters.

The case studies examined in this chapter are:

1. **FoG Villages, Sri Lanka:** After the 2004 Indian Ocean tsunami, the Foundation of Goodness (FoG) undertook a housing resettlement and civic infrastructure program in Seenigama on the southern coast as part of a long-term community development initiative for communities severely affected by the tsunami.
2. **Musicians’ Village, USA:** Hurricane Katrina in 2005 spurred a participative reconstruction program by Habitat for Humanity in New Orleans, building a Musicians’ Village to resettle the musicians of this city with a strong musical heritage.

While implemented in different geographic contexts and by different agencies, both projects were atypical of the many projects initiated in southern and eastern Sri Lanka and New Orleans and other Gulf communities. In terms of “more than a roof overhead” success in both these projects, it resulted from linking the physical products of reconstruction to a wider set of community and institutional processes. The next two sections of this chapter provide the case studies. These are followed by a conclusion that synthesizes the challenges encountered in this approach.

CASE STUDY 1: RECONSTRUCTION OF A TSUNAMI-AFFECTED COMMUNITY, SEENIGAMA, SRI LANKA

Context/Crisis	Indian Ocean tsunami, 2004
Location	Seenigama, Galle District, Sri Lanka
Type of project	Resettlement and housing reconstruction of tsunami-affected communities
No. of houses	153 houses of varying designs
Cost per m ²	Sri Lankan Rupees 8000 (about US\$80)
Date completed	December 2007
Implementing agency	Foundation of Goodness (FoG)
Donors	<i>Aviva Village</i> : AVIVA-UK and WNS Customer Solutions—Sri Lanka <i>Perth Village</i> : Perth City Council, Australia <i>KPMG-LOLC Village</i> : KPMG-UK and LOLC-Sri Lanka <i>Victoria Gardens</i> : State Government of Victoria, Australia

The village of Seenigama, near the towns of Galle and Hikkaduwa, is located on the southern coast of Sri Lanka. Its low-lying landscape coupled with the mining of limestone from the protective near-shore coral reefs led the tsunami to have a particularly catastrophic impact on the district. The recovery process in Seenigama was unique in Sri Lanka in that the implementing agency, FoG, was already situated within the affected community. FoG was founded in 1999 by Kushil Gunasekera, the son of a local landowner. Before the Indian Ocean tsunami in 2004, FoG provided community services, such as English and computer training, sports opportunities, a maternity clinic, and water and electricity supplies. In addition to family funds, Gunasekera was able to catalyze several international firms and agencies—from his business and sporting contacts—to support the various community development initiatives that FoG initiated.

After the devastation of the Indian Ocean tsunami, FoG marshalled previous partnerships, as well as new ones, to rebuild the Seenigama community. Four resettlement “villages,” consisting of 153 houses and supporting community infrastructure and services, were constructed in the area surrounding FoG headquarters in Seenigama.

In all, FoG built 625 new houses and repaired 401 others in Seenigama and nearby villages. This case study deals with the villages around the FoG headquarters.

In most postdisaster housing reconstruction projects, not only after the tsunami in Sri Lanka but also, indeed, in most parts of the world, it is common for implementing agencies to be external to the country or based away from the project site. They tend to stay for a limited time to implement their projects and then move on to new humanitarian emergencies elsewhere (Alexander, 2013). On the other hand, FoG was a local nongovernmental organization under Sri Lankan leadership and deeply embedded within the local culture and economy. This allowed FoG to readily appreciate local needs, to consult widely and effectively about local goals for recovery, and to build on the trust and social capital it had been instrumental in establishing. It also enabled FoG to sustain its work beyond the postdisaster relief and transitional stages of reconstruction.

Additionally, FoG's work encompassed a wide range of initiatives beyond the construction of new housing. Following an integrated postdisaster community development approach, FoG was able to address predisaster vulnerabilities to support long-term development and resilience. For example, when an international telecommunication company offered to fund a training center in Seenigama, FoG negotiated for scuba and underwater construction (e.g., of piers and ports) to be the focus of training, thus providing alternative employment for the coral divers who had been driven by lack of other opportunities and skills to damage the local fringing reefs. As a result, the further weakening of the reef as a safety barrier was prevented, stabilizing physical infrastructure for resilience. A women's training center, specializing in office and computer skills, home and childcare, retail sales skills, and textile crafts, was also established as a kindergarten and a national center for sporting excellence (which drew further financial support from overseas sporting associations and clubs).

The four "villages," of varying sizes and house designs that were constructed, were conceived within this community development approach. For the largest village, Victoria Gardens, Global Modular Housing Pty Ltd, a Melbourne-based housing supplier, was contracted by the Victorian Government to design and manage the project. However, the site plan was developed by DPM Consultants, Sri Lanka, led by their Principal Architect Jayantha Bandara. Various Sri Lankan-based architects, engineers, and subcontractors were appointed throughout the Victoria Gardens and other village projects.

The four posttsunami housing "villages" built by FoG in Seenigama include:

- **AVIVA Village:** A group of 10 single-storey detached houses supported by a community center, computer and English training center, library, a maternity clinic, and a playground. This village was funded by AVIVA-UK and WNS Customer Solutions-Sri Lanka.
- **Perth Village:** This was a cluster of nine single-storey detached houses next to the AVIVA Village, which benefitted from the community facilities of AVIVA Village. This village was funded by the Perth City Council, Western Australia.

- **KPMG/LOLC Village:** This was a group of 50 single-storey detached houses together with a community center, a water supply tower, a library, and a playground. In all, 25 houses were funded by KPMG-UK and 25 houses by LOLC-Sri Lanka.
- **Victoria Gardens:** This was a planned settlement of 84 two-storey duplexes laid out around a central community area that included a community center, a water purification plant, a sewage treatment plant, and a playground. The project was funded by the State Government of Victoria, Australia. This was FoG's largest resettlement project and was built on newly acquired land to rehouse tsunami-affected households that had lost their coastal property because a government declared posttsunami "buffer zone" policy prevented rebuilding close to the coast.

A variety of house types were built in the FoG projects. The earliest houses were single-storey models, the evaluation of which provided lessons for the building of Victoria Gardens. For example, one issue that was particularly significant came to be a preference for two-storey houses. Interviews with some of the residents of the first three villages found that they would prefer a two-storey house due to fear of future tsunamis. Thus, several house designs were offered to potential residents of Victoria Gardens and after wide discussions the designs selected comprised two-storey, two-bedroom houses in a duplex arrangement (see Fig. 11.1). This design option gave the residents greater safety (structurally strong concrete slab and wall construction, with the upper floor level above the height of the recent tsunami) should they experience another tsunami.



FIGURE 11.1

A view from Victoria Gardens showing the housing laid out around a central community area and playground.

SUCCESS FACTORS

The success of the projects in Seenigama was driven largely by the strong role played by FoG and its long-term engagement with the community. These resulted in five foundations for physical and social resilience and included the following:

- *Diversity in housing layout:* Each of the four “villages” had a unique character, with a clustering of similar houses. Although the house plans were similar within each village, site planning allowed for variety. In Victoria Gardens, for example, the duplexes had different orientations, different external color schemes, and different roof shapes.
- *Community infrastructure:* The houses were built as part of a system of community infrastructure that supported the important physical and social needs of the community. This included paved roads within the sites; power and street lighting; reticulated treated water supply from deep wells on-site; and a reticulated sewerage system, including an on-site tertiary treatment plant in Victoria Gardens.
- *Maintenance:* Unlike most agencies that had implemented posttsunami housing reconstruction projects and then left the beneficiary community behind, FoG continued to support the maintenance and upkeep of its housing and infrastructure projects. Communal areas such as playgrounds and open spaces were regularly maintained by mowing the grass and trimming bushes; cleaning the drains; and repairing roads as required. This sustained and contributed to consolidating the resilience of the community and the housing system.
- *Embedded within the community:* After the many international agencies, which came to assist Sri Lanka, had completed their housing projects, they concluded their operations in the area. Very few maintained any link with beneficiary communities. FoG, on the other hand, was embedded within the community and, after implementing the posttsunami housing and infrastructure projects, continued to support the community with a range of neighborhood services.
- *Integrated community development:* The final and, perhaps, key success factor was the integrated community development approach followed by FoG. There was clear understanding that building houses alone was not sufficient; housing had to be backed and sustained by a range of elements, both physical (e.g., roads, water, electricity, sanitation) and social (e.g., education, livelihoods, sports). The FoG housing projects had been implemented with the infrastructure necessary for community functioning and services and were sustained by a wide range of community development activities. Located around the FoG building, such activities included training, employment and cultural services, such as computer and English training, and other forms of vocational and business skills training—preschool, medical center, library, scuba diving training center, and sales outlet for products made by women with FoG’s support. Sport was seen as an integral part of children and youth development, and a variety of opportunities were provided within the Seenigama community, including a swimming pool, cricket ground, gymnasium, and a training center of excellence for youth (Fig. 11.2).



FIGURE 11.2

Beneficiaries of FoG who with a house regained their livelihoods—traditional dancing lessons and a grocery shop run from the house.

CASE STUDY 2: MUSICIANS' VILLAGE, NEW ORLEANS, USA

Context/Crisis	Hurricane Katrina, 2005
Location	Upper Ninth Ward, New Orleans, Louisiana, USA
Type of postdisaster project	Integrated housing, recreation, and music center
No. of houses	72
Cost per m ²	US\$100,000 per house Total cost including duplexes for the elderly, a children's park, and the Ellis Marsalis Music center is US\$20,726,500
Date completed	2008
Implementing agency	New Orleans Area Habitat for Humanity (NOAHH)
Donors	Funds contributed by NOAHH and the First Baptist Church and also raised from various other sources

When Hurricane Katrina struck the US Gulf Coast on August 29, 2005, the city of New Orleans, Louisiana, felt the maximum brunt of the fierce winds and flooding and the impacts extended for hundreds of kilometers along the coast to the east and west, as well as inland to the north. Hurricane Katrina brought about the deaths directly or indirectly of more than 1800 people, almost 80% of whom were in New Orleans. Katrina also injured more than 5000 others and caused damage worth over US\$100million. More than one million people were displaced. Over one million housing units were damaged, more than half of which were in Louisiana. Mississippi

was the next most affected state where more than 220,000 houses were damaged (see [Blake, 2011](#); [Liu, Anglin, Mizelle, & Plyer, 2011](#)).

The extensive destruction of dwellings made rehousing a priority for those who had suffered property loss. Initially, temporary accommodation was provided in caravans (“FEMA trailers”) by the Federal Emergency Management Authority. These were, at best, a short-term solution and the development of permanent housing remained a primary need. One of the first design solutions was “Katrina Cottage.” This was around the same size as a FEMA trailer (28.6m²) and was made of lightweight materials that could be easily assembled on-site. With plans and provisions for future extension, this became a widely adopted housing option ([Alter, 2008](#)). The Katrina Cottage design also influenced the housing built in the following case study of the Musicians’ Village.

However, housing reconstruction efforts post-Katrina were quite diverse with many significant initiatives from the government, business, and philanthropic sectors. One initiative was the Make It Right project. Initiated and funded in 2007 by the actor Brad Pitt, Make It Right engaged 21 (mostly) renowned architects to design houses for residents from one of the most ravaged areas of New Orleans, the Lower Ninth Ward (see [Feireiss, 2009](#)). Incorporating a variety of innovative designs, the houses were well built, responsive to flood risk, and energy efficient. By 2013, 90 out of the planned 150 houses had been built. However, the architects chose different design forms and construction systems, thus raising the price of many of the houses beyond the reach of most of those who that lived in the area pre-Katrina ([DePillis, 2013](#)). This made bringing people back to the Lower Ninth Ward a significant challenge, along with insurance and proof of tenure issues for many. After Katrina many of the residents left, and with the stigma of being a poor neighborhood lacking in infrastructure and amenities, the revitalization of the area was difficult.

In fact, poverty was widespread in New Orleans before the hurricane, with African–American communities among the poorest. Many of them, including many of the musicians in this city of a longstanding music tradition, were concentrated in the lowest, most flood-prone areas such as the Lower Ninth Ward ([Logan, n.d.](#)). Not only these communities were the most exposed and vulnerable to the hurricane, but low levels of car ownership among them, poor public transport, and the lack of adequate evacuation plans also made them vulnerable among the most severely impacted. The Musicians’ Village project was among a number that targeted the reconstruction needs of such communities. Instead of only building houses, the project aimed to build a community, indicated by its name, “Musicians’ Village.” This was linked to its other aim of preserving the local music heritage, thus going beyond only housing reconstruction.

The idea of building a Musicians’ Village in the Upper Ninth Ward came from New Orleans musicians, Harry Connick Jr. and Branford Marsalis. The New Orleans Public Schools Board played an important part by selling the land at nominal cost while substantial funding came from philanthropic donors, musicians who played concerts for the project, and two local community organizations. A year before Katrina, the First Baptist Church of New Orleans began plans to build 40 houses in the area under the name of the Baptist Crossroads Project (BCP). After Katrina, BCP merged with the NOAHH to implement the Musicians’ Village project.

The Musicians' Village encompasses five city blocks and consists of 72 detached houses, 5 duplexes for elderly residents, the Ellis Marsalis Center for Music, and a children's park (Fig. 11.3). The detached houses, whose style often



FIGURE 11.3

Sketch showing layout of the Musician's Village.

Courtesy of Kate Ryle

resembled the traditional “shotgun house” design of southern United States, were for sale on 20-year, no-interest mortgages to musicians and their families. Purchasers also had to make a 350-h community service or “sweat equity” contribution. Approximately 100 sq.m. in size, each house offered residents a choice of facades and the opportunity to paint the exteriors and interiors with colors of their choice. There was also an opportunity to make small adjustments to the room layout and position of doors and windows, as well as the colors of carpets, countertops, trim colors, and tiles.

Five duplexes were built for renting to elderly or retired residents. These were grouped facing a side street, with each duplex having two residential units with separate entrances. The duplexes followed codes and standards for elderly and disabled people and included wide doors for wheelchair access, grab rails, and accessible positioning of electrical outlets. These homes were built by more than 120,000 Habitat for Humanity volunteers coming from many different places to support the project.

A children’s park was also designed and constructed as a central community facility. In addition to children’s recreation (child-friendly equipment and soft landscaping to prevent injury), the park also offers a meeting and relaxation space for adults.

The Ellis Marsalis Music Center was built for the education and performance of local musicians. It is centrally located in the Musicians’ Village and provides over 1500 sq.m. of classrooms, recording studios, and a 170-seat performance theater. While it caters mainly to residents of the Musicians’ Village, it is open to other musicians and, thus, serves as an important hub of New Orleans’s musical heritage (Fig. 11.5).

SUCCESS FACTORS

The success of the Musicians’ Village project was due to a combination of factors that contributed to physical and social resilience and included the following:

- *Cultural cohesion:* The design of houses was derived from the style of vernacular New Orleans housing. This made them attractive to potential residents. The many choices that allowed homeowners to personalize the houses helped to develop a sense of ownership, while the goal of having 80% of residents involved in the music industry gave a sense of purpose and direction for community life. The wide range of age groups—from children to the elderly—that were catered for is added to community cohesion. The involvement of residents and volunteers in the construction of the project contributed to the enrichment of social capital within the Village and with people from other parts of the city.
- *Integration with community facilities:* Although the focus was on housing, community facilities such as the music center, elderly residences, children’s park, and a thrift shop allowed the project to demonstrate the value of being “more than a roof overhead” (Fig. 11.4).



FIGURE 11.4

A house of a rhythm-and-blues piano player in the Musician's Village.



FIGURE 11.5

The Ellis Marsalis Center for Music, a focal point of the community.

- *Disaster risk reduction:* The project area was flooded by Katrina. However, the construction of a new levee nearby helped to create a safe place to build. Houses were also built more than 30 cm above the FEMA base flood level, which involved a raised platform floor and a flow-through concrete block base for all homes. International building standards for wind-resistant structures and windows were also followed. This meant that there was no structural damage to the Musicians' Village from Hurricane Isaac in 2012 although nearly 60,000 houses were damaged across southeastern Louisiana.

- *Support to the local economy:* Even though there was no direct economic support component other than the “soft” loan terms, the large number of volunteers who came to build the project and stayed near the site brought income to local businesses. For example, two restaurants in the vicinity flourished during the construction. In addition to the sale of building materials, it was estimated that nearly 3500 jobs had been created by NOAHH in New Orleans since 2006.

KEY LESSONS

The Seenigama and Musicians’ Village projects offer valuable lessons for using the “more than a roof overhead” approach to postdisaster reconstruction. While some of these lessons are context specific, there are also many that have wider relevance to housing reconstruction after disaster.

- **The first lesson concerns the key message of the need to integrate housing with community infrastructure:**
Postdisaster reconstruction must go beyond building new houses to replace those damaged to an integrated approach where a range of other elements are provided, particularly community infrastructure and facilities such as roads, water, sanitation, electricity, schools, community buildings, and parks. In Sri Lanka and in the United States, because of the vastly differing level of public services and infrastructure, this was not a key undertaking of the implementing agencies; nonetheless in the Sri Lanka FOG project, community infrastructure, including roads, utilities, playgrounds, and community buildings, was a vital element.
- **Secondly, reconstruction should support livelihoods and the local economy:**
The opportunity to earn a living is essential for those affected by disaster. Throughout discussions with disaster-affected communities during fieldwork for this research, the regeneration of livelihoods was emphasized as being as great a need as housing. In many communities, the house can also be a workplace for home-based livelihoods, especially for women. Most of the implementing agencies supported livelihoods as part of their housing reconstruction initiatives, through mechanisms such as skills training, provision of equipment, the necessary infrastructure for a livelihood, start-up supplies, or through cash-for-work and/or sweat equity schemes. In addition, the reconstruction projects supported local economies through the creation of jobs and marketing opportunities for a range of local building product suppliers and producers.
- **An important third lesson concerns the need for widespread multistakeholder engagement:**
The complexity of postdisaster reconstruction demands the involvement of a wide range of stakeholders and professionals in projects. Associated with this is the involvement of community organizations that have been in the affected areas for long periods. They understand community history and culture, are

known and trusted, and are skilled in working in facilitative ways. This brings choice, a sense of direction, a sense of ownership, and a sense of ongoing involvement and responsibility. An increasing emphasis on multistakeholder engagement can be expected in the future as disasters become more complex and the global forces of climate change and urbanization continue to create unprecedented challenges.

- **A fourth lesson concerns the issues of replicability and upscaling:**
A key question, articulated by a staff member of one of the implementing agencies in this study, was, “Are we creating islands of benefit in a sea of widespread deprivation by such projects?” These case study projects do indicate possible future directions for effectiveness in rebuilding after a disaster, but there is yet much to be done in widely replicating and scaling up their successes.

CONCLUSION

The analysis above of postdisaster housing reconstruction is drawn from extensive empirical field-based research across two countries that examined the performance and outcomes of postdisaster housing reconstruction projects in countries from the Global South and North. The lessons drawn from the two case studies aim to assist agencies working on future postdisaster reconstruction projects. By focusing on housing reconstruction alone, without the complementary rebuilding of civic infrastructure and the strengthening of local livelihoods and capacity, ultimately leads to very limited long-term development outcomes. As the title of this chapter suggests, building “more than a roof overhead” is critical to the long-term rebuilding of resilient communities after disaster.

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Resilient Housing Reconstruction in the Developing World

12

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INTRODUCTION

Housing is often the most valuable and important asset for many people, and its principal role is to provide protection from the elements of nature. Disasters throughout the world often impact severely on housing, and it is usually the most visible element that is damaged or destroyed. Rapid onset disasters such as earthquakes and cyclones cause significant devastation to housing, often leading to loss of this valuable asset; slow onset disasters such as floods and bushfires often displace people from their homes and can also cause destruction (CMC, 2015). Displacement or loss of housing makes people vulnerable to possible aftershocks or to the climate—rain, snow, heat, etc.—compounding the effects of the disaster and hence impacting household and community health. Thus, there is the need for resilient housing to safeguard people from disaster risks and impacts.

Developing countries¹ tend to bear the brunt of disaster impacts, with the poor there often being the most severely affected (Hillier & Nightingale, 2013). Asia, the continent with the highest population and where the majority are developing countries, experiences the greatest disaster impacts in terms of number of disasters, economic damage, and numbers of people killed and affected (ADRC, 2014). Taking only one year, 2010, there were 144 recorded disasters in 30 Asian countries (ADRC, 2012). Table 12.1 shows some selected developing countries where recent disasters have devastated large numbers of housing, indicative of the precarious and life-threatening living circumstances of the great majority of the world's people.

Because of the physical nature of housing, it is particularly vulnerable to disasters, often representing the greatest share of loss in the total impact of a disaster on the economy (Lyons, 2009). For example, in the 2004 tsunami and earthquake in Indonesia, one of the biggest disasters in recent times, the housing sector experienced

¹The appropriateness of the term “developing” country or world has been debated and alternative terms—Global South, Majority World, etc.—have been suggested by different parties. It has been used here because of its widely understood meaning to signify countries with low socioeconomic and human development levels.

Table 12.1 Impact of Disasters on Housing in Selected Countries

Country	Disaster	Year	Housing Destroyed/Damaged	Sources
Bangladesh	Cyclone Aila	2009	616,000	IFRC (2010a)
Fiji	Cyclone Winston	2015	31,200	UNOCHA (2016)
Haiti	Earthquake	2010	293,383	United Nations (2012)
India, Indonesia, Maldives, Seychelles, Somalia, Sri Lanka, and Thailand	Indian Ocean earthquake and tsunami	2004	414,935	Disaster Watch (2006)
Nepal	Earthquakes	2015	785,075	UNOCHA (2015)
Pakistan	Floods	2010	1,608,185	ADB and World Bank (2010)
Philippines	Typhoon Haiyan/Yolanda	2013	1,079,452	Pacific Disaster Center (2013)

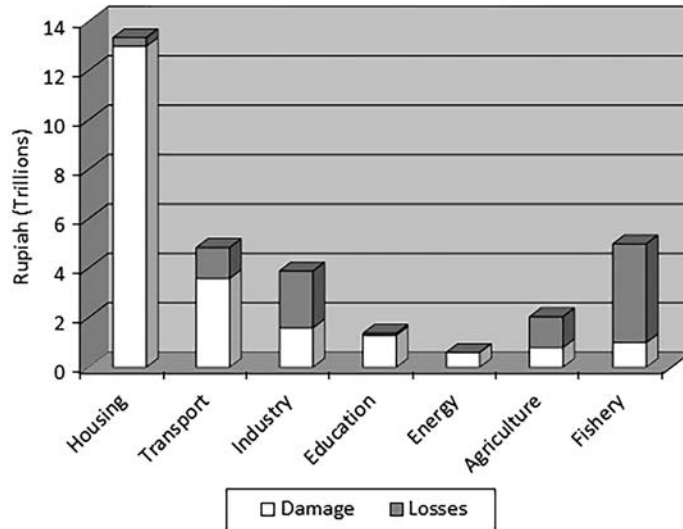


FIGURE 12.1

Impact of the 2004 Indian Ocean tsunami on different sectors in Indonesia; note the proportionately much higher impact on the housing sector.

Adapted from Marti (2005).

maximum economic damage (Marti, 2005) (see Fig. 12.1). In developing countries particularly, the impact of disasters on the built environment is much higher than in developed countries, estimated at more than 20 times in magnitude (Barakat, 2003). Many agencies from prominent bilateral and multilateral bodies to grassroots

nongovernmental organizations have begun to take disaster resilience² seriously; however, this is yet to converge more strongly with the housing sector in developing countries.

POSTDISASTER RECONSTRUCTION: AN OPPORTUNITY FOR BUILDING RESILIENCE

The increasingly frequent and massive disasters in recent history have necessitated large and extensive reconstruction programs by a wide range of agencies worldwide, particularly after the Indian Ocean Tsunami in 2004. Housing in developing countries is often most visibly and extensively devastated by disasters and thus in many postdisaster recovery programs, the majority of resources and main priority is allocated to shelter and infrastructure reconstruction compared to other sectors (Lang, 2008). Most country-specific guidelines and initiatives for safer buildings have arisen after major disasters such as earthquakes and tsunamis (ERRA, 2006; NHDA, 2005). In places where disasters are frequent and recurrent, such as floods in Bangladesh, or typhoons in Vietnam, resilient housing initiatives are high on the agenda of agencies (Ahmed, 2005, 2016; Ahmed & Charlesworth, 2013; Tro, 2011).

During reconstruction, there is the opportunity to understand and thereby address and overcome the underlying vulnerabilities that had previously prevented resilient housing construction and the risks that threaten durability and sustainability of housing. Based on local knowledge and participation, building housing back to a better standard that is less vulnerable to context-specific hazards can contribute to reduced disaster risks in the long term (Lyons, Schilderman, & Boano, 2010). The involvement of people from the area allows understanding the nature of local risk and accordingly design housing that mitigates the risk. Reconstructed or rehabilitated housing with future risk in mind can prove more resilient. To provide a few basic examples: incorporating earthquake-resistant construction elements such as bracings and struts can reduce future earthquake risk; or building raised shelter in flood-prone areas can protect them from damage.

WIDER LINKAGES

In addition to the above-mentioned technical aspects of resilience, it is important for agencies implementing housing reconstruction projects to take into account a range of social, cultural, political, environmental, and other issues, requiring a sustainable and holistic approach to building disaster resilient housing. As opposed to merely

²Resilience is a broader term including a wide range of shocks and stresses (Rockefeller Foundation, 2016), whereas disaster resilience is concerned with the capacity of people and systems to withstand and/or to resist the impacts of disasters and be able to recover easily (UNISDR, 2009). It includes physical “hardening” (Valdes, Amaratunga, & Haigh, 2013) as well as softer aspects such as social capital (Aldrich, 2012).

constructing houses via the provision of funding, agencies need to ensure that design and technical support is provided and the construction is supervised and monitored—and also be aware of constraints that may prevent the implementation and uptake of resilient construction methods. The network of relationships within communities, contributing to their social capital, can often be a key element in resilient postdisaster reconstruction and recovery, as argued by [Aldrich \(2012\)](#) in a variety of contexts.

A study on mainstreaming disaster risk reduction ([Wilderspin, Barnham, Gill, & Lockwood, 2008](#)), where the author was a team member, highlighted that during housing reconstruction the main thrust of the intervention should be to build back better so that the repaired or new housing is safer and more resilient, and at the same time local capacity is developed for constructing, replicating, and maintaining such housing. This should be implemented within a framework of local risk assessment, improvement of local building practices and skills, support to local industry and employment, development of improved and more resilient building materials and techniques, and preparedness and contingency planning for subsequent disaster events. Agencies implementing housing reconstruction projects need to be aware of the balance between the provision of housing and ensuring technical support and capacity building. Together with technical assistance, attention has to be paid to ensure a strong degree of skills transfer and development, leading to building the capacity of homeowners, local professionals, and builders, as well as increased market opportunities for local suppliers and construction workers.

LIVELIHOODS: A VITAL LINK

The link between housing and livelihoods is important and contributes to the sustainability of a housing project, especially to achieve disaster resilience. Often evident in postdisaster situations, affected people tend to prioritize housing as their most urgent need together with livelihood regeneration ([Delaney & Shrader, 2000](#); [Skinner, 1991](#)). Beside a house being a workplace and having strong implications for health and well-being contributing to economic productivity ([HFHA, n.d.a](#)), production of housing after a disaster can create local jobs and regenerate the local economy through production, procurement, and transport of building materials ([Cosgrave, 2008](#); [Feinstein International Center, 2011](#)). A study showed that households whose homes were rebuilt after a disaster were able to resume income-generating activities, which allowed economic recovery from the disaster's impacts ([HFHA, n.d.b](#)). Importantly, local capacity can be developed for building resilient housing and in this sense allows the disaster resilience initiative to be sustained over the long term.

SOCIAL CAPITAL: THE MISSING ELEMENT

The physical aspects of resilient housing rely strongly on the links that connect people, that is, social capital. Implementation of reconstruction projects requires relationships between institutions and communities, and the involvement of different stakeholders.

Social capital is the glue that joins them to be able to work toward the common goal of building resilience. This is such an important and intrinsic element, but it often gets hidden beneath the discussions on resilience that focus on making stronger buildings and infrastructure, which of course would not be possible without the interrelationships between people.

Social capital has been defined widely in a variety of contexts; for example, [Lucini \(2013\)](#) points to its relationship with resilience in postdisaster reconstruction as pertaining to social ties and networks. Others such as [Unwin \(2016\)](#) have similarly suggested that social capital works at different levels including communities, organizations, and institutions. It is clear from many studies ([Aldrich, 2012](#)) that communities with a high reservoir of social capital are able to achieve effective post-disaster reconstruction and build resilience. Often communities that are poor can have great social capital, as pointed out by [Aldrich \(2012\)](#): "...even highly damaged communities with low income and little aid benefit from denser social networks and tighter bonds with relatives, neighbors and extralocal acquaintances." Housing reconstruction can be a vehicle for vitalizing social capital and is an opportunity to form or strengthen community-based organizations that contribute to long-term resilience.

A CHANGING CONTEXT: CLIMATE CHANGE AND URBANIZATION

Scientific evidence indicates the increased frequency and intensity of disasters throughout the world resulting from climate change ([Anderson & Bausch, 2006](#); [IPCC, 2012](#)). This has ushered in a new set of challenges: Areas that have historically not experienced certain types of disasters are now experiencing them, such as the floods in Pakistan in 2010 ([Gronewold & Climatewire, 2010](#)); disasters are increasingly becoming more frequent and intense in historically disaster-prone areas as in the lower Mekong Delta in Vietnam ([Bird, 2009](#); [Vinh, 2012](#)) and the Ganges-Brahmaputra Delta in Bangladesh ([Shamsuddoha & Chowdhury, 2007](#)); the entire Pacific region is now subject to loss of land and habitat due to sea level rise, presenting tremendous challenges to human habitat, particularly when compounded by coastal disasters such as cyclones and tsunamis ([World Bank, 2013](#); [World Bank & SOPAC, 2009](#)).

Rapid unplanned urbanization is another phenomenon that has resulted in unpredictable disaster patterns. For example, the brisk and often hasty urban development of Bangkok and its surrounding areas in Thailand has subjected it to severe flood impacts as experienced in 2011; as succinctly observed by a United Nations official, "We have grown fast, but not safe" ([Barta, 2011](#)). Such urban vulnerability has become strongly evident in a number of developing world cities; the devastation of the 2015 earthquake in Nepal's cities has been pointed out as a consequence of "haphazard urbanization and rampant building code violations" ([Misra, 2015](#)) and "increased urban densification, rapidly expanding informal settlements and development that outstrips a government's ability to enforce standards" ([Cross, 2015](#)) (see [Fig. 12.2](#)). Reconstruction and building resilient housing are thus confronted



FIGURE 12.2

View from Kathmandu, Nepal, in 2009 before the 2015 earthquake showing the unplanned nature of urbanization there.

by a specific set of challenges in cities in developing countries that have densified and grown in unregulated patterns ([Habitat for Humanity, 2012](#); [IASC, 2010](#); [IFRC, 2010b](#)). This is discussed further in this chapter in the case study (see [Case Study: Villa Rosa, Haiti](#) section).

CHALLENGES IN POSTDISASTER RECONSTRUCTION

While postdisaster reconstruction presents the opportunity for building resilient housing, it often faces a complex range of challenges. Among them stands out the urgency to rebuild houses so that displaced disaster victims have homes again. Reconstruction agencies face pressure from governments, media, and affected communities to build a large number of houses within as little time as possible, as described in the case of Sri Lanka after the 2004 Indian Ocean tsunami ([Hettige, 2007](#); [Mulligan, Ahmed, Shaw, Mercer, & Nadarajah, 2012](#)). This is not an easy task given the constraints of a disrupted context; large-scale permanent housing reconstruction is usually a protracted process ([Cosgrave, 2008](#)) even in developed countries ([Oxfam, 2005](#)) and in developing countries, due to existing institutional and economic shortfalls, attempting rapid reconstruction ushers in a whole set of problems related to institutional arrangements, buildings materials procurement, builder and labor availability, as well as endemic constraints such as corruption. Despite well-meaning intentions, reconstruction agencies are often challenged by obstacles. Reconstruction often requires careful planning, and sensitivity and understanding of the needs of affected

communities, which requires time. [Mulligan et al. \(2012\)](#), again in posttsunami Sri Lanka, have argued for such an approach that supports community development beyond simply rebuilding houses.

Housing reconstruction requires addressing a range of issues, each with its own set of challenges: building housing that is culturally and environmentally appropriate; coordination between different agencies and stakeholders; clear policy direction; avoidance of re-creation of vulnerability; equitable distribution; prevention of human rights abuse, corruption, and misappropriation; overcoming inordinate construction delays; and adequate financial management. Such challenges have been discussed widely in the literature ([AFP, 2009](#); [Ahmed, 2011](#); [Boen, 2006](#); [Charlesworth & Ahmed, 2015](#); [Eye on Aceh, 2006](#); [Forbes, 2006](#); [INFORM, 2005](#); [Perlez, 2006](#); [Steinberg, 2007](#); [Tsunami Evaluation Coalition, 2006](#)).

THE NEED TO IDENTIFY GOOD PRACTICE

Despite the developing world experiencing the greatest disaster impacts and the housing sector often being most severely affected, there is limited or scattered literature on leading practices on building disaster resilient housing therein. The gray literature of humanitarian agencies often deals with temporary and transitional housing in the context of crises because of their primary focus on emergency management, and literature on permanent housing is comparatively scanty. Most people expect to live in permanent housing over the long term that protects them from multiple disaster cycles, hence the significance of its disaster resilience. The annual “Shelter Projects” reports by UNHCR, IFRC and UN-Habitat (2013–14, for example) is one key attempt to compile examples of housing projects, but the projects are not discussed in much detail. In the face of the limited literature on permanent housing reconstruction, some recent publications such as by [Aquilino \(2011\)](#) and [Charlesworth and Ahmed \(2015\)](#) present some examples of good practice from global case studies. The author of this chapter is a coauthor of the latter publication and has extensively explored housing reconstruction projects around the world. One of the case studies of the book is summarized below as an example of good practice in one of the poorest countries of the world, Haiti, which had been severely impacted by an earthquake in 2010.³

CASE STUDY: VILLA ROSA, HAITI

Haiti is one of the poorest countries in the world ([Global Finance, 2013](#)) and also highly prone to disaster. The country was struck by a massive earthquake in 2010, which killed 220,000 people and injured more than 300,000. Almost 200,000 houses were badly damaged and more than 100,000 were destroyed. In Port-au-Prince, the

³The information presented in the case study has been collected from interviews and observations by the author during fieldwork in Haiti. Some unpublished institutional documents were also consulted.

**FIGURE 12.3**

A view of Villa Rosa.

capital city, 90% of buildings were informally built and more than 85% of the population were living in slums in tightly packed, poorly built buildings (Blaranova & Christiaens, 2012; United Nations, 2012). Housing reconstruction in Haiti after the 2010 earthquake required addressing a range of social, economic, and other issues, beyond the building of houses. This case study project illustrates such an approach.

The project was located in a settlement in Port-au-Prince called Villa Rosa (see Fig. 12.3), which had grown informally over three decades and before the earthquake had more than 10,000 residents. Typical of such an informal settlement, it was densely built with lot sizes as small as 10 sq. m and narrow pedestrian walkways with limited vehicular access; buildings up to four stories were precariously built on hill slopes (AFH, 2012). The buildings were made of concrete block masonry confined within a reinforced concrete frame and used poor-quality materials. Infrastructure and services were generally lacking. Poor drainage, sanitation, and waste management posed serious health hazards. Sixty percent of Villa Rosa was devastated in the earthquake, and out of 1335 houses, 595 were completely destroyed and 260 damaged.

PROJECT SUMMARY

The Villa Rosa project utilized postdisaster reconstruction as an opportunity to develop and implement a community-based redevelopment and housing plan. It offers useful lessons on how such housing reconstruction can be undertaken in situ in a densely built, urban, poor, informal settlement by working with the disaster-affected community.

Led by the Dutch agency Cordaid and implemented with a range of partners, the Villa Rosa reconstruction project is an example of community-based owner-driven

reconstruction together with the development of local skills and capacity, particularly in disaster resilient construction. More than 170 new houses were built and nearly 350 houses were retrofitted with earthquake-resistant construction. The project is also notable for its integration of housing with community infrastructure. This was a pilot project representing the first stage of a long-term community action plan for physical and economic development of the wider Villa Rosa settlement.

AGENCY ROLES

Cordaid provided funding and coordinated with partner agencies, and selected beneficiaries, together with building capacity of the community leaders and community-based organizations. Build Change, a US-based organization specializing in earthquake-resistant construction, supported the physical rebuilding and repair. It also provided training and raised awareness of local builders and homeowners on earthquake-resistant construction, developed house designs through beneficiary consultations, and provided supervision and construction management support. The organization Architecture for Humanity (AFH), supported by UN-Habitat, carried out the physical planning and construction of community infrastructure.

Other agency partners included the International Organization for Migration (IOM) supporting WaSH (water, sanitation, and health); Global Communities (formerly CHF International) ran a cash-for-work program for debris removal; the local authority, Casek, helped regularize tenure security in this informal settlement where previously people did not have land titles. A range of other agencies were involved in the project in smaller and varying roles, indicating the complexity of such projects where it is not feasible, if not impossible, to be implemented by any one agency.

HOUSING RECONSTRUCTION PROCESS

The housing reconstruction process was led by Build Change, initiated in 2011 after clearance of the rubble from the earthquake. In consultation with beneficiaries, Build Change engineers and architects developed the designs for housing and retrofitting. Together with the designs, the first 60% of the funding was provided to the beneficiaries, who then employed local builders trained by Build Change. Construction was supervised by Build Change staff, with a remaining 35% funding provided to the beneficiaries upon satisfactory progress and the final 5% after completion.

For new houses, the US \$ 3500 provided was often not enough to complete construction, so beneficiaries added their own funds. Usually the final works that beneficiaries paid for were plastering and painting, which were undertaken after occupying the house when they had available household funds. Two-storey houses were built on some of the smallest lots because of the space limitation. All new and retrofitted single-storey houses included provision for building an extra story in the future.

MAIN PROJECT ELEMENTS

The project consisted of interventions for both physical and economic recovery, comprising the following elements:

- **Resilient construction:** Earthquake and cyclone resistant construction techniques were applied in all new and retrofitted houses. This included strengthening the building structure and its parts with steel reinforcements, bracings, and straps. A ring beam, lacking in previous houses, was added to hold the structure together. Good-quality thick corrugated iron sheet was used for the roof cladding to avoid lifting off in storms. The process enabled building awareness and local capacity on these resilient construction techniques.
- **Community infrastructure:** The community prioritized infrastructure upgrading options through a community action plan. This included paved walkways, underground drainage, solar-powered streetlights, landscaping of public areas, and a basketball court popular with the community's youth (see Fig. 12.4).
- **WaSH:** A range of WaSH services were provided, including communal and household latrines, repair of hand pumps, drilling of wells, and solid waste management.
- **Cash-for-work:** The cash-for-work program to remove the extensive debris left from the earthquake allowed people to earn desperately needed cash and clear space for the reconstruction to proceed.



FIGURE 12.4

The basketball court was an important part of the reconstructed settlement.

KEY ACHIEVEMENTS

The project followed an owner-driven process. Beneficiaries did not merely receive a house but were involved in its design and construction and gained skills in the process. This allowed them satisfaction and to monitor the quality of materials. Technical support by Build Change ensured further quality control. Together with building new houses, retrofitting damaged houses helped cater to a wider group. Disaster resilient features became acceptable by incorporating them into typical Haitian-style houses. The owner-driven process was complemented by in situ reconstruction; instead of relocation, reconstruction in the existing settlement enabled people to continue living where they had existing livelihoods and networks.

An integrated approach was followed where, in addition to housing, basic infrastructure such as paved walkways, drainage, streetlights, waste management, and WaSH were integrated into the project. The roles played by different agencies made this integration possible. Beyond physical elements, social aspects were also integrated, including land tenure, community organizations, and capacity building. There was provision for incremental expansion by incorporating scope for future vertical expansion of houses, which was an effective strategy given the high density of the settlement and its growing population.

Capacity building through training local builders in disaster resilient construction meant that the skills would remain within the community. Additional training to homeowners helped raise awareness on resilience. The teamwork between different agencies, each bringing its own set of specialized capacities and resources, contributed to the project's achievements and effective implementation.

KEY CHALLENGES

While there were many achievements of the project, in such an impoverished country like Haiti, understandably, there were also significant challenges. Coordinating timely and useful contributions from a wide range of stakeholders was difficult. Aligning toward a common goal the diverse interests from agencies with different backgrounds and institutional cultures was a complex challenge. Apart from the involvement of the local authority Casek, the Haitian government was not directly involved with the project, leaving leadership and decision making to external agencies. Nonetheless, Build Change did initiate public sector technical capacity building by training of government engineers, indicating a way forward to ensure sustainability after external agencies depart.

This was a pilot project, but it came with the risk of creating an “island of benefit” in a “sea” of vast deprivation. This is a common dilemma in many such reconstruction projects in the developing world where poverty and need are widespread and extensive; there simply seems to be never enough resources to make a significantly large-scale impact.

Although local capacity building and a cash-for-work program were provided, there was no support for long-term livelihoods and the economic sustainability of the community. The transition from postdisaster reconstruction to sustainable development remains a typically weak area in the work of humanitarian agencies.

BENEFICIARY NARRATIVES

Although there was a strong technical element in the Villa Rosa project, as discussed above, building resilient housing behind the technical inputs was a human interest factor, as became evident from the personalized narratives of a range of stakeholders involved in the process, documented by the author during fieldwork in Haiti. These narratives highlighted the intangible human motivations, experiences, feelings of satisfaction, and aspirations that act as a mesh reinforcing the achievements of the design and construction of resilient housing. Furthermore, they painted a picture of the life of disaster-affected communities in the developing world.

Here two such narratives are summarized, one from a beneficiary of a new house and another from a retrofitted house, representing the two main modes of housing reconstruction support. Such households, the unit of the community, provide an insight into the community's human experience of the housing reconstruction process.

Owner of a New House

Tesie Lems lived with his wife, child, sister, and two brothers in a small two-room single-storey house built through the Villa Rosa project (see Fig. 12.5). He also benefited from the cash-for-work debris removal program. His previous house had completely collapsed in the 2010 earthquake. He and his family lived in a temporary shelter for close to 3 years before his house could be completed in November 2012.



FIGURE 12.5

The new house of Tesie Lems.

The house was built in an owner-driven process by a Build Change–trained builder with a five-member construction team. Tesie and his household members also helped—cleaning the site, carrying materials, fetching water, etc.

There was provision in the house structure for building an upper floor, but Tesie did not have money for that when interviewed in 2013, hence he was compelled to live in an overcrowded situation with six persons fitting into the two small rooms. Although a small latrine had been provided in the project, a kitchen could not be fitted into such a small lot, so the household cooked and ate outside in a narrow space between the house and its neighbor. Despite such difficulties, Tesie was happy to have received the house. “It’s a good project,” he said.

Owner of a Retrofitted House

Venite Clerilus lived with her infirm husband and four grown-up children in a house retrofitted in the Villa Rosa project (see [Fig. 12.6](#)). The house had been partially damaged by the earthquake in 2010; its back part had given way and crumpled. She was the family’s main breadwinner and earned a living by buying wholesale small goods from the countryside, such as vegetables and coal, and selling them in the city for a small profit.



FIGURE 12.6

The retrofitted house of Venite Clerilus.

The back part of the house was rebuilt, and corner reinforcements and a ring beam for earthquake resistance were incorporated into the house's structure. To allow building a future upper floor, reinforcement rods are kept extended beyond the roof, and space retained to add a staircase. With her own funds, she fixed her latrine and built a small septic tank.

The US \$ 1500 she received from the project helped her to make the repairs and retrofitting, employing workers trained by Build Change. "I wanted to have a concrete roof so that the house can hold up against storms," she said, and with her savings, and some from her children, she had managed to build such a strong roof. She still needed to paint the house and was saving money for that at the time of interview.

LESSONS FROM VILLA ROSA

The Villa Rosa project was multifaceted and implemented in partnership between several agencies, extending beyond only rebuilding houses destroyed by the disaster to a wider set of inputs to build community resilience. It thus offered some valuable lessons.

Despite the challenges involved in coordinating a range of agencies, this project demonstrates that a multistakeholder and multidisciplinary partnership between the funding agency Cordaid, technical agency Build Change, and urban planning agencies AFH and UN-Habitat, as well as various others, was fruitful in dealing with a complex problem. Bringing on board a range of prominent international partners such as IOM and Global Communities, and also the involvement of the local government authority, Casek, maximized the project's potential for effectiveness.

By avoiding the typical "one-size-fits-all" approach on "green field" sites where communities are resettled as often done in reconstruction projects in the developing world, this project's in situ reconstruction approach succeeded in addressing a diverse range of community needs including livelihoods and social capital that would otherwise not have been achieved.

The project underscores the importance of an integrated approach where housing was combined with community infrastructure such as paved walkways, drainage, streetlights, and landscaping, and services such as water supply, latrines, and waste management.

CONCLUSION

Given the specter of increasing disaster impacts in a fragile and turbulent world, this chapter underscores the necessity of prioritizing building resilience, particularly for the world's majority who are mostly at risk. The developing world, representing the vast majority of the world's population, extensively experiences the severe impacts of disasters, which are amplifying with global climate change and rapid, unplanned urbanization. These impacts are particularly harsh on the housing sector, usually the most valuable and important asset people own, or find shelter in, and quite often

not built to be able to withstand these impacts. Thus, there is a widespread need for disaster resilient housing in the developing world. However, although “hardening” of the built environment to withstand and easily recover from disaster impacts is an important aspect of resilience, there is a “soft” aspect, relating directly to people and institutions, particularly manifested in livelihood support and development, local capacity building, and strengthening social capital.

The recent discourse on postdisaster reconstruction, particularly after the 2004 Indian Ocean tsunami, one of the most massive disasters in the near past, focuses on “building back better” strategies as a way of achieving resilience and this is now on the radar of humanitarian agencies. However, there are many challenges to that aspiration in the developing world. Once again, it is not only a matter of rebuilding stronger houses, which in itself can be a challenging task, but also addressing a gamut of issues that sustain the initiative over the long run.

Given this situation, identifying examples of good practice can be a useful building block toward more widespread implementation of resilient housing. As described in this chapter, looking at a case study from one of the poorest and severely disaster-affected countries of the world, Haiti, where achievements have been made despite severe obstacles brings replicable lessons. The country already had extensive impoverishment before the 2010 earthquake and had been hammered by a cyclone just a couple of years earlier. The earthquake exacerbated the existing chronic poverty, creating a highly challenging situation. The key elements of the Villa Rosa case study project—resilient construction, in situ reconstruction in a dense urban informal settlement, partnership between diverse agencies, owner-driven reconstruction, and local capacity building—can pose challenges even in less severe circumstances, but yet the project achieved a significant level of success. This project, with its many positive achievements in such a difficult context, is thus an example of effective postdisaster housing reconstruction in the developing world.

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Ten Years of Great Love— The Evolution of Housing Reconstruction in Banda Aceh, Indonesia

13

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INTRODUCTION

The scale of devastation caused by an earthquake in the Indian Ocean on December 26, 2004, was unprecedented. The earthquake, 150 km from the Acehese coast, affected more than a dozen countries from South East Asia through to East Africa. The energy released on the Earth's surface was more than 1500 times that of the Hiroshima atomic bomb. The seabed rose 5 m in some areas and displaced 30 km³ of water. Between 9.1 and 9.3 on the Richter scale, the earthquake was the second largest ever recorded and took place over a 10-min period.

It took less than an hour for the first tsunami to reach Aceh's coastline with waves reaching more than 7 km inland (Eye on Aceh, 2006). Of the seven most devastating waves, the maximum was 24 m at the shoreline rising to 30 m inland. A 20-m flood remained temporarily over coastal areas with sand deposits of up to 800 mm thick (Moore, 2006).

Livelihoods were destroyed, livestock was lost, agricultural land was covered in debris, and salt and water sources were contaminated (Eye on Aceh, 2006). The impacts on the natural environment and ecosystems were significant and widespread—affecting agriculture, aquaculture, and fisheries—and local economies were devastated with the inundation of large tracts of coastal land (United Nations Environment Programme, 2005). More than 1 million survivors fled to refugee camps or were housed by friends and relatives (Eye on Aceh, 2006). The World Bank estimated damage and economic loss amounting to US\$4.45 billion, almost 97% of the gross domestic product of Aceh (Nazara & Resosudarmo, 2007; United Nations Development Programme, 2005). A pledge of US\$7.8 billion was made by over 600 agencies including governments, humanitarian aid agencies, and philanthropists throughout the world. By 2009 US\$7.41 billion was disbursed (Aceh Recovery Newsletter, 2009).

This chapter examines two new housing settlements constructed by Tzu Chi, a prominent international aid agency, in Panteriek and Neuheun in the city of Banda

Aceh. These were called “Great Love Village I” and “Great Love Village II,” respectively, and were some of the largest reconstruction programs operating in Aceh province with 716 houses constructed at Panteriek and 846 at Neuheun. Many Acehnese were eager to move to these houses having lived in tents and barracks for up to 2 years.

In many respects these two “Great Love” villages are similar in their spatial layouts and identical in their house designs. In both locations the agency used contractors to design and build “duplex” houses of 36 m² using the same plan and the same lightweight materials. The most significant difference stems from their locations in relation to the city center. While Panteriek is located 2 km from the city center and is well served by public transport, the Neuheun village is 17 km away, with poor transportation options.

The construction systems used in these houses have not proven to meet the needs of all the residents, and there is some limited awareness and disquiet among some residents regarding the use of asbestos as a construction material rather than the more desirable masonry construction methods. This has contributed to ongoing efforts by a sector of households within these communities to modify and rebuild in an effort to improve their housing. Given that these two villages are so similar in their formal layout, an analysis of both communities allows us to record these modifications and rebuilding efforts and report upon the role location plays in determining the resident’s capacity for recovery.

RECONSTRUCTION PROCESSES AND OUTCOMES

More than 200 humanitarian agencies worked in Aceh province after the 2004 Indian Ocean tsunami with 60% engaged in housing reconstruction efforts (Steinberg, 2007). The process adopted three key stages. During the initial emergency response, agencies, where possible, provided tents on cleared land between the destroyed houses. Alternatively people were accommodated in public buildings, such as mosques and schools, in locations inland away from the floods. Many others found shelter with host families or relocated to other parts of Indonesia.

The need for more durable and sturdy shelter types became pressing, and during the second reconstruction phase many agencies began constructing “transitional” housing of a standard between a tent and a permanent house. Two main types of transitional houses were built. Houses of the first type were timber “barracks” shared by multiple families or individuals and located on public land. The second-type houses, supplied by the Red Cross, were 36 m² “shelters,” steel framed with plywood panels for walling and flooring. After the first monsoon, some reconstruction agencies responded by improving some shelters with additions such as concrete flooring and low brick walls to protect from flooding and rainwater (Oxfam, 2005).

The third key phase, the construction of permanent housing, proved to be a protracted process subject to many technical, social, and governance issues. The initial tsunami response was carried out by the National Development Planning Agency (BAPPENAS) together with the Ministry of Public Works. Within 4 months a

separate agency, *Badan Rehabilitasi dan Rekonstruksi* (Agency for Rehabilitation and Reconstruction, BRR), was established. Initially BRR took on a supervisory role, but by the end of 2005 it expanded to 500 staff plus consultants to manage all aspects of the recovery process and implement longer-term projects (Nazara & Resosudarmo, 2007; Steinberg, 2007). Mandated to operate for 4 years, BRR ceased operation in April 2009 with projects worth US\$800 million remaining incomplete. Responsibility was delegated to the Ministry of Public Works and coordinated by new agency, the Aceh Sustainable Reconstruction Agency (BKRA) (Aceh Recovery Newsletter, 2009).

Irrespective of the type and size of house owned before the tsunami, BAPPENAS revealed its policy to ensure that survivors were treated equally by reconstruction agencies allocating houses. BAPPENAS stipulated that each reconstruction house should have a maximum floor area of 36 m² (Steinberg, 2007). This modest constraint enabled the reconstruction agencies to provide a large range of housing types from a variety of construction materials and to varying degrees of finish and quality. Over the next 4 years 141,000 permanent houses were constructed in the third phase of the reconstruction process. As the redevelopment process unfolded, it became apparent that participating agencies concentrated their efforts in different ways. Some focused on quantity, whereas others built fewer houses but with quality materials and higher levels of finish. Others used the opportunity to shape a new community with social, educational, and religious purposes. A small number of agencies ignored guidelines altogether to compete for influence and prestige by building larger houses with expensive finishes (Das, 2007; Greenblott, 2007; Steinberg, 2007) and many Acehnese comment that some types of houses are far more desirable than the more modest types. However, the typical house included two bedrooms, a living room, a kitchen, and a toilet.

Comparisons of physical outcomes and community attitudes to the various types of houses constructed by the agencies have proven to be revealing. A close study of nine settlements by O'Brien and Ahmed (2012a) has revealed the following series of key issues that affect people residing in the houses built by reconstruction agencies in Aceh.

Residents living in houses built by reconstruction agencies frequently aspire to:

- enlarge the overall size of their house;
- maximize the economic capital of their house;
- demonstrate their status;
- create space for social networking to occur; and
- improve the functionality of their house.

The following are the additional points of interest:

- Around 95% of residents modify their houses.
- Resident's housing aspirations are not met with the types of housing built by the reconstruction agencies.
- The size of the resident's plot of land plays a significant role in defining the options available for modifications.

- The reconstruction process could be streamlined if the designers preplanned for various types of modifications.
- Many residents find the rebuilding process challenging because it involves economic, social, and cultural dimensions.
- A range of house types and sizes is beneficial, as this will accommodate the variety of needs (O'Brien & Ahmed, 2012a).

It is a common theme to see that many households have found the reconstruction agency housing to be insufficient for their needs, and there is significant evidence showing that households are modifying their housing, if and when they have the opportunity, due to factors driven by aspirations with both local and global dimensions (O'Brien & Ahmed, 2014). Many of these modifications are in response to the perceived inadequacies of the house and the inability of the house to meet the needs and aspirations of its residents. For example, it is not surprising that residents with larger families might want to increase the size of their house. Nor is it surprising to find that people who run a home-based business might like to open a shopfront. There are many examples where pragmatic reasons such as these have governed the modification of reconstruction types. In many other cases the residents have sought to match the levels of refinement seen on the better quality houses and those with higher levels of status.

This chapter takes a slightly different angle and compares the same type of house constructed in two different locations by the same reconstruction agency. These two settlements were built using a “cookie cutter” approach building duplex housing with standardized plans and materials. This comparative survey isolates spatial, formal, and technological issues and allows comparisons to be made based on geography and occupant demographics.

TZU CHI IN BANDA ACEH—TWO SITES

Tzu Chi has achieved much renown for its programs over many decades. With humble beginnings from 1966 a Buddhist nun, Dharma Master Cheng Yen, has led the group to be one of the most significant not-for-profit organizations operating internationally. The organization has been built upon Buddhist philosophies and Cheng Yen's works with the poor in the Hualien region of Taiwan (O'Neill, 2010). Initially set up as a collective of housewives supporting the disadvantaged in the local neighborhood, the capacity of the networks grew with help from the media and support from politicians. At the same time an extensive grassroots supporter base of volunteers, many recruited in their time at school, helped implement and finance its charitable programs (O'Neill, 2010).

Tzu Chi now claims more than 10 million members across 47 countries with its devotees contributing to projects that include the development and ownership of several large hospitals, schools, television stations, housing estates, and industrial complexes. While Tzu Chi has been highly visible during international disasters and recognized for contributions after Hurricane Katrina (2005), the Indian Ocean tsunami (2004), and the Sichuan earthquake (2008), it has also increasingly been

subject to both domestic and international scrutiny. Allegations have been aired in Taiwanese and Chinese media accusing Tzu Chi of using donated funds to purchase high-risk shares in multinational companies (Kuo-tsai, 2015), using its media arm to interfere in a tainted food scandal (Chang, 2014), improper land deals (Kuo-tsai, 2015), tax evasion and poor governance (Hsu, 2015), and moving away from its core relief works (Chen, 2015).

As one of the first relief agencies to respond to the earthquake and tsunami that struck the Indian Ocean on Boxing Day 2004, Tzu Chi played a major role in redevelopments in Sri Lanka and Indonesia and maintained its efforts with large-scale programs over the following 4 years. At Hambantota in Sri Lanka, Tzu Chi was responsible for 649 houses with 1002 houses at Meulaboh, 270 km via the coastal road south of Banda Aceh. A further 716 houses were constructed at Panteriek and 846 at Neuheun in Banda Aceh, and it is these second two settlements, located in Fig. 13.1 below, that form the basis of this study. In Aceh province these case study settlements were labeled “Great Love Village I” at Panteriek and “Great Love Village II” at Neuheun. In each location Tzu Chi also constructed a school (prep to year 9), a medical center, and a community building. With infrastructure services such as water, power, and sewerage plus roadways and drainage, these projects were significant undertakings.



FIGURE 13.1

An aerial photograph locating Panteriek close to Banda Aceh city and Neuheun on the outskirts of the city between the coastline and the foot of the mountains.

CONSTRUCTION TECHNOLOGIES AT THE GREAT LOVE VILLAGES

The dominant form of construction for residential dwellings in Aceh prior to the tsunami has been based on reinforced concrete slab and frame elements with infill panels built from rendered masonry. This system is preferred in urban areas as it is perceived as robust and representative of the household's aspirations toward improved amenity and status. In general, the larger number of agencies involved in the reconstruction efforts followed this pattern, but there were exceptions. These include developments by Bank Mandiri and Uplink that used timber frames and walls and the developments by Muslim Aid and Tzu Chi that used lightweight asbestos panels on timber and steel frames, respectively (Fig. 13.2).

The issue of the use of asbestos is not the key focus of this chapter, but its use in the "Great Love" settlements is significant and subject to further research by the authors. Despite the well-documented evidence demonstrating that prolonged inhaling of airborne asbestos fibers is known to cause serious lung illnesses and death, asbestos continues to be mined and produced in a number of countries, including Russia and China. Western countries phased out asbestos mining and the use of asbestos products in the 1980s before moving to ban it altogether (Australian Government, 2015). The asbestos used in the exterior walls of the Tzu Chi housing is known as *Chrysotile* asbestos and is one of the more common forms of asbestos used in building construction. It is known to cause mesothelioma, a form of lung cancer (Kanarek, 2011).

There is evidence that the asbestos is susceptible to damage from wear and tear in the villages constructed by Tzu Chi. Evidence of aging was observed in the form of cracked corners and instances of "lifting" or delamination of the asbestos sheets from the underlying framing. Walls are dusty with the fibers flaking. Interviews undertaken for this research (and discussed later in this chapter) reveal that although many of the occupants of the houses were aware that their houses were constructed from



FIGURE 13.2

Tzu Chi-constructed duplex type houses with asbestos cladding on a light steel frame. The left image shows a typical duplex at Neuheun in 2009 and the right image shows extensive modifications at Panteriek in 2015.



FIGURE 13.3

Examples of cracking and panels lifting in the asbestos sheets in the housing constructed by Tzu Chi.

asbestos, with most complaining about the asbestos dust, few were aware of the health dangers of the airborne particles. Residents were more likely to speak of the limitations of asbestos as a construction material and its lack of robustness by highlighting the cracks and holes in their own houses (Fig. 13.3).

RESEARCH DESIGN

A research team has built a relationship with the community at the Great Love Village II at Neuheun since 2009 revisiting periodically as part of a longitudinal postoccupancy study (O'Brien & Ahmed, 2012a, 2012b, 2014). More recently, the Great Love Village I at Panteriek has been included to extend understandings of the geographic and economic factors that govern residents' modification of houses. A variety of research tactics are required to address questions that have spatial, technical, and social dimensions (Groat & Wang, 2002). To undertake this effectively the research team includes an architect/academic, engineer, and social geographer to analyze data from survey mapping exercises, interviews, and focus groups. Interviews were conducted by Acehnese speaking interpreters to maximize the capacity for interviewees to contribute their experiences.

The team conducted a survey in both the Great Love I (Panteriek) and II (Neuheun) villages to identify a typical street in each and then typical houses in each. The aim was to ensure we included a representative example from each. All houses were mapped and then typical examples (as described in detail later in this chapter) were selected for the interviews. Six groups of interviews were conducted at Panteriek and another six at Neuheun. Additional care was taken when selecting the case study examples to ensure that both genders and a range of age groups were represented.

The research team produced maps, plans, and sketch drawings of case study plots and houses. These were initially hand drawn on site and were later reproduced as a digital database. Data are recorded in a consistent way following typical architectural conventions as shown in Fig. 13.4.

COMPARING VILLAGE MAPS—GREAT LOVE I—PANTERIEK

Fig. 13.5 shows Great Love I Village at Panteriek.

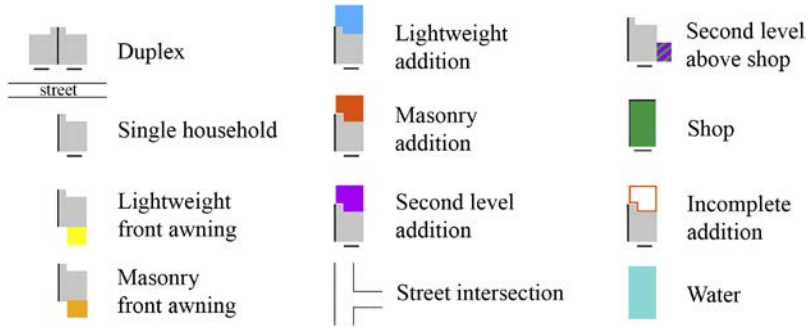


FIGURE 13.4

Key for Figs. 13.5 and 13.6.

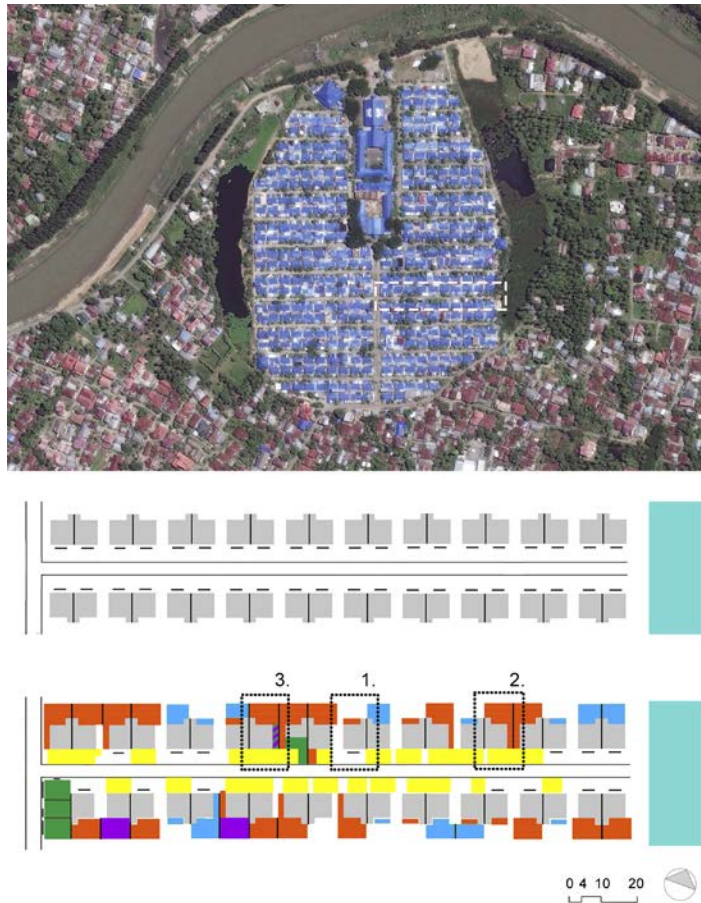


FIGURE 13.5

Great Love I Village at Panteriek. The top image shows an aerial view revealing the layout and scope of the village as it was constructed in 2007 and highlights the location of the street surveyed in 2015 in the drawing below. The case study houses labeled 1, 2, and 3 are discussed in later sections of this chapter.

COMPARING VILLAGE MAPS—GREAT LOVE II—NEUHEUN

Fig. 13.6 shows Great Love II Village at Neuheun.

COMPARATIVE SCOPE OF CHANGE

The maps prepared in the previous section indicate that there is more redevelopment occurring at the Panteriek Village than at Neuheun. To provide evidence of

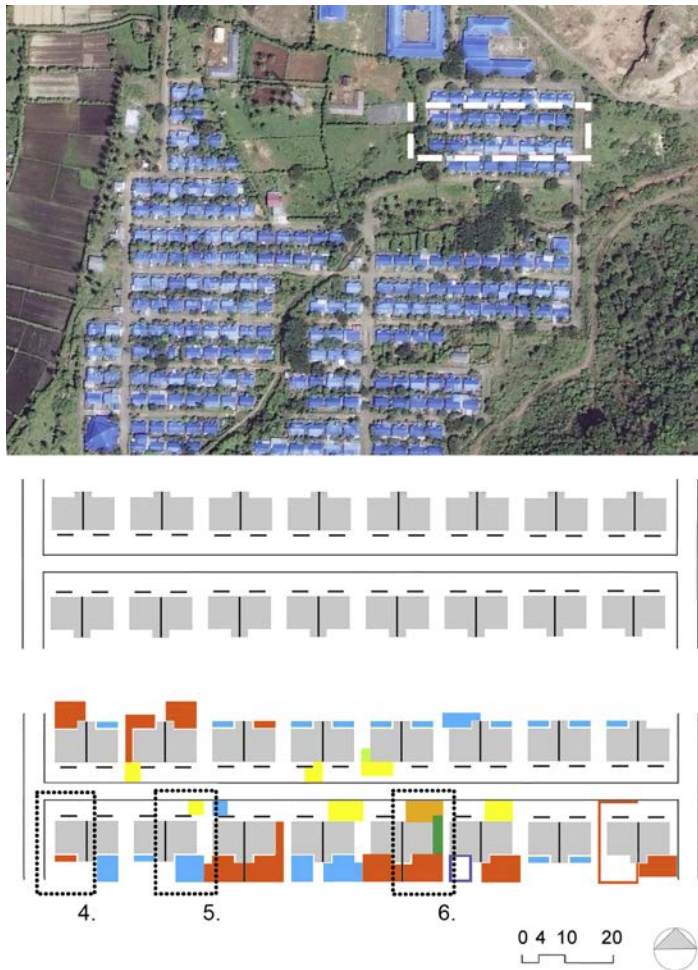


FIGURE 13.6

Great Love II Village at Neuheun. The top image shows an aerial view revealing the layout and scope of the village as it was constructed in 2007 and highlights the location of the street surveyed in 2015 in the drawing below. The case study houses labeled 4, 5, and 6 are discussed in later sections of this chapter.

Level of modification	Type	Great Love Village I Panteriek (32 houses)		Great Love Village II Neuheun (40 houses)	
		Number	%	Number	%
Low-level	A	0	0	1	3
	B	1	3	0	0
	C	2	6	11	28
	D	3	9	2	5
	E	6	19	2	5
Mid-level	F	3	9	3	8
	G	6	19	7 (2 incomplete)	18
	H	4	13	2	5
	I	10	31	3	8
High-level	J	1	3	1	3
	K	2	6	0	0
	L	1	3	0	0
	M	1	3	0	0

FIGURE 13.7

Levels of modification against types at the two Great Love villages.

this, a quantitative comparative analysis identifies relationships between levels of redevelopment across the two settlements. The extent, type, and materiality of the typical levels of redevelopment have been identified—firstly into broad categories (low, mid, and high) and within those escalating levels of improvements (Fig. 13.7).

Low level

Type A: Nil

Type B: Front awning

Type C: Enclosed rear porch in lightweight

Type D: Enclosed rear porch in masonry

Type E: Front awning and enclosed rear porch

Mid level

Type F: Full rear addition in lightweight

Type G: Full rear addition in masonry

Type H: Front awning and full rear additions lightweight

Type I: Front awning and full rear additions masonry

High level

Type J: Front awning, shop, and full rear additions

Type K: Front awning and second storey addition

Type L: Front awning, second storey addition, and shop

Type M: House demolished and replaced by multiple shops

The evidence reveals that while both the Great Love I and II villages have similar quantities of modification, overall there are greater numbers of higher level modifications at Panteriek compared with Neuheun (Fig. 13.8).

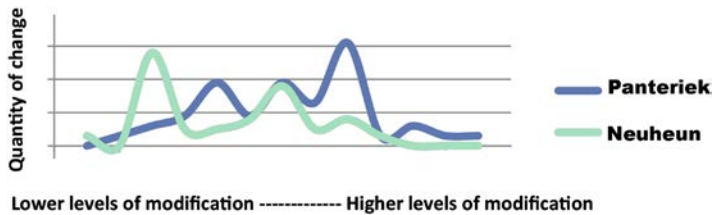


FIGURE 13.8

Comparing levels and quantity of modification at the two Great Love villages.

CASE STUDY EXAMPLES—GREAT LOVE I VILLAGE—PANTERIEK

The case study examples for the three levels of modification are described below (Fig. 13.9).

CASE STUDY 1—LOW-LEVEL MODIFICATIONS

Saufiawati is happy with her house in the Great Love Village I having lived in barracks for nearly 2 years after the tsunami. She particularly appreciates being given a house that is better quality than her house demolished by the tsunami. The appearance of her house is important to her, and she has painted the walls and used filler around the doorframes with the aim to make it appear that the house is not made of asbestos. Saufiawati explained that asbestos is not dangerous in an earthquake, whereas the brick houses crack and fall down. She has added a brick and concrete kitchen at the back, but the foundations are not strong and she thinks it will fall over. Saufiawati has a certificate for the right to use the house (HGB) but is unclear about the formal status (is this in terms of tenure??) of the house and land. She has an HGB for 10 years, but there is no information yet about what will happen after 10 years.

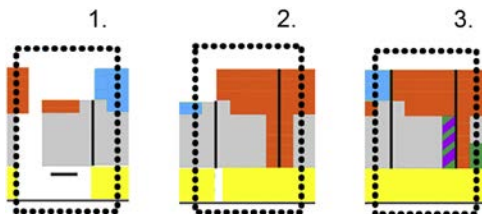


FIGURE 13.9

From left to right, examples of low-level, mid-level, and high-level modifications at Panteriek.

CASE STUDY 2—MID-LEVEL MODIFICATIONS

Nurhayati's tsunami experience has left her too scared to live close to the sea, and she prefers this location since the children can walk to school and the neighbors are nice. She believes that the house is comfortable and with more money plans to make further additions to the house. The layout of the village suits Nurhayati because she can share the cost of extending the house with her neighbors because they can share a wall. She knows that the house is asbestos and is aware of the cracks in the ceilings but says her husband can fix it. She does not believe that there are any serious issues with asbestos because she has lived here for many years and not had any problems. Nurhayati and her husband have a certificate for the right to use the land for 20 years, but she is unsure what will happen then. However, she is confident that they will find a solution in the future.

CASE STUDY 3—HIGH-LEVEL MODIFICATIONS

Sri Iza moved from the coastal area before the tsunami into barracks on the outskirts of Banda Aceh before resettling in her Great Love house in 2007. She now lives with her husband and their three school age children supported by her shop by the house and his work as a driver. The funds for building the shop, and second storey above, came from an Australian nongovernmental organization who had employed her husband. At first the village was not a good place to live and Sri Iza estimates that 200 families allocated houses decided to refuse them because the village was dry, hot, and treeless. She has heard that many went on to regret their decision. She knows that there are better quality houses built by other agencies and sites those built by a Saudi Arabian organization. However, these houses were built much further from town and that is a problem for these families. Despite this she is grateful for the house and sees Panteriek as a good location to earn a living. She has to keep painting the house to try to stop her baby coughing from the dust and the new work on the house has been done in masonry. Sri Iza has a certificate to use the house for 20 years and believes that then she will be given the full certificate.

A common response from the people interviewed at the Great Love I Village was that the location close to the city center offered distinct advantages over many other new villages. This proximity contributed to the capacity of households to build economic security, which in turn, enabled further modifications and improvements to the house. Interviewees had mixed feelings about their tenure over their houses. It was common for some occupants to believe that they were assured 10 years of residency while others thought it was 20. However, this lack of surety makes residents apprehensive about investing in their houses.

In general, the residents are grateful to have been provided with this housing but most are aware that it was not constructed to high standards. Any additional works require better quality foundations, and it is not considered ideal to add to the existing house due to its poor structural capacity. Most interviewees knew their house was constructed from asbestos but remain unsure about the health implications. Symptoms such as coughing were commonly blamed on the asbestos dust, but few knew of any links between asbestos dust and significant health outcomes such as lung cancer.

CASE STUDY EXAMPLES—GREAT LOVE II VILLAGE—NEUHEUN

The case study examples for the three levels of modification are described below (Fig. 13.10).

CASE STUDY 4—LOW-LEVEL MODIFICATIONS

Amina was a tenant before the tsunami and is very grateful to have this house after living in tents and barracks after the tsunami. She is a cleaner and her husband a laborer. They have three children. Amina believes most housing aid was directed to homeowners and she had to work hard to convince five different government agencies to gain permission to register for her house. She understands that her house is not so comfortable because it is dusty. Amina said that the house is far from the city, which is acceptable for the children as they can walk to school. It is more difficult for her to go shopping or to the city as it is a long walk to the bus. Because of this commute, many of her neighbors have left the village to rent new houses closer to the city even though it costs four times as much to rent in the city. Amina spoke of the uncertainty over the ownership certificates and the threat of being asked to leave.

CASE STUDY 5—MID-LEVEL MODIFICATIONS

Suriani lives on her own since her children married and moved to other parts of Aceh. Before the tsunami she was a renter, but in the immediate aftermath she was given a sewing machine and began sewed clothes for her income. She now works making traditional clothes for Acehnese dancing events as well as modern clothes. After living in the barracks in Neuheun for 2 years, she heard that the Great Love II Village would provide houses to renters so she came here. The location of the house is acceptable she says because she is old, she does not have a problem living far away from the city. However, Surlanti says the house is low quality because there is asbestos dust, which makes her itchy. She keeps repainting her house every second year to keep the dust in but it does not last.

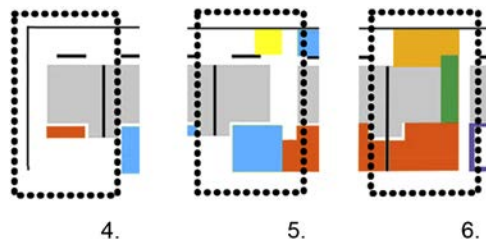


FIGURE 13.10

From left to right, examples of low-level, mid-level, and high-level modifications at Neuheun.

CASE STUDY 6—HIGH-LEVEL MODIFICATIONS

Denny lives with his wife and two children and lived close by before the tsunami. He works as a civil servant in the Department of Fisheries and his house is 16 km from his office. He asked to receive a house from one of the other agencies close to the city but was refused because he had lived in Neuheun before. He then requested to have a house at the Great Love I Village but was not eligible. He has maximized the size of his house by extending to the side and the rear and with a porch to the road. He has used durable materials such as brick and concrete. Denny explains that everyone wants to change to brick rather than asbestos, but the families must work together because of the shared walls. He knows that the house has a problem with the dust and that he should repaint every 2 years. He is aware that there are other panel products that are safer than asbestos, and he is also aware of the ambiguous issues regarding the ownership and the lack of formal certificates. Without an ownership certificate his house is worth far less than others and he cannot get a bank loan.

The people interviewed at the Great Love II Village at Neuheun shared concerns about their long-term ownership over their houses. Efforts have been made by some of the residents to speak with Indonesian government officials and Tzu Chi representatives to clarify the ownership issue but there is no resolution. There is a feeling at this village that the people at the Great Love I Village at Panteriek are more likely to be threatened with eviction because of the higher land value at Panteriek, but no one is really sure of the long-term implications.

Another issue raised by the residents at Neuheun has to do with the lack of a reliable water supply. Residents further to the north of the settlement are elevated above those at the southern end and the water pumps struggle to supply water throughout the day. The residents commented that they could only access water for a short period in the afternoons. At least one resident has attempted to bore his own well, without success, and is frustrated at the lack of service. It is hard to measure the full effect this has upon the residents and their level of investment in their housing, but it is a disincentive for residents to invest in a house that has diminished infrastructure.

DISCUSSION

There are a series of key points emerging from this study that contribute to our understanding of the enabling and disabling factors facing households recovering in the aftermath of a disaster. Housing, for most family groups, ranks alongside health and economic security as a key aspiration within the recovery process and resources are allocated accordingly. Many complex factors govern each household's capacity for recovery, and the research strategy used here highlights the types of common alterations and the role-specific factors such as location, tenure, and materiality play in realizing their ambitions. Tzu Chi's Great Love villages reveal some key points to consider in the light of efforts to improve the resilience of households recovering after disasters.

LOCATION

The evidence reveals that recovery (as measured by a household's capacity to add value to their dwelling) is markedly improved by the location of the settlement in relation to the centers of economic activity. Panteriek, 2 km from the Banda Aceh's city center, demonstrates greater levels of resource allocation to the improvement of the housing as compared with the village 17 km away at Neuheun.

This chapter has identified a few key factors that go toward explaining this difference and each stems from the perceived advantages associated with living closer to the city center. Residents have identified the advantages of good roadways and public transport options that service the Panteriek village. By contrast those at Neuheun describe the difficulties they face commuting from their more isolated village and the extra resources and time this requires. This isolation has other effects upon the economies of the Neuheun village. Whereas the residents at Panteriek have greater capacity to use their house for commercial purposes, given the proximity to higher levels of economic activity, those at Neuheun have less opportunity. At Panteriek more households have modified their houses to accommodate microbusinesses or shopfronts. An example of this opportunistic initiative is highlighted at Panteriek where a single house at the corner of two streets close to the center of the village has been demolished and replaced with three shops to reap the economic benefits of its corner location.

This inequity is further entrenched during the process of allocating residents to new settlements and houses. Prior to the residents being allocated to specific houses, they were strongly vetted by Tzu Chi staff in a series of interviews. Urbanized homeowners and families with young children were prioritized more highly and allocated houses at Panteriek. Renters, underemployed, and people living on the outskirts of the city were allocated houses at Neuheun. It is important not to overlook the role the redevelopment agency plays as it allocates households to specific locations and houses. In effect Panteriek was the default site for the "elite" clients. Selecting one household for Panteriek and allocating another to Neuheun was a significant piece of social engineering that contributes to differences between the two communities.

There are additional issues at play when the resident's benefit from proximity to the city center. Social networks are nurtured when people live in closer proximity to their shopping, education, health facilities, and family. Panteriek residents find it much easier to travel short distances to the neighboring communities given the quality roads and public transport options. The ease with which the Panteriek residents can engage with their neighborhood is a significant advantage to their well-being and capacity to recover from the disaster. This proximity enhances employment opportunities, which in turn requires less time and resources allocated for commuting to and from work.

TENURE

The residents of both communities stress the importance they place on the issue of tenure and the insecurities they face given the lack of any official certification. The most common belief is that the residents have a 20-year guarantee to occupy

the house while some understand this to be only 10 years. No residents have any official government directed explanation of what happens at that time despite many residents seeking further clarification. While this issue clearly does not stop residents from investing in their house, the interviewees mention that this is a risk and that it does influence their decision making. They understand the possibility that they might have to relinquish their houses and be forced to walk away from any investment they have made to the house. However, most families have faith that all will be resolved, “*God willing.*” It is not possible to quantify the degree to which this lack of tenure influences resident’s behavior; however, the issue must be considered as a factor that dissuades efforts by residents to invest in their housing.

MATERIALITY

The materials used by Tzu Chi to construct the houses, as well as those used in the subsequent additions and modifications, play a significant role in defining the village over the longer term. The robustness of the house, coupled with signs that define the resident’s aspirational status, are primary drivers in the reconstruction efforts. The evidence outlined in this chapter points to hierarchies of redevelopment with some materials (asbestos sheet, timber, plywood) seen as less valued as others (masonry, reinforced concrete, tile). This is to be expected in aspirational communities within Aceh (O’Brien & Ahmed, 2014) and more broadly (Hall, 1991; Tagg, 1991).

Tzu Chi’s use of asbestos is a key consideration when analyzing the Great Love villages. The interviews with residents touch upon the relationships between asbestos and the perceived lack of robustness, with many comments critical of the brittle material and the ways in which it cracks. Such is the criticism that there are no cases where asbestos is used in any new works initiated by the residents themselves. Instead the research has revealed a preference for timber construction, or for those with the economic means, reinforced concrete and masonry.

As the life span of the asbestos panel diminishes over the years, there is evidence that residents will continue to seek alternate materials as they remodel or demolish houses to rebuild. One house within the sample street at Panteriek has been totally removed, and there is evidence that this process will occur more frequently throughout the whole village. As some residents build higher levels of economic wealth, entire houses across the village are being replaced in a process that is likely to increase—particularly if concerns about the health effects of asbestos fibers are heeded.

DUTY OF CARE

There is a duty of care to not ignore the implications that stem from the use of asbestos paneling within these recovering communities. Although highlighting health concerns was never the focus of this chapter, several questions have been inadvertently raised during the fieldwork period and again during the subsequent analysis. It is

worth identifying them here as issues that should be addressed in future research programs. *What responsibilities do reconstruction agencies have over the lifetime of their projects? Does the responsibility end once the structures have been completed or does it extend to include maintenance and harm minimization strategies for building contractors and the broader community? Should Tzu Chi assist and educate the residents of their Great Love villages to identify ways to improve their village without contributing to further undue health risks?* Given the aspirations for improved housing, and the capacity for the residents to drive this change, it is most likely that the trend to improve the housing will continue at a strong pace. A documented and safe technique for removing the asbestos and locating it in secure waste disposal areas must be developed as a duty of care to the residents of the Great Love villages in Indonesia.

CONCLUSIONS

During the reconstruction phase in the aftermath of a disaster, there is significant pressure for international and domestic aid agencies to efficiently produce large numbers of houses to resettle and rehabilitate the affected communities. Limited ranges of designs and mass production techniques were methods employed in Aceh to rapidly increase the quantity of housing. To its credit the Tzu Chi organization was responsible for some of the extensive redevelopment programs in Indonesia in the wake of the 2004 Indian Ocean tsunami. Two of these developments, one close to the city center at Panteriek and the other 17 km away at Neuheun, highlight the importance location and socioeconomic factors play in the redevelopment of the housing infrastructure. The residents in the settlement closer to town (Panteriek) are more likely to be employed and have greater capacity to improve their houses with the addition of more living spaces and improved construction materials. On the other hand, the residents in the more remote settlement (Neuheun) are less likely to have well paid employment and hence have lower capacities to improve their housing. This difference between the two settlements was not accidental with Tzu Chi deliberately selecting urban homeowners to reside at Panteriek and the underemployed or renters to live at the more remote Neuheun village. These factors highlight growing levels of disparity between the two settlements with Panteriek undergoing physical changes, as evidenced by resident-initiated modifications to housing, at a higher pace and exhibiting more substantial levels of remodeling. Other factors governing these differences appear to be of a secondary nature. For example, access to reliable water supplies is less assured at Neuheun, ensuring that the settlement is less attractive to many residents.

These difficulties, coupled with the insecurities that accompany the vague tenure issues, do not stop the majority of residents from both settlements aspiring to make efforts to improve the housing with the addition of new living, sleeping, and gathering places made from more robust construction materials. However, little is known about the best methods for rebuilding (and demolishing) the houses—particularly as

asbestos is the main construction material. Given that asbestos fibers are so strongly linked with lung cancer, it is paramount that steps be put into place to educate these communities of the dangers as well as providing residents, and the construction sector, with safe and cost-effective ways to remove and treat the waste asbestos. The role that Tzu Chi might play in future education and rehabilitation programs at Neuheun, Panteriek, and Meulaboh should be amplified given the organization's charter to care for people in need.

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Blakely Disaster Readings

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Community-Driven Change

14

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INTRODUCTION

This chapter includes a personal account of the sterilization of my land and the community advocacy role I undertook to campaign for changes to bushfire planning policy. I also explore the policy development context between 2009 and 2011, impacts of the policy on the broader community, the advocacy process, and the ongoing challenges for property owners, communities, and policy makers.

On February 7, 2009, now known as Black Saturday, 173 lives were lost and 2029 homes were destroyed by bushfires in Victoria, Australia. The Victorian Bushfires Royal Commission (VBRC), conservatively estimated that the bushfires caused losses of AUD \$4.4 billion (VBRC, 2010c), approximately 1.4% of Victoria's state gross product (ABS, 2015). The impacts of Black Saturday remain today, survivors mourn the loss of loved ones, and rebuilding lives, homes, and communities continues to be a challenge.

In response to Black Saturday, new statewide bushfire planning regulations called the "Bushfire Management Overlay" (BMO) were implemented on November 18, 2011. The regulations created their own wave of postdisaster trauma. Private land, previously lawfully subdivided, was rendered undevelopable where sites were deemed an "unacceptable risk." This "sterilization" had considerable local impacts, particularly as the government did not provide compensation, despite the VBRC recommendation to do so.

BLACK SATURDAY REBUILDING AND RECOVERY

The Black Saturday bushfires triggered government and community reevaluation of the state's bushfire risk management strategy. The imminent concern was how and where would Black Saturday victims rebuild and reestablish their lives. The statewide strategic issue was whether planning and building policy could prevent life loss from the inevitable future disaster.

In the 48 h following Black Saturday, the then Prime Minister of Australia, Kevin Rudd, said:

Hear this from the Government and the Parliament of the nation. Together we will rebuild each of these communities — brick by brick, school by school, community hall by community hall.

Hudson (2009)

Questions arose about whether people in high-risk areas should be permitted to rebuild at all. Although it seemed distasteful to consider permanent displacement of traumatized survivors, potential acquisition of high-risk property was openly discussed among media commentators, the wider community, and later by the VBRC. The following issues were raised:

- Would a buyback scheme include the properties still standing in those townships? If the risk was too high to rebuild new, bushfire-rated homes, would not the risk be far greater for existing houses in the same area that are not built to any bushfire standards?
- Would all existing high risk properties across the state be compulsorily acquired? What parts of Victoria are too high risk for people to live in and visit? How would that affect the future of Victoria?
- Would compulsory acquisition occur as a preventative measure or only apply to property destroyed after disasters?
- What is the threshold for unacceptably high risk?
- Can bushfire risk be addressed through building and landscape design?
- Can the broader landscape be managed to reduce bushfire intensity?
- Is the planning and development strategy either to retreat from bushfire or to accept it and address it?
- Will evacuation policy provide an alternative to relocation and property acquisition?

Many Black Saturday victims felt that rebuilding was essential to their personal recovery process (Gunningham, 2015). Government responded to this sentiment by permitting Black Saturday victims to rebuild on the same sites and granted exemptions from bushfire planning regulations on May 14, 2009 (VC57, 2009). For victims who did not want to rebuild, the government established a voluntary buyback scheme. There were four limiting factors to the buyback scheme: it applied only to properties destroyed on Black Saturday, the property must have been a primary residence, it had to be located within 100 m (328 feet) of significant forest, and the total budget was capped at AUD \$50 million (Department of Justice, 2012).

Of the 2029 properties destroyed, only 550 were eligible for the buyback scheme, and 114 properties accepted the buyback (Department of Justice, 2012). That is, 6% of the total properties destroyed, and 21% of those eligible accepted the buyback.

To put this in context, there are approximately 300,000 properties covered by bushfire planning regulation in Victoria (DTPLI, 2014) and 90% of Victoria by area is designated as prone to bushfire (Fig. 14.1) (DELWP, 2016). If 5% of all



FIGURE 14.1

Designated bushfire-prone areas of Victoria are shown in gray.

From DELWP (2016).

bushfire-prone sites were deemed an unacceptable risk, the value of those sites would be approximately AUD \$7 billion.

The limitations on eligibility of the buyback scheme demonstrated poor political commitment to a statewide risk management and resettlement strategy. Apart from Black Saturday-affected areas, it remained unclear what the state's intentions were for existing homes and new developments in other high risk areas.

THE VICTORIAN BUSHFIRES ROYAL COMMISSION

The VBRC was established on February 16, 2009, to investigate the causes of, and responses to, the Black Saturday bushfires. The Commission handed down 67 recommendations in July 2010, and in November 2010 a newly elected government promised to implement all recommendations. However, many recommendations have since been abandoned or only partly implemented for various reasons including prohibitive cost (BRCIM, 2012). There were 18 recommendations relating to planning and building reform (VBRC, 2010b), which were largely interdependent, so as to provide the state with a consistent land use strategy for all property types: undeveloped sites, existing homes, new homes, and new and existing buildings for vulnerable uses such as childcare centers,

hospitals, nursing homes, schools, and accommodation for disabled people. This chapter argues that planning and building recommendations have been selectively adopted, leading to a failed land use strategy with poor outcomes for landowners and communities.

VBRC recommendation 49(h) proposed that vulnerable use buildings should be subject to bushfire building regulations, which has not subsequently been implemented despite the potential catastrophic outcomes for school children, nursing home residents, hospital patients, and people with disabilities, whom all face barriers to evacuation (PWC, 2012).

Recommendation 53 included the requirement that property owners provide a Bushfire Attack Level (BAL) assessment of the site and the construction standard (if any) of the home, to be included in compulsory property sale disclosure documents. Just as the motor vehicle safety star ratings inform purchasing decisions without guaranteeing the prevention of injury or death (ANCAP, 2016), the VBRC sought to empower property buyers with greater knowledge about a site's bushfire risk and building compliance. It was also intended that the market would reward bushfire resilient properties with higher demand and sales prices. Alarming, the recommendation was rejected by the Department of Justice without any evidence-based justification:

In relation to the disclosure of a current BAL assessment in a section 32, DOJ has advised that concerns were raised as prospective purchasers may rely solely on this instead of undertaking their own due diligence. The current BAL assessment may give prospective purchasers a false sense of security.

BRCIM (2012)

The BMO was developed in response to VBRC recommendations regarding land use planning, which included the recommendation to limit development on sites deemed an “unacceptable risk.” To avoid the “harsh consequences for the landowners concerned if land is sterilized” (VBRC, 2010a), VBRC recommendation 46 proposed a government funded retreat and resettlement policy for existing developments and identified buyback and land swap schemes as solutions (VBRC, 2010a). The VBRC also advised government that bushfire planning policy reforms must “explicitly enable landowners to take reasonable steps to reduce bushfire risk to an acceptable level,” ensuring that “acceptable risk is clearly defined” (VBRC, 2010a).

The BMO limited development in high-risk areas, as recommended by the VBRC, but the government did not buyback land that the policy rendered undevelopable or offer land swaps or any form of compensation. There was no definition of “acceptable risk,” so it was unknown how landowners could reduce risk to an “acceptable level.” Mapping was not publicly available to identify the unacceptably high-risk regions or sites, so landowners, home owners, property purchasers, and communities did not know whether they were subject to land sterilization.

MY STORY

This section of the chapter is my personal account of the impacts of the BMO as an affected landowner and the community advocacy role I undertook to lobby for changes to the policy to enable ourselves and other landowners to build our homes.

BIG HILL

In 2004 my family bought land at Big Hill, a coastal settlement on the Great Ocean Road in South-West Victoria. Our land sits in the treetops with views to the ocean (Fig. 14.2).

Our 3-acre site was subject to bushfire planning regulation, and bushfire resilience was central to the design of our home. We planned to build to the highest bushfire construction standards and install an accredited private bushfire shelter.

The purchase of our land included planning permission to build a home, but we could not afford to build within the regulated 2-year time frame. We would have to reapply for planning permission when we were ready to start the project (Fig. 14.3).

Our neighbor at Big Hill started construction of his home in 2011 and had successfully navigated through the existing bushfire and local planning requirements. Our sites are adjacent and nearly identical in size, shape, aspect, and slope; we therefore hoped to achieve the same result—permission to build on our land (Fig. 14.4).

By mid-2011 we were ready to start the project. We hired expert consultants to prepare the necessary planning application reports: BAL site assessment (which determines the level of bushfire risk and corresponding construction requirements) and ecological, geotechnical, and water treatment studies, and we finalized the house design drawings. Prior to submitting our planning application, the BMO was introduced on November 18, 2011. We had to get a new BAL rating and bushfire planning



FIGURE 14.2

Big Hill, Victoria.

Photo courtesy of Kate Cotter.



FIGURE 14.3

Cotter land at Big Hill.

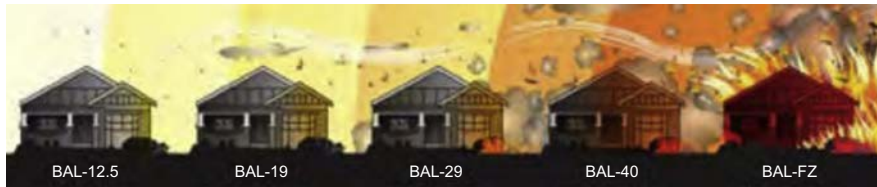
Photo courtesy of Kate Cotter.



FIGURE 14.4

Neighboring property at Big Hill.

Photo courtesy of Kate Cotter.

**FIGURE 14.5**

BAL ratings.

From CFA (2012).

report to comply with the new planning regulations. To our horror, our BAL rating changed from medium risk BAL 29 to extreme risk BAL Flame Zone (FZ). Although the national construction standards provided solutions for BAL FZ, the BMO did not allow new BAL FZ development at all (Fig. 14.5).

Although we proposed additional safety measures such as sprinklers and an approved private shelter, there was no solution available for our site. We sought second and third opinions and met with the Country Fire Authority (CFA) on site, but the answer was the same—we could not build on our land.

We spent Christmas 2011 in a depressed state. We stood on our now worthless land and wondered if we should have bought one of the older houses across the street instead. We would have been more exposed to bushfire risk, but at least we could have lived where we wanted to live. Our neighbor could build but we could not. None of it seemed logical, fair, just, or reasonable.

THE LOBBY GROUP

Once the feelings of shock and hopelessness subsided, I decided I had to fight. It was not really a choice, we could not afford to lose the value of our land. In March 2012 I set up a blog, where I wrote about our situation and called for affected landowners to join my lobby group. My strategy was to provide a unified voice for landowners across the state, gather data from landowners to establish an evidence base, research the political policy context, collaborate with experts to develop alternative solutions, and work with media outlets to tell our story to the broader community, with the aim of pressuring government to change the regulations.

The blog was generating interest, and by late 2012 the lobby group had over 3000 members. Despite the large number of members, there was broad consensus that we wanted government to amend the BMO to provide solutions for all sites. We believed that was more achievable than compensation that could amount to billions of dollars and the majority of members did not want to give up their land for any price.

RESPONSE FROM GOVERNMENT

Lobby group members wrote to the Planning Minister to explain their situation and argue for reasonable reforms to the BMO. The response from government and agencies was consistent—the VBRC recommended restricted development

**FIGURE 14.6**

Lobby group members Paul and Amanda Houghton from Hepburn Springs.

From *The Australian*, Akerman, P. (2013), Photo: David Geraghty/NewsPix.

and the government would not provide compensation, in other words "tough luck" (Figs. 14.6 and 14.7).

We consulted with bushfire scientists and fire safety engineers and proposed solutions that would strengthen life safety outcomes and allow development for existing subdivisions. I presented to the CFA, Fire Services Commissioner, and Department of Transport, Planning and Local Infrastructure (DTPLI) where the response was the same—there would be no shift in policy.

However, a meeting with the then Red Tape Commissioner, Mr. John Lloyd, fortunately resulted in him taking great interest in the issue. He visited lobby group members on their land and met with bushfire experts and government departments.



FIGURE 14.7

Lobby group members Angela and Arthur Jones.

From The Herald Sun, Ainsworth, M. and Campbell, J. (2014), Photo: Jason Edwards/NewsPix.

Mr. Lloyd took the case to the Deputy Premier and impressed upon government that the BMO needed to be addressed urgently as it was causing intolerable suffering in the community and would damage the government.

By July 2013 we had not succeeded in engaging with the Minister despite our attempts to produce a “win-win” outcome for government and landowners, through reasonable, evidence-based amendments to the policy. Landowners did not have time on their side, banks were getting nervous about holding mortgages on valueless property, families were spending their building money on rent, and I was receiving phone calls from members who were at breaking point. We were all desperate to get on with our lives and limit the damage already inflicted by the BMO. We launched our media campaign with a view to increasing pressure on government ahead of the 2014 state election.

MEDIA

My media strategy was to present two aspects of the issue, the impacts on landowners and the consequences for regional communities. It was likely that many Victorians would be outraged that government could sterilize land without compensation. It was also likely that most Victorians had a personal connection to the regional townships and settlements that were under threat from the BMO. I worked on developing relationships with media, covering state and national print, city and regional radio, public and commercial television, and freelance journalists. We agreed on communicating the themes of justice, fairness, and reasonable solutions to the media. While I was confident that we could provide a never-ending stream of stories about different families in all areas of the state, I was concerned that media appetite for our stories would be short-lived. Despite my concerns, between July and October 2013 we had coverage across all media outlets on a weekly basis.

THE MINISTER CALLS

On the October 15, 2013, we were featured on a prime-time national current affairs TV program, which resulted in widespread media coverage the following day. The media interest triggered an immediate response from government—I was called in to meet the Minister and his advisors. The Minister said our proposed solutions seemed entirely reasonable and the government would act quickly to alleviate the suffering imposed by the policy. Politicians from both major parties tabled their concerns about the BMO in parliament (Fyffe, 2013, p. 2966 and McLeish, 2013, p. 3619). I realized our campaign was succeeding; we were also receiving support from industry associations, local government, and the broader community.

On December 17, 2013, the Planning Minister announced that reforms would be made to the BMO:

I expect those changes will be very straight forward to allow residents to be able to build on their properties, particularly on land that's been deemed unbuildable at this point of time.

What we're going to do is ensure private land, private risk. That principle is paramount and importantly Victorians will be aware of their fire risk before they build.

Longbottom (2013)

However, by April 2014 the promised changes to the BMO had not eventuated. We reinstated the media campaign, which led to this newspaper editorial:

Premier Denis Napthine is faced with a serious and growing problem as the November 29 election draws closer. The Government cannot stand by as people, through no fault of their own, find themselves paying off loans on land they cannot either build on or sell because of the building codes adopted after the bushfires in 2009.

Herald Sun Editorial (2014)



FIGURE 14.8

Lobby group protest at parliament.

From ABC News (2014).

To maximize the media coverage, we organized a protest at parliament in the following days, where we handed over a petition to the Planning Minister. All TV news outlets covered the story that evening (Fig. 14.8).

The Minister's advisors called me shortly after the protest, and we had several meetings to work through changes to the BMO.

LEGISLATION CHANGES

On July 31, 2014, changes to the BMO planning legislation were implemented. The changes did not go as far as guaranteeing "private land, private risk." The new BMO was not a wholesale change in the way risk was assessed or managed; acceptable risk was not defined and remained open to the interpretation of referral authorities. However, some of our suggested solutions were included; there were more options for reducing risk such as private shelters and building to FZ, and the nationally accepted method for BAL assessments would replace the more onerous Victorian method.

I was cautiously optimistic that increased flexibility in the revised BMO would enable us, and many others, to build our homes.

THE BMO AND REGULATORY FAILURE

During the 2.5-year community campaign for changes to the BMO, the failures of the policy development process emerged. The process was authoritarian, and little regard was apparently given to independent expert advice or impacted communities. A lack of impact analysis and evidence-based reasoning resulted in regulatory failure.

EXPERT ADVICE

The VBRC had been heavily critical of state government, local government, and government agencies for a variety of shortcomings, including land use planning policies. This chapter argues that in the often irrational, defensive, and emotional period after a disaster, it is particularly important that independent experts have a major role in policy development to ensure policy reform is evidence and risk based.

The BMO was developed to replace the Wildfire Management Overlay (WMO), which had been developed in response to the 1983 Ash Wednesday bushfires. The BMO established a new BAL site assessment method and mandatory defendable space distances, which were more conservative than the nationally accepted building standards method.

The DTPLI and CFA consulted with experts during the formation of the BMO policy in 2010 and 2011. Experts advised that the proposed BMO assumptions and inputs would generate higher risk assessments, higher compliance costs, and reduced development compared to the existing national construction standards BAL assessment methodology (Bennetts, 2011; Shaw, 2011).

(The proposed BMO inputs)...would result in a total set-back of more than twice the value that would be required by simply applying the building standard. If this is what is proposed, it is not considered to have any basis at all

Bennetts (2011)

And

The (BMO) Working Group should avoid taking the approach of safety independent of accepted cost/benefit analysis which would lead to a legislative or policy response that exceeds the logical analysis of the risk in a true cost versus benefit sense and does not meet community and Government expectations

Shaw (2011)

However, in its briefing to the Planning Minister, DTPLI stated that the impact of the BMO would be an *increased* number of building developments, *lower building costs*, and *fewer* BAL FZ assessments:

The single site assessment process in most instances will reduce the BAL required for a particular site and the number of sites assessed as BAL FZ due to different modelling assumptions from the current WMO process. This reduction in the BAL will need to be balanced by more stringent vegetation management prescriptions to achieve an acceptable level of safety.

This means that sites previously considered by the CFA as too high a risk for development may now be able to be developed, allowing landowners to build homes. Building costs for landowners may also be lower as houses are likely to be able to be built to a lower BAL.

DTPLI (2011)

Inconceivably, the DTPLI Minister's brief was contrary to expert opinion provided earlier in the year and provided the Minister with a false prediction of the policy impacts on landowners.

IMPACT ANALYSIS

The inputs in the national construction standards BAL assessment were scrutinized as part of the Australian Building Codes Board *Construction in Bushfire-Prone Areas—Regulatory Impact Statement*, a rigorous cost/benefit analysis, alternative policy evaluation, and stakeholder consultation process (ABCB, 2009). The VBRC also considered the national construction standards BAL inputs and “despite great scrutiny by the VBRC and many witness statements in relation to the Standard...the VBRC made no comment on the inadequacy of the (BAL inputs) FDI 100 or the Flame Temperature 1090K” (Shaw, 2011) and increasing those inputs “appears to be based on CFA’s existing policy rather than scientific evidence” (Shaw, 2011).

I argue that the DTPLI and CFA’s decision to alter those inputs without evidence-based reasoning, rigorous impact analysis, and cost/benefit analysis demonstrated a failure of due process. Mapping the new BAL ratings would have identified the scale of land sterilization caused by the BMO. For example, BAL mapping was conducted for the township of Wye River (Colac Otway Shire, 2014) in 2014. Over 90% of existing properties were rated BAL FZ (Fig. 14.9).

The BMO prevented BAL FZ development, therefore 95% of the township became undevelopable. The impact of a BAL FZ rating was that vacant land was sterilized and existing homes could not be upgraded or rebuilt, resulting in disastrous economic, social, and bushfire resilience outcomes. If this mapping exercise was carried out in 2011, it would have informed government of the degree of land sterilization caused by a more conservative BAL assessment method.

PRIORITY OF LIFE

The VBRC concluded that life safety must be prioritized over property protection, which became the basis of the new public safety campaign “leave early and live.” The BMO policy did not allow risk to life to be addressed with the use of approved private and community shelters, mandatory evacuation, or any other measure. The development of single dwellings in high-risk areas could simply be refused, despite the growing number of technical solutions available to prioritize life safety.

Vulnerable use buildings were not included in state planning or building policy or in the National Construction Code. Existing homes were not addressed by any policy at all. Both categories of buildings presented greater risk to life than new bushfire compliant dwellings (Fig. 14.10).

Blakely Disaster Readings

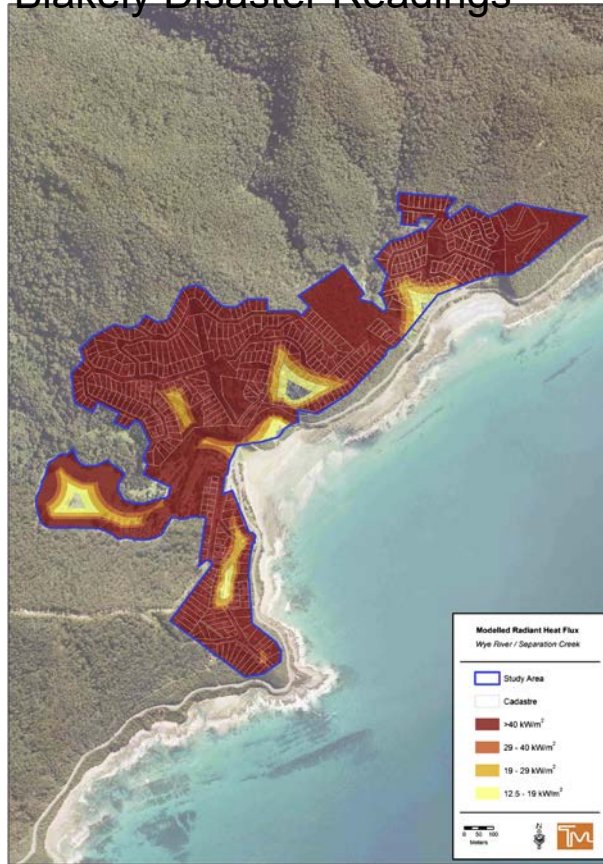


FIGURE 14.9

Wye River BMO BAL mapping.

Courtesy of Terramatrix (2013, p. 188).

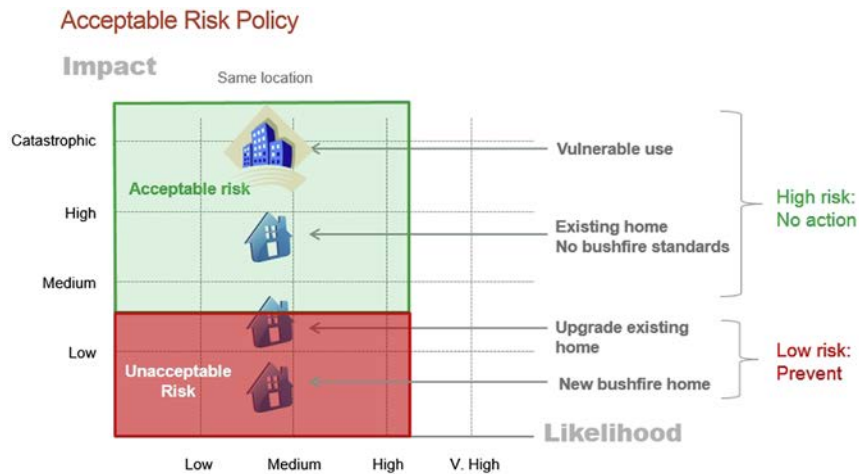


FIGURE 14.10

Acceptable risk and regulation.

From Cotter (2012)

As blocks of land became sterilized under the BMO, neighboring residents declared that they would have to stay and defend their existing homes, because the BMO would prevent them rebuilding after a bushfire. The regulation was changing human behavior toward a higher risk outcome.

Home owners wrote to the Minister to advise him of this policy outcome:

By making rebuilding very difficult or impossible these restrictions will force residents to reevaluate their leave early policy and reluctantly stay to defend their home in a bushfire which could result in further lives lost.

Irving (2012)

For example, Ed Kennedy's planning permit application was refused, where he proposed to build to the highest allowable bushfire construction requirements. After his application was refused by council, Mr. Kennedy took the case to the Victorian Civil and Administrative Tribunal, where the tribunal upheld the refusal of a permit, and stated:

This (location and risk) is not a position I would want to put any family in

VCAT (2012)

Rather than being permitted to build to strict new bushfire standards, the Kennedy family now rent a dilapidated, 80-year-old weatherboard home next door to their sterilized land. The BMO policy forced the Kennedys' into a higher risk situation (Fig. 14.11).

IMPACT ON LANDOWNERS

The response from government and agencies was consistent, such as this example from DTPLI to Mr. Ben Adamson:

In the aftermath of this disaster the VBRC recommended changes to the Planning and Building controls. These have been implemented and there are circumstances, like yours where it is not responsible to support new dwellings in areas where the risk is too great

Monk (2013)

Mr. Adamson had paid AUD \$272,000 for his land, which was zoned to allow the development of a dwelling, but was rendered undevelopable by the BMO. The land was unsalable as buyers would not purchase sterilized land. The site is surrounded by existing, older houses, which were allowed to be occupied, despite older homes posing a higher risk to life than newly built bushfire-rated homes. Mr. Adamson had a mortgage on the now valueless property, placing him in a negative equity situation. He was forced to rent an older home, not built to any bushfire standards in a nearby high-risk area. He had previously managed the vegetation on the site but was unable to afford to continue that maintenance, which resulted in higher fuel loads and increased risk to nearby properties. The financial and emotional strain impacted Mr. Adamson's health.

**FIGURE 14.11**

Illustration of regulatory failure.

From Cotter (2012).

IMPACT ON COMMUNITIES

For all townships, including those recovering from disasters such as Black Saturday, community-wide resilience and viability relies on new development to provide jobs and accommodation for locals and tourists and prevent inflated rents (RIA, 2013). Existing lawfully created subdivisions are expected to be developed over time, and that contribution to the economy is factored into local government revenue forecasts. Communities voiced their objection to the BMO being used by government to block new development and strip property rights from its citizens, which was viewed as a threat to the viability of regional areas of Victoria (Meehan, 2013).

LESSONS AND REFLECTIONS

FORMALIZING COMMUNITY ADVOCACY

A major lesson I learned was that the process of bushfire planning policy development was deeply flawed, undemocratic, inconsistent, inexpert, and lacking in strategy. Communities were not involved in the policy development that drastically impacted their viability and resilience. Community engagement and impact

analysis could have prevented the adverse political, economic, and social consequences. A formal role for community advocacy in state planning policy could strengthen the democratic process and identify impacts prior to implementation. In response to this lesson, I established a national, not-for-profit organization called the Bushfire Building Council of Australia, which has a board of independent bushfire experts, and property owners can become members, free of charge. Our objective is to provide a platform for independent experts and landowners to work together to promote evidence-based policy and innovative building solutions.

EMPOWERING HIGH-RISK COMMUNITIES

Landowners and communities felt disempowered by the BMO policy and its severe impacts. For many areas where the BMO sterilized land, it may have been possible to mitigate the bushfire risk to an acceptable level for the whole community through strategic fuel management, shelters, upgrading of existing housing stock, and evacuation planning. The economic case for alternative solutions to risk management is compelling. Where building a home to meet BAL FZ requirements is estimated to add AUD \$100,000 to the cost of construction, both the Victorian Community Fire Refuges and private bushfire shelters cost approximately AUD \$2500 per person (MyEM, 2015; Wildfire Safety Bunkers, 2015), which may form part of a family's, or whole community's, integrated emergency management plan.

If there are circumstances where risk to life cannot be reduced to an "acceptable level," then those property owners and communities should be engaged in the decision-making process that determines their future. There are many alternatives to uncompensated land sterilization, as identified by the VBRC, to reduce development in high-risk areas (McDonald, Macintosh, & Foerster, 2013). A critical pathway to empowering communities is to inform them of their risk, both at the community level and individual property level. Statewide risk and hazard mapping is not available to the public. The mapping that is available simply shows whether a property is in a bushfire-prone area, which applies to over 90% of the state. Prospective property purchasers, existing home owners, renters, and tourists have little or no access to meaningful bushfire risk and property compliance information.

POSTDISASTER POLICY DEVELOPMENT

The postdisaster political environment is challenging; public inquiries and outraged communities often attribute blame to governments and responsible agencies. To protect themselves from future culpability or to appease public discontent, governments and agencies may implement policy reform rashly, without the normal rationale of an evidence- and risk-based approach. This chapter contends that regulatory failure, such as that caused by the BMO, can be avoided by formalizing the roles of independent experts and community advocates to ensure that policy development is balanced, rational, and follows due process, including carefully considered policy impacts.

IS THE CHALLENGE OVER?

For some lobby group members, the new BMO did not enable them to build or rebuild. Others have walked away from their land, where the financial and emotional toll was already too great. Ben Adamson has sold his land at a significant loss after the local council advised him that they would never approve development on his site, despite changes to the BMO. After 4 years of legal appeals and lobbying, Ben could not justify further time and money fighting local government (Fig. 14.12).

Lobby group members Jacqui McIntosh and Steve Exner received planning permission under the new BMO in 2014, but they are currently unable to afford to proceed as their building money was depleted due to renting for several years while fighting for changes to the BMO. Their planning permit requires high construction requirements as well as a private shelter, which is currently cost prohibitive for Jacqui and Steve (Fig. 14.13).



FIGURE 14.12

Lobby group member Ben Adamson.

From Leader Newspapers, Webb, E. (2013), Photo: Laurence Pinder/Newspix.



FIGURE 14.13

Lobby group members Jacqui McIntosh and Steve Exner.

Photo courtesy of Jacqui McIntosh.

We received a planning permit for our house at Big Hill in November 2015. We are currently still working through the building permit phase and hope to commence construction by March 2017. It has now been 5 years since we started the planning process.

The communities of Wye River and Separation Creek were devastated by bushfire on Christmas Day 2015. No lives were lost due to full emergency evacuation, but 116 properties were destroyed. Over 90% of properties in the townships had been mapped as BAL FZ prior to BMO amendments in 2014 (Terramatrix, 2013, p. 188), and rebuilding would not have been permitted under the former policy. Properties constructed under both versions of the BMO were lost in the bushfire, which highlighted inadequacies in planning policy, building standards (CSIRO, 2016), and community-wide settlement strategy. Planning policy exemptions have been established to allow rebuilding as the small lot sizes could not achieve defensible space requirements (C089, 2016). An expert panel has been established to generate alternative building solutions as existing policy rendered rebuilding unaffordable for many and would have led to fracturing of the community (WyeSep Connect, 2016). The continuing need for policy exemptions and policy “work arounds” highlights the inadequacy of the BMO to enable cost-effective risk management solutions for existing subdivisions.

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Blakely Disaster Readings

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Planning for Recovery: Ideas and Problematics

15

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INTRODUCTION

This concluding chapter provides a summary and critical discussion of the themes addressed throughout this book. It suggests ways forward in urban planning terms by highlighting core problematics of recovery processes, while advancing overarching principles for improvement. The chapter commences with a discussion of various elements of an “ideal” settlement and its characteristics—not just in physical terms—but also in ways that join the built environment with the qualities of places that are intertwined with their constituent human and environmental systems. It discusses the challenges of recovery and relevant planning processes. The wider framework of disaster resilient settlements, as well as the theoretical and practical contributions provided in previous chapters, is drawn upon. While the scope of this book and the complexity of the topic do not allow for all elements of the framework to be covered in one single publication, we draw upon wider literature where required to illustrate some additional material missing points.

RECOVERY AND DYNAMIC SETTLEMENTS

Traditional approaches to disaster recovery were oriented mainly to redevelopment, particularly in terms of physical structures and systems, and specifically sought to find ways to improve the resistance of communities to expected possible future shocks, if the community had capacity to achieve this. While this must remain important to the resilience of communities, simply bouncing back to a predisaster state as soon as possible is understood now to be insufficient, even if new features that might improve physical resistance to features such as flood walls, or wildfire asset protections zones, have been upgraded. It has been argued and demonstrated in various studies that to simply “bounce back” often results in settlements where future disaster events might result in even more severe impacts if the wider adaptive capacities of communities are not developed as a key part of recovery (UNISDR, 2015a). With increasing numbers of disasters internationally and the increased impacts they bring to communities, it is imperative to recover in a manner that minimizes future impacts. Recovery, as a

physical development process, cannot occur independently of the social, economic, and environmental systems that support human settlements. However, it is not feasible in most cases to seek that entirely new settlements be constructed afresh. Rather, it is generally the case that recovery needs to build on the positive existing elements of settlements, after assessment of beneficial redisaster characteristics are made in parallel with modifying and improving negative characteristics. As stressed by Blakely in [Chapter 5](#), postdisaster activities should not simply follow activities declared by politicians, but we must ensure that we are not repeating “the past when we know that the future holds new threats” ([Chapter 5](#), pp. 63–76). He further argues that we should assist communities to recover to a state that is more or less familiar for citizens, but it should be done so intelligently to ensure that their resilience is increased toward natural or human-made disasters as well as social and economic shocks.

The building of a “new normal” that exceeds the resilience of previous settlements is often limited by the realities of recovery activities. Targeted to literally “recover” settlements focused on physical structures, these activities often do not account for other processes influencing future development and tend not to address long-term social elements contributing to resilience. These might include decreasing socio-economic inequities, improving connectedness, and promoting social, economic, and governance inclusivity and vitality. This is particularly evident in the context of developing countries, where physical structures are often rebuilt relatively rapidly by outside agencies, while communities are left without long-term prospects. Recovery actions tend not to reflect upon the dynamics of settlements, predicted changes in demographics, vulnerable groups, and so forth. For the development of resilient settlements, however, we must take a holistic approach that will include all aspects of community development. It should be acknowledged that settlements are dynamic rather than static entities, and recovery should not obstruct or limit wider development processes. Moreover, if more care is taken to ensure that recovery-related processes are not undertaken in isolation, but include all aspects of community development, the end result will be a more adaptive and disaster resilient settlement.

How can we ensure that recovery takes into account the range of actions necessary to appropriately manage risks into the future? We argue here that urban planning is a key discipline in the recovery process that is able to bring together a range of relevant practices and understandings, which can then be used by relevant professionals as required. The following section of this chapter provides a discussion of systems we must attend in human settlements, while the section [Ways Forward to Deal With Core Challenges to Plan for Disaster Recovery](#) argues the role of planning in their “resilient recovery” and further development.

ELEMENTS OF A RESILIENT SETTLEMENT: PHYSICAL, HUMAN, AND ENVIRONMENTAL SYSTEMS

As reiterated throughout the book, the resilience capacity of human settlements depends on a range of elements, some of which are interrelated and dependent on each other, oriented around the physical particularities of places and the ways that

human systems such as governance, economics, and social relations interact. We argue that planning has the potential to contribute significantly to disaster recovery by facilitating and encouraging the capacity of these elements, improving their resilience, ensuring ongoing maintenance, and improvement of overall performance (beyond disaster resilience) of human settlements as a result. Based on cases presented in this book and the wider literature, we have themed these elements into three systems that are fundamental to human settlements: physical, human, and natural. Physical elements are those aspects dealt with by the traditional built environments disciplines (e.g., buildings, roads, spatial layout, etc.); human systems including governance of settlements, its social and economic elements (e.g., community inclusion, buy back schemes); and environmental systems, referring to the manner in which ecological and natural elements interact with the settlement (e.g., floodplains or fuels for bushfires).

Traditional recovery practices have typically sought to rebuild settlements to a pre-disaster state. However, introduced in 2004, the concept of build back better “calls for the ‘incorporation of disaster risk reduction’ measures into post-disaster recovery and rehabilitation processes and use opportunities during the recovery phase to develop capacities that reduce disaster risk in the long term” (UNISDR, 2015a, p. 2). Today, resilient recovery is recognized as imperative to sustainable development, including disaster risk reduction (DRR) practices themselves. It is defined as:

the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events

UNISDR (2009).

DRR emphasizes the importance of understanding and responding to dynamic change processes in physical and social aspects of settlements’ development, as well as the parallel development of knowledge and evidence sets. These are directly interconnected with the concept of urban resilience, understood by Meerow, Newell, and Stults (2016, p. 39) as:

the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.

From the above, we consider urban systems consisting of three characteristics: physical, human, and environmental. Fig. 15.1 demonstrates the conceptual relationship between these characteristics with urban resilience achieved in the conjunction of the three.

The development of disaster resilient communities is a process of systematic monitoring and adjustment of its physical, social, and natural systems to ensure that its state is evolving with changing risks and is capable of mitigating them, as well as other goals and objectives being addressed. As noted empirically though, few communities include disaster risks in their development in the first instance,

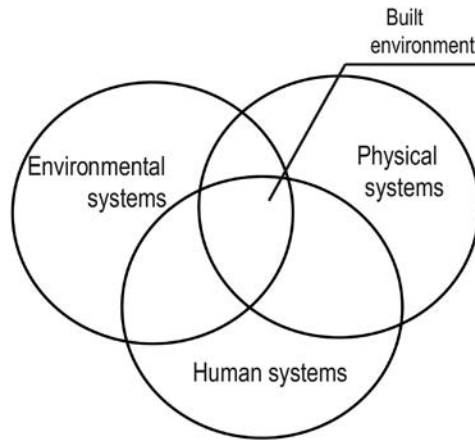


FIGURE 15.1

Conceptual representation of built environment, whereby resilience is affected by the characteristics of dynamic environmental, physical, and human systems (developed by authors).

and unfortunately, it is often only disastrous events themselves that are triggers for governments to actively integrate new relevant policies and regulations. The Swiss hazard mapping, assessment and regulation practices are an example of tragic events in 1951 acting as trigger points for strong evidence-based government intervention responding to risky land speculation and development in avalanche prone areas (see [Chapter 7](#)). This case shows the ways in which the recovery stage and associated activities can be fundamental to the development and implementation of ongoing and systematically monitored actions aiming to develop disaster resilient communities over time.

We argue that there is a need to establish a culture of prevention and improved resilience through recovery processes based on the following principles.

- Urban planning is embraced as a key aspect of good governance.
- Understanding communities as the primary object of recovery, supported by appropriate physical rebuilding.
- Urban planning is provided with a legitimate place in DRR processes, rather than being seen only as a simply regulatory mechanism—but rather is understood as a powerful tool for DRR and as a spatial process of data integration and application, beyond just regulation.
- Planning is understood as key to integrating processes and knowledge spatially, with social, economic, and ecological knowledge.
- There is a culture of initial prevention and risk reduction not just reaction and response before recovery, combined with preevent plans for recovery itself.

- Actual implementation of appropriate hazard outcomes.
- Mitigation of impacts occurring if events are unavoidable.
- The development of learning and knowledge repositories about risks and their treatments.
- Actively bringing people together and integrating subsequent actions.
- Ongoing review and monitoring of regulations, policies, and actions against previously established targets.
- Seeking to make a range of diverse community types resilient.
- Vulnerability is reduced and adaptive capability is improved.
- Good governance is understood as a legitimate outcome in itself (since it improves resilience), as the basis of good urban planning and as a starting point to integrate action.

Urban planning is particularly seen and acknowledged as a powerful tool for development of DRR and resilience. Its dynamic nature allows planning ahead and addressing principles of resilient recovery ensuring that capacity for recovery planning and monitoring is strengthened, roles of diverse stakeholders are clear, national and international policies and standards for disaster recovery strategies are developed, continuum between disaster cycle stages are maintained, and frameworks to enhance risk governance are established and promoted (UNISDR, 2015a).

Among the high-level policy assertions of the centrality of planning to DRR is the Sendai Framework for Action 2015–2030. This 15-year international agreement aims to reduce disaster risks by establishing interdisciplinary actions and acknowledges the role of urban planning in a number of key priorities (UNISDR, 2015b). More particularly, it highlights the need to promote the mainstreaming of disaster risk assessments into development and implementation of land use relevant policies; incorporating relevant hazard mapping into planning policies; aim to develop in a disaster-resistant manner where development cannot be avoided; include community in the assessment processes; promote resilience of new and existing critical infrastructure; establish and facilitate link between response, rehabilitation, and future development; and relocation of facilities and infrastructure to areas with reduced risk levels where possible. The role of land use planning is further acknowledged in the document, which highlights the importance of developing guidance for preparedness for postdisaster recovery, including lessons from other practices and exchanging knowledge and experiences. The framework addresses the dynamics of systems by promoting and reiterating the need for follow-up tools informed by changes in environment and demographic needs of communities.

It is our assertion and the one shared by many others including the [International Recovery Platform](#) (n.d., p. 64) and [UNISDR \(2015a\)](#) that the discipline of urban planning can deliver desirable resilience. We assert in addition, however, that urban planning is also faced with many challenges to its application in recovery. We have summarized these in six main categories set out below, most of which are impacted by the various and conflicting time scales involved in the recovery process, contrasted

with the need by many government and other agencies to achieve timely results. These categories are as follows:

1. Recovery usually focuses on rebuilding, but it is actually for people
2. Equity and the harsh realities of recovery
3. Opportunities, path dependencies, and change
4. New and existing knowledge versus timely rebuilding
5. Temporal scales of “temporary” actions/or work around “Fixes” may be long lasting
6. Site specificity versus standardization and homogeneity

RECOVERY USUALLY FOCUSES ON REBUILDING, BUT IS ACTUALLY FOR PEOPLE

While recovery processes necessarily require rebuilding, cleanup, provision of basic services, and other physically oriented activities, the *purposes of rebuilding are ultimately to serve and support human needs and capabilities* within ecological and economic contexts. However, these processes occur at different temporal scales and it may be challenging to integrate human needs with the imperatives of speedy and cost-efficient recovery that is usually oriented to physical outcomes and performance indicators.

As highlighted in the cases of Sri Lanka and New Orleans, effective recovery addresses wider physical, social, and economic infrastructure matters and improves upon preexisting vulnerabilities to support long-term recovery, rather than just to provide shelter. Examples of community inclusion in processes, addressing community infrastructure needs, and supporting the local economy are discussed in [Chapter 11](#), when local divers were provided with job opportunities during recovery to compensate for loss of their income. These cases show that key success factors include linkages being made between institutions, community, and the design and production of physical structures. The Sri Lankan case study in particular demonstrates the importance of ongoing maintenance of housing, public places (e.g., playgrounds), and infrastructure (roads) provided to the affected residents. Despite its effectiveness, this form of postoccupancy maintenance and monitoring is unfortunately rare. The Haiti example in [Chapter 12](#) illustrates the significance of community inclusion in the rebuild stage, adding considerably to social capital while providing them with a sense of ownership and improved capacity to deal with future events.

The use of housing as a facilitator of income generation (e.g., home-based business) is often a fundamental to recovery in lower income communities, developing countries or informal settlements, as discussed in [Chapters 11 and 4](#). This highlights the need for rebuilding to carefully attend to the needs of residents to ensure that their income is not compromised unduly. Such concerns are also applicable to wider settlements. Post-2001 recovery practices in Bhuj, India (see [Chapter 8](#)) can, in one reading of the situation, be understood as rather disruptive as it involved (voluntary) relocation of affected residents. However, the location of the new settlement was in

a desirable location in terms of securing livelihood and proximity to the main urban area. Alternatively, the relocation in Banda Aceh, Indonesia, discussed in [Chapter 13](#), can be understood as a contrasting case. Here, the village was relocated to an area identified as less tsunami prone. However, the process was carried out without careful consideration of the social and economic needs of residents, leaving them without easy access to the marina—a key generator of their livelihood. As many residents eventually returned to the original areas of their settlement that provided access to income generation activities based around fishing and other marine activities, they again developed tsunami vulnerabilities. These two cases highlight the significance of social capital and means of livelihoods for the future of a community, and the need to address or account for these early in the recovery processes, specifically when relocation is considered.

The establishment of extraordinary agencies and processes, often by “temporary” external agencies or providers, may facilitate decisive action and coordination but at the expense of building local capacity and resilience.

While the most familiar and common of such agencies are usually large NGOs, such as International Federation of Red Cross/Red Crescent Societies (IFRC) or United Nations Development Program (UNDP), the cases reported in this book reveal the significance of various other organizations that have power and potential to meaningfully support the ongoing reduction of social vulnerability. For example, contributions of the First Baptist Church organization partially supported development of housing and recreational areas in Upper Ninth Ward post-Katrina (see [Chapter 11](#)). Dutch agency Cordaid, together with a number of partners, led the Villa Rosa community-driven reconstruction project in post-2010 Haiti.

The “Make it Right” foundation in New Orleans, which still, 11 years later, continues development of housing projects in communities affected by Katrina is an example of an agency established as a response to disaster. Initiated by a wide range of individuals, it subsequently developed further and assists in the long term a wider range of vulnerable groups, such as disabled veterans in Newark, NJ, referring to New Orleans. However, it must also be acknowledged that some argue that the outputs of this foundation are not affordable for residents, suggesting they do not help the most vulnerable, and that their aesthetics do not support or reflect the community character (e.g., [Alexander, 2014](#); [Campanella & Rose, 2016](#); [Vinnitskaya, 2013](#)). All of these are preventing, if not reducing, building local capacity and resilience.

Recovery agencies such as Foreign Exchange Management Act (FEMA) also have significant influence upon long-term recovery and local capacities as a result of typically being responsible not only for evacuation but also temporary services, such as housing, which often become semipermanent as disasters impacts can often last longer than initially anticipated (e.g., prolonged 2001 earthquakes shocks in Ahmedabad, India) or recovery (e.g., initial cleanup) takes longer than expected due to setbacks.

The agencies and commissions established postdisaster events (e.g., Canterbury Earthquake Royal Commission post-2011 earthquakes) usually include leadership provided by high-level individuals such as external commissioners, often not expert

in the field, to develop deeper understandings of reasons and suggest recommendations for system improvement. Political circumstances, time pressures, and diverse community need to add considerable pressures on these individuals and the bodies they represent. This can lead to rather hasty or “undercooked” decisions and recommendations. For example, in the post-2009 Victorian wildfire season, recommendations correctly made by the Victorian Bushfire Royal Commission to bring up-to-date building and planning codes, resulted in subsequent application of building codes that were not fully integrated and up-to-date with the latest science, and imposed unreasonable fire risk assessments across the state. The community backlash to this was considerable, since many homeowners were unable to build at all on fire-prone land, leading to a rapid political “backflip.” In contrast, this mobilization of community sentiment can be seen as a positive development of local capacity and understanding of bushfire risk treatments (see [Chapters 10 and 14](#) for more details). While it might not be available in all communities, the Sri Lanka example of Foundation of Goodness (FoG) demonstrates how locally based organizations can be utilized in a meaningful way in the recovery activities as they have knowledge and understanding of local context and needs of the community. This is evident in provision of jobs for local fishermen as a source of income in recovery period.

EQUALITY AND HARSH REALITIES

Despite our best efforts, it remains a harsh reality that *disasters are not fair* in their impacts upon different segments of the population, and the recovery process itself may not always be fair in the ways that losses, opportunities to improve after events, and opportunities for actions among individuals and organizations are reallocated during the recovery process.

[Chapter 3](#) discusses the dependence of the recovery processes on preplanning and prior levels of equality within affected communities. If not addressed, ongoing inequality can potentially lead to differing recovery abilities and even civil unrest among residents. While not directly addressing this, [Chapter 8](#) discusses importance of legalization of marginalized groups and addressing informality, which would not only address questions of equity but also prevent formation of new and potentially more vulnerable settlements in the future. Such transformation of systems vulnerable to future events adds to resilience of settlements, as defined by [Meerow et al. \(2016\)](#).

The practices of humanitarian agencies discussed in [Chapter 4](#) demonstrate the importance of addressing challenging and complex questions of human rights for housing, which are complicated by tenure status, land ownership, cultural contexts, but most important are recovery finances and their distribution. Recovery agencies and donors tend to provide financial assistance according to assessment of damage incurred to individual properties. While this is conceptually logical, in practice it raises a series of complications, as resources are typically limited and insufficient to assist all affected. This raises questions as to whether overall and ongoing community benefits will result from distributing recovery finances equally among all affected to use as they see fit, base it upon house damage, or vulnerability of residents ([Häberli, 2013](#)).

Resilient Coastal City Regions

**Planning for Climate Change
in the United States and Australia**

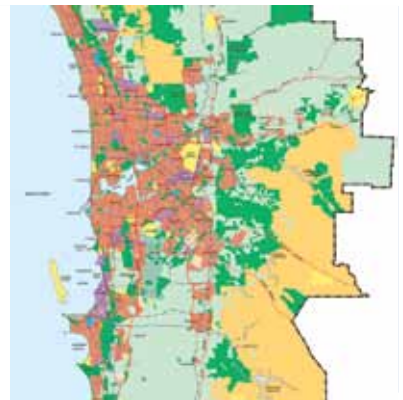


Resilient Coastal City Regions



Planning for Climate Change in the United States and Australia

Edited by
Edward J. Blakely
and
Armando Carbonell



Introduction

Climate Change and Coastal City Regions

Armando Carbonell and Edward J. Blakely

This book reports on responses to climate change in nine coastal cities and metropolitan regions in the United States and Australia. When it comes to climate change, these large, sprawling countries have much in common beyond their predilections for coastal development. First, per capita they are among the highest greenhouse gas (GHG) emitters in the developed world, with Australia usually heading the list and the United States close behind. Second, both countries are exposed to significant climate-related risk relative to sea level rise and storm surge, drought and water shortage, floods, wildfires, and heat waves. The urban regions documented here represent some of the most critical conditions either country faces.

The importance of dealing with potentially severe climate impacts has become increasingly clear. In recent years, we have seen a number of extreme temperature and precipitation events, and climate records were set in countries around the globe. For example, according to the U.S. National Oceanic and Atmospheric Administration (NOAA 2011), in the United States and Australia during 2010 alone:

- The year tied with 2005 as the warmest since record keeping began in 1880. The global combined land- and ocean-surface temperature was 0.62°C (1.12°F) above the twentieth-century average of 13.9°C (57.0°F).
- During the first months of the year, a strong negative Arctic Oscillation—a climate pattern that allows chilly Arctic air to slide south while warmer air moves north—brought snowstorms and record cold to much of the Northern Hemisphere. Polar air reached far into the deep-southern United States in January and February. The record cold weather caused ocean temperatures in the Florida Keys to drop below 15°C (59°F), bleaching and killing coral reefs, which cannot survive sustained cool water temperatures.
- In the Southern Hemisphere, Australia's Bureau of Meteorology reported its warmest summer on record, with an average temperature 0.2°C (0.4°F) higher than the previous record set during the summer of 1997/1998. Australia also experienced its coolest winter in 13 years.

Blakely Disaster Readings

Armando Carbonell and Edward J. Blakely

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- La Niña brought record rainfall to most of Australia toward the end of the year. The country had its wettest spring on record (from September through November). In contrast to the rest of the country, however, southwestern Western Australia had its driest spring on record.
- In September, following its second-coolest summer on record, the western United States experienced a scorching heat wave during which downtown Los Angeles reached the highest temperature ever recorded there: On September 27, the temperature reached 45°C (113°F), breaking the old record of 44.4°C (112°F) set on June 26, 1990.

In terms of cost impacts, eight of the ten most expensive presidentially declared disasters in the United States were storm-related (FEMA 2010):

Most Expensive Presidentialy-Declared Disasters*

Event	Year	FEMA Funding
Hurricane Katrina (FL,LA,MS,AL)	2005	\$29,318,576,948**
9/11 Attack on America (NY, NJ, VA)	2001	\$8,818,350,120
Northridge Earthquake (CA)	1994	\$6,978,325,877
Hurricane Rita (TX,LA)	2005	\$3,749,698,351
Hurricane Ivan (LA,AL,MS,FL,NC,GA,NJ,PA,WV,NY,TN)	2004	\$2,431,034,355
Hurricane Georges (AL, FL, MS, PR, VI)	1998	\$2,245,157,178
Hurricane Wilma (FL)	2005	\$2,110,738,364
Hurricane Charley (FL,SC)	2004	\$1,885,466,628
Hurricane Andrew (FL,LA)	1992	\$1,813,594,813
Hurricane Frances (FL,NC,PA,OH,NY,GA,SC)	2004	\$1,773,440,505

* Numbers are in actual dollars, not adjusted for inflation.

** Approximately 68 percent funded.

Similarly, in Australia the last decade has seen tens of billions of dollars in damage from floods in Brisbane and Victoria, fires in Melbourne and Canberra, and Cyclones Yasi and Larry.

This book deals with both *mitigation* (the reduction of GHG emissions) and *adaptation* (managing the climate-impact risks that cannot be avoided), as the terms are generally used in this field. Stern (2007, 24) has laid out the mitigation dilemma:

Much economic activity involves the emission of GHGs. As GHGs accumulate in the atmosphere, temperatures increase, and the climatic changes that result impose costs (and some benefits) on society. However, the full costs of GHG emissions, in terms of climate change, are not immediately—indeed they are unlikely ever to be—borne by the emitter, so they face little or no economic incentive to reduce emis-

sions. Similarly, emitters do not have to compensate those who lose out because of climate change. [Symmetrically, those who benefit from climate change do not have to reward emitters.] In this sense, human-induced climate change is an externality, one that is not “corrected” through any institution or market [Pigou 1912], unless policy intervenes.

The Lincoln Institute of Land Policy initially became involved in the issue of climate change through our work with planning directors in the 30 largest cities of the United States. As early as 2006 these city planners were raising a new question: How do we respond when our mayors ask about global warming?

In 2005 as the Kyoto Protocol was going into effect—before Nicholas Stern (2007, i), in his important review, declared climate change the “greatest and widest-ranging market failure ever seen,” or the fourth report of the Intergovernmental Panel on Climate Change (IPCC 2007) laid out in stark terms the consequences of inaction—many big-city mayors had joined with those from more than 1,000 other municipalities in signing the U.S. Conference of Mayors Climate Protection Agreement, launched by Seattle Mayor Greg Nickels. Other mayors had joined the pioneering ICLEI (now Local Governments for Sustainability) Cities for Climate Protection. Still others were working with either the Clinton Climate Initiative or the C40 Cities Climate Leadership Group, two efforts to help large cities reduce their greenhouse gas (GHG) emissions that since have merged. The planning directors’ queries led to a series of briefings in Cambridge, Massachusetts, at a 2007 seminar that was part of an annual program convened by the Lincoln Institute in collaboration with the American Planning Association and the Graduate School of Design at Harvard University.

Around the same time, the Lincoln Institute commissioned longtime colleague Edward J. Blakely to write a working paper on the topic of urban planning for climate change (Blakely 2007), shortly before he was called to New Orleans to head the city’s post–Hurricane Katrina recovery effort. Working with other North American colleagues, the Institute also published two policy focus reports on related topics: *Urban Planning Tools for Climate Change Mitigation* (Condon, Cavens, and Miller 2009) and *Planning for Climate Change in the West* (Carter and Culp 2010).

The present volume has benefited from Ed’s experiences in the trenches in New Orleans, Australia, and elsewhere, Armando’s seminars on climate change and cities, and the studio on Climate Change, Water, Land Development, and Adaptation that he taught at the Harvard Graduate School of Design, with sponsorship support from the Dutch government. But above all, this book is the work of the contributing authors from the United States and Australia, who diligently prepared their chapters, brought them to Cambridge to be critiqued in a seminar in 2010, and provided revisions and updates throughout the copyediting and book design process. Some of the U.S. authors also traveled to Perth

in Western Australia to meet with Ed Blakely and several of the Australian authors to present our findings at the World Planners Congress in July 2011.

At least from the vantage point of the United States, it appears that the pendulum has swung from an initial emphasis on mitigation, as reflected in the mayors' initiatives in response to the Kyoto Protocol, to one focusing on adaptation, as cities begin to prepare for the onslaught of climate-related impacts. The nine cases presented in the following chapters show a range of adaptation responses. As we will consider in the concluding chapter, however, in order to avoid catastrophic results it remains necessary to reduce GHG emissions significantly. While there are encouraging developments at the national level in Australia, recent analysis suggests that the time for action is critically short. It remains to be seen whether governments will rise to meet the global challenge.

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Resilient Coastal City Regions

Blakely Disaster Readings

United States of America

Source: Weiss and Overpeck, University of Arizona



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Blakely Disaster Readings



Blakely Disaster Readings

Figure 1.1 New York City

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 1

New York City

Robert D. Yaro and David M. Kooris

The New York metropolitan region is especially susceptible to adverse effects of natural disasters due to its geographic location on an archipelago and adjoining peninsulas of the United States mainland (figure 1.1). The area's densest urban communities, including Manhattan Island and adjacent areas of Long Island and Staten Island, are close to New York Harbor, the Hudson River Estuary, and Long Island Sound. Much of the development in these areas has been built on low-lying land prone to tidal and storm-related coastal flooding that is exacerbated by sea level rise.

Despite its location in a temperate climate zone, the New York City region is also prone to extreme summer heat waves, compounded by the urban heat island effect. During these increasingly frequent events, daytime temperatures can exceed 100°F, threatening public health. The city has taken actions to develop detailed projections of the impacts of such climate-related changes, yet only recently with a focus on adaptation policy. Fragmented governance may further hinder the ability to protect this productive region. A better understanding of this sensitive ecosystem and new policy mechanisms is required to deal effectively with these and other climatic conditions.

Geological, Cultural, and Land Use History

About 20,000 years ago, the Wisconsin Glacier began its steady retreat northward from present-day New York City, freeing the region from the ice blanket that had covered it for millennia. At its southernmost maximum extent, the massive glacier had deposited a terminal moraine nearly 100 miles long (figure 1.2). This ridge trapped a meltwater lake behind its sandy and rocky dam. Toward the western edge of this linear mound, an outcrop of ancient bedrock that had been exposed by the friction of the glacier stood high in this low-lying landscape. A wide river delivering ancient water from the highlands meandered west around the moraine before eventually meeting the constantly rising Atlantic Ocean.

Over the next 15,000 years, the contrasting forces of south-moving freshwater and northward pressure from the ocean formed a series of new channels that carved the terminal moraine into a series of smaller islands. The meltwater lake broke through the moraine to form Long Island Sound, framed at its eastern end by the channel known as the Race and to the west by the East

Figure 1.2 Geology of the Tri-State Metropolitan Region

Source: Regional Plan Association.



River. The force of the Hudson River bringing freshwater south from the highlands eventually created the most direct path. It punched through the terminal moraine between Staten Island and Long Island, and joined what are now the upper and lower bays of New York Harbor. Over the millennia, as the changing climate combined with hydrologic forces, an archipelago off the northeast coast of North America offered the ingredients to support human civilization.

About 3,000 years ago, several waves of Native American tribes moved into the region and made a permanent settlement. By the time European ships set sail for the New World, approximately 5,000 members of the Lenape tribe lived within the current city limits of New York, and several thousand members of other tribes congregated in the surrounding region. As sixteenth- and

seventeenth-century European explorers charted the region and set up trading posts, the strategic value of this protected harbor's location became clear, and the cultural foundations of an open society evolved in the then-Dutch colony (Hornberger 2005).

By the late seventeenth century, wars and disease brought on by European colonization had decimated the Native American population and left the region under British control. In the eighteenth century, the thriving trading post evolved into a city that was an important battle site during the Revolutionary War and ultimately the political epicenter of the new Republic. Though the city ceased to be the new nation's capital, the construction of the Erie Canal and immigration in the nineteenth century ensured that it would become the fledgling country's economic center. Over the last 100 years, significant infrastructure investments and governance decisions have propelled New York City's evolution into the global metropolitan region it is today (Burrows and Wallace 2000).

Metropolitan New York stretches far beyond the city's borders. A transportation system that includes hundreds of miles of highway and nearly 1,000 fixed-route transit stations connects employment and housing centers across three states, 31 counties, and more than 700 municipalities. The region is currently home to approximately 23 million people and more than 10 million jobs. Annually, the economic activity produced in this most vibrant subset of the United States economy totals \$1.2 trillion.

Much of the last half-century's growth has centered around highways rather than the rail network (figure 1.3). Decades of sprawl have resulted in automobile-dependent suburban and exurban communities that are incredibly energy intensive and have few public open spaces. Although its urban core is the most densely populated urban area in the United States, the successive rings of lower density development have given Metropolitan New York an average density less than that of Metropolitan Los Angeles, a region often considered the epitome of urban sprawl (Fulton et al. 2001).

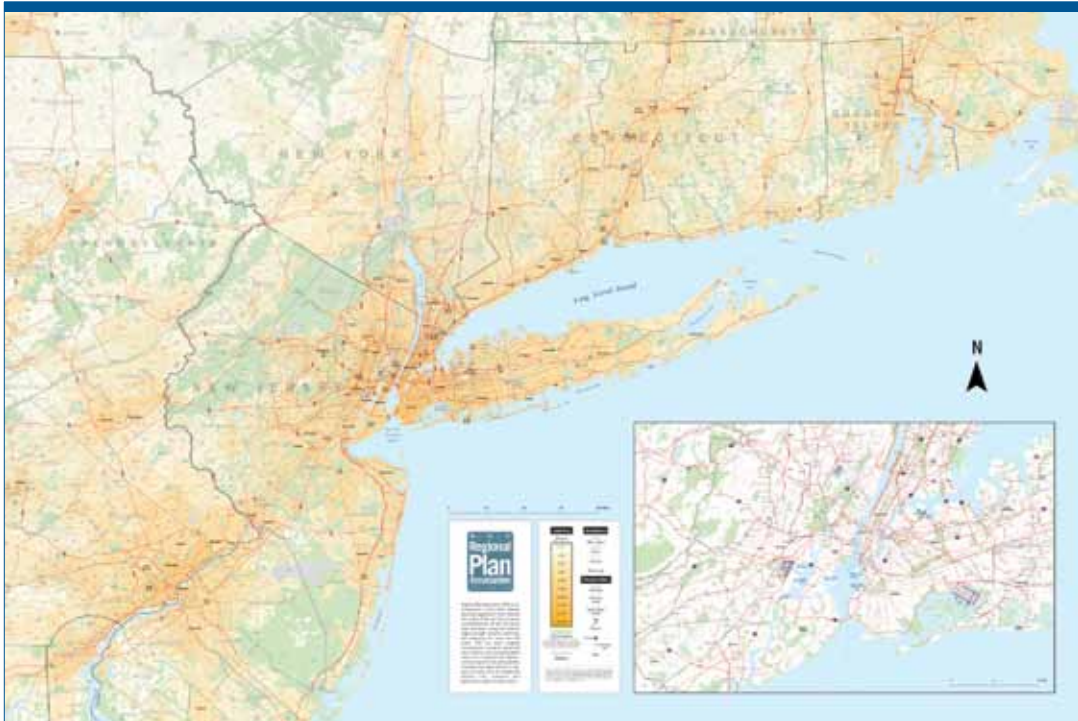
Its high densities and intensive transit use give New York City among the lowest greenhouse gas (GHG) emissions per capita of any municipality in the country. Many surrounding suburban communities have higher per capita emissions rates that tend to accompany higher-income residential areas, even though they tend to be transit-friendly and relatively compact. Coordinated land use and transportation policies, efficient building retrofits, renewable power generation, and landscape preservation for carbon sequestration are needed to make this region sustainable, mitigate the most severe impacts of climate change, and adapt to those impacts that are already unavoidable.

Impacts of Climate Change on the Region

As the science concerning climate change is researched and documented and local modeling is conducted, the implications of global temperature rise on local weather patterns and ecological conditions in Greater New York are

Figure 1.3 Residential Densities and Infrastructure in the Tri-State Region

Source: Regional Plan Association.



becoming better understood. The Union of Concerned Scientists has modeled the impacts on a subnational scale providing a clear picture of the anticipated effects of climate change on the northeastern United States (Frumhoff et al. 2007). This analysis was augmented by the New York City Panel on Climate Change (NPCC) using modeling techniques that provide a more refined level of detail for this metropolitan area (Horton et al. 2009).

The expected impacts on the communities that make up Greater New York can be defined broadly within three categories: sea level rise and storm surge, rain and storms, and heat waves (table 1.1). The impacts described in the following sections are based on the probability of temperature increases in the region. While different models applied at different scales predict a range of climate outcomes toward the end of the twenty-first century, their projections through mid-century are fairly consistent. Summer temperature increases between 1.5°F and 3.5°F can be expected between now and 2030, with increases of between 4 and 8°F by mid-century. While this might seem harmless, especially on a cold winter day, the impacts can be quite severe and can be exacerbated during extreme weather events.

Table 1.1 Climate Impacts on the New York Metropolitan Region

Sources: Frumhoff et al. (2007); Horton et al. (2009).

	Baseline		Early Century					Mid-Century				Late Century					
	NPCC (1971– 2000)	North- east	NPCC	Northeast				NPCC	Northeast				NPCC	Northeast			
				Summer		Winter			Summer		Winter			Summer		Winter	
				Low	High	Low	High		Low	High	Low	High		Low	High	Low	High
Sea level rise (in.)	N/A	relative to 2005	2–5	0.5–1				7–12	4–5				12–23	9.6–16.1			
Sea level rise rapid approx. (in.)	N/A	relative to 2005	5–10					19–29					41–55				
Precipitation (in.)	46.5	?	0.5%	little change		?	?	0–10%	little change		?	?	5–10%	little change		20%	30%
Air temperature (°F)	55	?	1.5-3	1.5–3	1.5–3.5	2.5–4	2.5–4	3–5	2–5	4–8	4–5	4–7	4–7.5	3–7	6–14	5–8	8–12
Days above 90°F	14	15	23–29	23	26	N/A	N/A	29–45	36	51	N/A	N/A	37–64	41	79	N/A	N/A
Days above 100°F	0.4	2	0.6–1	N/A	N/A	N/A	N/A	1–4	N/A	N/A	N/A	N/A	2–9	8	28	N/A	N/A

Sea Level Rise

The most widely known effect of global warming is the impact of melting glaciers on sea level as once-landlocked ice enters the oceans. New York City encompasses close to 600 miles of coastline, and the region adds another 2,200 shoreline miles, making the metropolitan area particularly susceptible to sea level rise. Several analyses of projected sea level rise have been conducted by the Union of Concerned Scientists, the Earth Institute at Columbia University, and the NPCC. The projections from the latter two studies are based on more locally specific data and modeling. Each instance presents a potential range of sea level rise dependent on GHG emissions and many other factors related to the melting rate of the world’s glaciers.

The NPCC projects minimum sea level rises of 2 inches by 2020, 7 inches by 2050, and 12 inches by 2080 (Horton et al. 2009). For the same three target years, the Earth Institute’s projected rises are 4.3, 6.9, and 9.5 inches, respectively (Rosenzweig and Solecki 2001). Given the uncertainty over the long term,

it is important to note that, despite the varying rates of rise at this low end of the projection range, both sources point to an approximate minimum sea level rise by mid-century within the metropolitan region of 7 inches. At the high end, while they become increasingly divergent, all the projections are threatening.

If climate change factors compound to increase the rate of glacial melt, the NPCC projects sea level rise of 5 inches by 2020, 12 inches by 2050, and 23 inches by 2080 (Horton et al. 2009). The Earth Institute's compilations suggest even greater increases of 11.7, 23.7, and 42.5 inches, respectively (Rosenzweig and Solecki 2001). Based on these forecasts, New York's metropolitan coastline is likely to experience at least one foot of sea level rise within the lifetime of the region's current elementary school students.

Recent observations near the North and South Poles and the characteristics of the coastal northeastern United States indicate that these projections may be too optimistic. Current rates of melting are much closer to the average rates that occurred during the last glacial retreat than the lower rates projected in the current climate models. It has been observed that the polar regions are more sensitive than the mid-latitudes to climate change and will, therefore, demonstrate impacts more rapidly than other parts of the globe. For these reasons, combined with uncertainty in the Intergovernmental Panel on Climate Change (IPCC) models, the NPCC decided to explore a "rapid ice melt sea level rise scenario," which projected sea level rise late in this century at between 41 and 55 inches (Horton et al. 2009). This is closer to the Earth Institute projection of 42.5 inches and points to a significantly higher impact on the coastal metropolitan area.

These projections may be conservative, and each additional inch of ocean level will have its own impact on various coastlines around the globe. Recent studies show that the northeastern United States will be disproportionately affected by rising seas. According to an analysis published in *Nature Geoscience*, dynamic sea level rise along the northeastern seaboard will occur almost twice as fast as in the world as a whole (Yin, Schlesinger, and Stouffer 2009). This drastic sea level rise differs from coast to coast mainly because of the cessation of deep convection and deepwater formation in the Labrador Sea and the slowdown of the subpolar gyre.

The combination of larger sea level rises and more concentrated populations relative to other coasts means the Northeast is among the U.S. regions most vulnerable to climate change. Though projections encompass a significant range, recent observations at the poles support the hypothesis that increased sea level rise will occur in the New York metropolitan area and indicate that, in the coming decades and certainly by the later years of this century, it will be an inevitable aspect of life in this region, making adaptation essential.

Coastal Storm Surge

Future coastal storms and the surges they create as they approach land will significantly compound the risks of sea level rise in the region. New York City has

a long history of hurricanes and nor'easters. Climate change makes it nearly inevitable that more severe challenges involving these natural events are yet to come. The city's location makes it particularly vulnerable to storm surges from massive coastal storms because the nearly right-angle intersection of the coast of New Jersey with Long Island acts as a funnel and pushes high waters into New York Harbor. Urbanization has cost the region 85 percent of its coastal wetlands, further reducing the natural capacity of the landscape to buffer developed areas from the impact of storms.

In the early nineteenth century, a Category 4 hurricane that made land-fall at Jamaica Bay one September caused a 13-foot storm surge that hit Lower Manhattan and led to flooding as far north as Canal Street. Historically, this was considered a very rare occurrence because ocean temperatures in the Northeast in the fall are normally cool. Later that century, however, a far weaker Category 1 or 2 storm completely obliterated Hog Island in Jamaica Bay, where summer cottages and fishing posts had been built. The enormous Long Island Express Hurricane of 1938 hit the shores of eastern Long Island and Connecticut with a 25- to 30-foot wall of water, killing 700, injuring thousands, and causing billions of dollars in property damage.

In the second half of the twentieth century, a Category 3 hurricane in 1960 and a massive nor'easter in 1992 each flooded parts of Lower Manhattan and at the Battery posted rises above mean sea level of 8.5 and 7.7 feet, respectively. The 1992 storm caused seawaters to flood coastlines across the region and to overtop some entrances to the PATH rapid transit system, resulting in serious damage and causing hundreds of millions of dollars in damage to housing, utilities, and commercial development. A storm surge as little as another foot or two higher—equivalent to the increases anticipated due to sea level rise in the coming half-century—would result in still more widespread flooding. Even without the effect of sea level rise or the full impacts of climate change, the city's infrastructure has been taxed by recent heavy coastal storms. Just during the past decade, New York City subways have experienced flooding three times, and each time large portions of the region's mobility system were shut down (Center for Climate Systems Research n.d.; Gornitz 2001; Gornitz et al. 2006; and Jacob 2001).

In the mid-1990s, the U.S. Army Corps of Engineers specifically considered the impact that storm surges associated with hurricanes of different magnitudes would have on the city's transportation infrastructure. If a Category 3 hurricane were to take a path up the east coast toward New York City at the most severe angle, it could create a surge of up to 25 feet at John F. Kennedy International Airport, 21 feet at the Lincoln Tunnel, 24 feet at the Battery in Lower Manhattan, and 16 feet at LaGuardia Airport. Both the Lincoln and Holland Tunnels would be completely inundated (U.S. Army Corps of Engineers 1995). As staggering as these results are, the modeling does not include the potential additional effect of a high tide or the height of waves on top of the surge.



Subway flooding in New York during a 1992 Nor'easter

Photograph: Courtesy of US Army Corps of Engineers, NY District

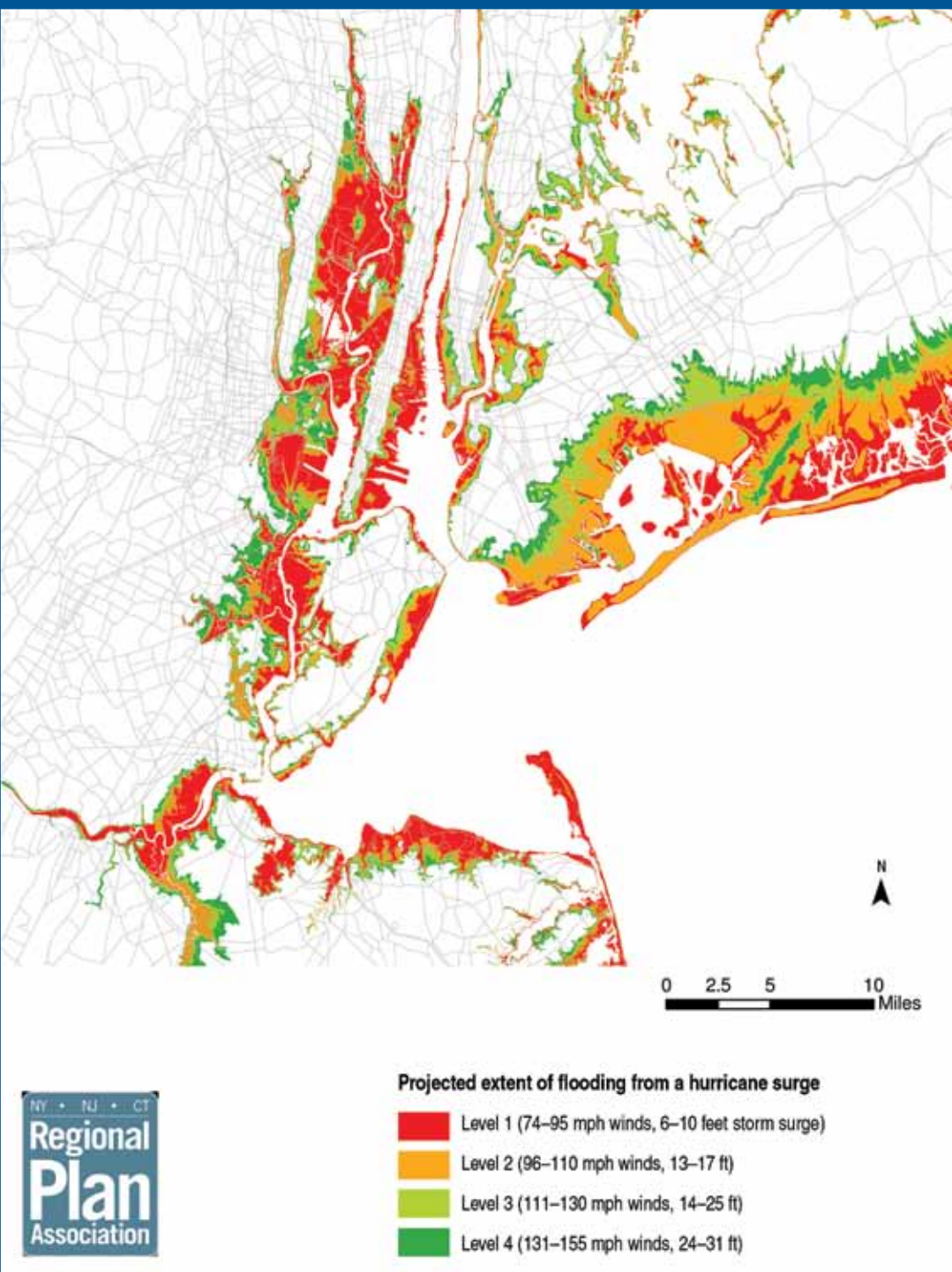
Although Category 4 storms have been rare, ocean waters are projected to become significantly warmer, thus increasing potential storm frequency. The Army Corps' analysis identified surges associated with such a storm reaching 31 feet at Kennedy Airport and the Lincoln Tunnel, 29 feet at the Battery, and 21 feet at LaGuardia Airport. Compounded by sea level rise, the result could be catastrophic. In addition to the impact on critical infrastructure, the destruction of property would be immense because so much of the coastline supports homes and offices of increasing value (figure 1.4). If a storm in 2011 followed the same path as the Long Island Express hurricane, projected losses would total \$39.2 billion (2005 dollars) across the Northeast (Pielke et al. 2008).

Rainfall: Frequency and Intensity

Lack of rain and desertification are likely results of climate change in many regions of the globe, but Greater New York is expected to experience more rainfall than in the past, as predicted by the Northeast Climate Impacts Assessment (Frumhoff et al. 2007). While the models do not demonstrate clear consensus, and it is difficult to project changes in average annual rainfall, the metropolitan area could see increases of up to 10 percent within the next few decades (Horton et al. 2009). Declines may be observed during certain seasons,

Figure 1.4 Vulnerability to Hurricane Flooding in the New York City Region

Source: Regional Plan Association.



but the increases are most likely to occur in the winter months. This changing distribution over the course of the year has an impact on both water supplies and drought. Significantly more important than the increased amount of rain and its annual distribution, however, is the trend toward increasingly frequent extreme storms. The intensity of these storms, the amount of rain deposited in a short time period, and the accompanying winds and surges could be the catastrophic hallmarks of climate change throughout the region.

Inland and along the coast, these storms can overwhelm the capacity of natural drainage systems. Even though the amount of forestland in the Northeast is at its highest acreage since the rise of European settlement, the amount of impervious surface has also increased dramatically. Exurban and suburban development has converted forestland and grassland into building footprints, roadways, and parking lots, significantly impairing the ability of many natural watersheds to manage downpours. Rain that should otherwise be held in the tree canopy or slowly percolate into the ground instead is channeled into pipes and rapidly dumped into streams and rivers. The impacts of such rainfall are likely to include flooding and contamination of waterways and water supplies in many communities.

The greater probability of intense storm events increases the likelihood that more severe flooding will occur, which in turn will force communities to rethink development location based on the amount of risk they are willing to accept. While little construction has occurred on designated 100- and 500-year floodplains since flood-risk mapping came into use, much of the region's existing development is located close to rivers' mouths. Contemporary forecasts conclude that within 10 years, 100-year floods could begin to occur as often as every 43 years, which would double the risk facing development located in the region's vulnerable areas. By 2050 a so-called 100-year storm could occur as often as every 19 years and that could ratchet up to as often as every 4 years by 2080.

Flooding currently viewed as an anomaly may soon occur once or twice a decade, and that will completely alter insurance risks and threaten the value of significant portions of the metropolitan region. As more intense rainstorms hit the hard surfaces covering so much of the area, run-off will accelerate, threatening both more frequent and more severe flooding as well as increasing the extent of pollutants entering the waterways. Of greatest importance is the increased risk of contaminants entering the unfiltered reservoirs of New York City in the valleys of the Hudson and Delaware Rivers. Contamination in these reservoirs will put the region's potable water supply at risk, requiring significant investment in filtration infrastructure to secure the integrity of this crucial resource (Demong et al. 2008).

Heat Waves

Severe storms stem from the rising temperatures associated with global warming. Overall, under a low emissions scenario, the climate of the tri-state area

in 2050 is anticipated to be like that of coastal Virginia in 2010 or, if emissions continue to rise at current rates, it will be more like coastal South Carolina or Georgia (figure 1.5). While rain is projected to increase on the whole, and intense storms will become more frequent, summers will be even hotter. Extreme heat and rainfall variability and intensity will lead to extended heat waves and drought. Currently, the region experiences an annual average of 14 days that reach temperatures greater than 90°F. By 2020, this number is likely to increase to between 24 and 40 days. By mid-century between 30 and 62 days per year will exceed the mark, which is equivalent to between one and two months of heat waves. In 2080, the number could reach a staggering 89 days annually—fully one-quarter of the year.

These heat waves will be accompanied by more frequent and severe droughts. Higher temperatures could result in reducing snowpack, which feeds a portion of the region’s water supply. As supply is constrained, increased heat will also lead to increased demand for water. Compounded by the potential reduction in reservoir volume stemming from the lack of rainwater recharge, significant conflicts could arise between the needs to maintain maximum reservoir levels and to keep storage capacity that helps mitigate increased flooding risk throughout the watershed (Demong et al. 2008).

City and State Planning for Climate Change

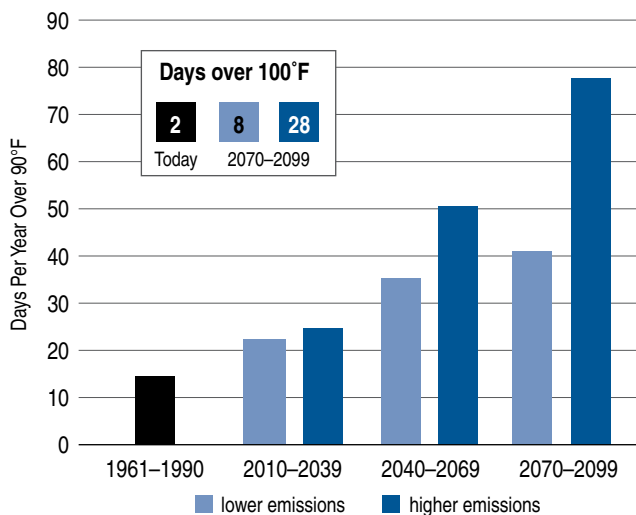
The implications of these data demonstrate the need to adapt to a changing climate, and planning for its threats has begun at multiple levels of government. In the face of federal inaction on this issue, municipal measures to address climate change have received significant national and global attention. Many of these local plans have been supported strongly by the business community, increasing the likelihood of their success. However, up to now most municipal plans have focused almost exclusively on mitigation instead of climate adaptation.

New York City

New York City is taking a leadership role in addressing both adaptation and mitigation in its planning efforts. The scale of its watersheds and water distri-

Figure 1.5 Impact of Global Warming on Heat Waves in Central Connecticut

Source: Frumhoff et al. (2007).



bution system ensures that the Department of Environmental Protection is concerned with a geography significantly larger than the city's 300 square miles, an area already much larger than that of the average municipality in the region. Although the Office of Long Term Planning and Sustainability and the Department of City Planning have recently taken the lead in a robust approach to adaptation planning, the city's initial climate action efforts focused on mitigation planning.

In 2007 New York City's Mayor Michael Bloomberg led the creation of PlaNYC 2030, a comprehensive sustainability and climate plan with detailed recommendations. It included land use recommendations to accommodate an additional one million residents in transit-oriented locations; open space and water quality recommendations to provide every resident with access to parkland and waterfront; recommendations to reduce demand for electricity through building efficiency and green supply using renewable options; and transportation recommendations to increase the city's already high transit trip share. The plan also laid out detailed performance measures to track progress in achieving these goals, and by 2009 most of the short-term objectives had been reached. The city is now in the process of revising PlaNYC in accordance with a new local law that requires plan updates every five years.

PlaNYC contains three specific recommendations related to adaptation: (1) create an intergovernmental task force to protect vital infrastructure; (2) work with vulnerable neighborhoods to prepare site-specific plans; and (3) launch a citywide strategic planning process for adaptation. To achieve the first goal, in 2008 the mayor convened the NPCC to determine the likely impacts of global warming on the city by compiling existing analyses and conducting modeling exercises. The panel further determined what adaptation responses will be used to address those impacts that cannot be avoided through mitigation strategies already adopted in PlaNYC. The panel is using these more location-specific projections to identify risks posed to critical infrastructure and propose strategies for adaptation.

In spring 2008, the city began a partnership with Brooklyn's United Puerto Rican Organization of Sunset Park (UPROSE) to conduct pilot workshops in that neighborhood as a first step toward achieving its second goal of developing a citywide strategy for local plans in vulnerable areas. Later that year the effort was expanded to include pilot workshops in all five boroughs, and the full outreach and development strategy is now being finalized. To attain the third goal, the city will be starting a strategic planning process for adaptation as a component of a sustainable communities regional planning grant through the U.S. Department of Housing and Urban Development (HUD).

New York State

In areas of the state outside New York City, adaptation planning is taking place at the state agency and subregional levels. The Office of Climate Change, part

of the state's Department of Environmental Conservation (DEC), established the Climate Smart Communities program, which offers resources on mitigation and adaptation for municipalities. The DEC also chairs the legislatively established Sea Level Rise Task Force, which released its report on 31 December 2010. Of the state's 62 counties, 17 lie in the coastal zones of the Atlantic Ocean, Long Island Sound, and the tidal portion of the Hudson River.

The task force's report assesses impacts and potential strategies put forth to protect the state's coastal ecosystem, public works and infrastructure, and local communities. The focus is on nonstructural strategies aiming to enable the natural systems to adapt to sea level rise while new development avoids vulnerable areas, retreats from them, or enables migration of natural protection mechanisms. Between 2004 and 2009, New York State spent nearly \$23 million on projects to protect public infrastructure and private property from erosion and coastal area flooding. Several hundred million dollars more are to be used for projects on Long Island alone.

Because sea level rise will make constant replenishment of beaches and dunes impossible, the report focuses on enabling these geological features to migrate inland. This strategy is not feasible in the urban core, however, and the report's significant reliance on nonstructural solutions resulted in New York City withholding support for five of the thirteen recommendations. The report does acknowledge that, while nonstructural strategies are preferred, adaptation will "require a multitude of flexible, non-exclusive, location-specific approaches" (Sea Level Rise Task Force 2010, 54). With more than \$125 billion in residential assets alone within the 100-year floodplains of Nassau, Suffolk, and Westchester Counties and New York City, specific interventions need to be found.

The report's 13 recommendations deal with policies, partnerships, funding, research, and outreach. The first of them sets the stage for future action by proposing that the state officially adopt the sea level rise projections of the task force through a legislative act or executive order. This will put all agencies and government entities on the same page regarding assessment of the threat facing New York. Several recommendations, however, focus on the necessary, but still unfunded and incomplete, research required to determine the nature of more specific and local impacts in order to make response actionable at multiple levels of government. While some recommendations call for amending policy and eliminating current subsidies that can serve to increase community resiliency at little or no cost, many aspects of the plan will require funding. The recommendations include several innovative funding mechanisms, such as dedicating real estate transfer taxes on sales of luxury housing within the coastal zone for adaptation actions, and exchanging publicly owned properties acquired as a result of tax delinquency with homeowners whose houses occupy land in vulnerable areas. The report highlights the realities that there are no easy solutions, a broad range of strategies will be necessary, and protection of the most con-

centrated and valuable aspects of the built environment entails more research and inventive responses for the urbanized core of the region.

In coordination with several university partners, the New York State Energy and Research Development Authority (NYSERDA) has funded ClimAID, a statewide climate adaptation assessment (New York State ClimAID 2009). In the coming years the initiative will focus on case studies to demonstrate the interconnectedness of climate impacts and adaptation strategies with co-benefits to communities to address multiple threats simultaneously. In 2011, NYSERDA began this process by issuing a request for proposals for regional coordinating organizations or consultants to help communities on Long Island, in the Hudson Valley, in the Albany capital region, and upstate municipalities complete regional GHG inventories; develop action plans; and align local, regional, and state policy to achieve reduction targets.

While Long Island is just beginning a comprehensive sustainability planning process that will include adaptation recommendations, the Hudson Valley is the subregion of the metropolitan area farthest along in preparing its climate adaptation strategy. Rising Waters is a collaborative effort of the Eastern New York Chapter of The Nature Conservancy and its partners: the Hudson River Estuary Program of the DEC, Hudson River National Estuarine Research Reserve, Cary Institute of Ecosystem Studies, New York State Water Resources Institute at Cornell University, and Sustainable Hudson Valley (Nature Conservancy 2009). During 2008 and 2009, the effort brought together more than 150 local representatives in a series of scenario planning workshops to explore the implications of climate change and possible adaptation courses. Over the coming years, working groups will advance policies that aim to improve community preparedness for extreme events, incorporate climate impacts into the land use planning process, guide future development away from floodplains, and make critical infrastructure more resilient. Rising Waters uses a model process to engage a wide range of stakeholders and identify those strategies that provide the greatest benefit given the range of impacts the region will likely face in the future.

Rising Waters began with the development of four scenarios that consider how Hudson Valley communities and agencies might deal with the impending impacts of climate change up to 2030.

1. Procrastination Blues assumes very little action within the time period.
2. Stagflation Rules demonstrates economic stress that may result only in land regulatory adaptation measures.
3. Nature Be Damned depicts a future where large engineered megaprojects are built in response to damaging floods.
4. Give Rivers Room outlines a future in which flooding continues even after megaproject construction and a new push toward nature-based solutions are in place. (Aldrich, Dunkle, and Newcomb 2009)

Eighty climate response actions were measured against eight criteria in order to assess ease of implementation, ability to achieve desired adaptation goals, ability to limit negative social and environmental externalities, and potential to be transformative. Each of the responses was assessed within the context of the four scenarios and ranked on its ability to respond correctly in a variety of contexts. The five most effective actions were: (1) holding regular neighborhood meetings to discuss response; (2) updating community-based emergency response plans coordinated with state agencies; (3) requiring local communities to work with the state's Office of Emergency Management to maintain updated regional hazard and predisaster mitigation plans; (4) requiring state agencies to conduct flood-risk assessments of all major infrastructure; and (5) changing the requirements for stormwater permits.

Connecticut

In 2009 the State of Connecticut's Department of Environmental Protection began assessing adaptation options and released a series of eight reports (based on the NPCC modeling) detailing the effects of climate change in sectors related to human habitation and environmental quality. The reports examined biodiversity and habitat, fisheries, forestry, infrastructure, natural coastal shoreline environment, outdoor recreation, water resources, and wildlife.

Four working groups were established to study the impacts and adaptation strategies addressing the state's agriculture, infrastructure, natural resources and ecological habitats, and public health needs. Their initial reports summarized the threats to these four sectors and were released in early 2010. The groups presented draft adaptation strategies and implementation plans to the state legislature in mid-2010 (Connecticut Department of Environmental Protection 2009). The following discussion outlines some of those findings for each sector.

Though one may not think of agriculture as a significant part of the economy in an urbanized northeastern state, Connecticut's nearly 5,000 farms comprise more than 13 percent of its land area and produce goods that exceeded \$550 million in sales in 2007. Of greatest significance are its oyster crop (highest value in the nation); milk production (highest yield per cow of any location east of Michigan); witch hazel (highest production in the nation); and black currants (highest production in North America). Dairying in particular will be significantly impacted by the heat and storm effects on herds. The increase in temperature will require additional cooling operations to prevent the spread of infectious disease among cattle and keep dairy cows cool to reduce stress. Warm waters will improve shellfish growth off the Connecticut coast, but may increase their susceptibility to disease.

Two of the state's most successful crops—witch hazel and grapes—will benefit from warmer weather and a lengthened growing season, and these conditions will also raise the possibility of biofuel production in areas where it is currently not supportable. On the other hand, maple syrup production may be

impossible by 2080 due to the disappearance of a freeze/thaw cycle. Increased temperatures and precipitation will also place warm-weather crops at significant risk during the second half of the summer, making them more susceptible to pathogens and bacteria. Many such crops depend on consistent temperatures and precipitation to thrive.

Enabling an urban, suburban, and rural population to prosper in Connecticut has required significant investment in the built environment and infrastructure involved in transportation, energy, water, wastewater, stormwater, and coastal protection. Models developed by the Federal Emergency Management Agency (FEMA) using the current 100-year flood maps do not yet include projected impacts from climate change. A risk assessment workshop run by Connecticut's Department of Environmental Protection, with participation from working group members, assigned a high risk level for all infrastructure categories except water supply and indicated that these risks would begin to materialize by 2020 in most categories. Stormwater infrastructure, specifically, has been built to a design standard far too limited to accommodate the projected volume of rain by mid-century. Record storms in spring 2010 washed out culverts, resulting in bridge collapses and flooding throughout coastal communities. Storm impacts to the coastal route forced Northeast Corridor public transit lines out of service for several days, making it increasingly clear that transit—a significant element of a GHG mitigation strategy—is also one of the most vulnerable support systems that will require early adaptation measures.

Natural resources and landscapes form the backbone of the state's quality of life and, in turn, its economy. Not surprisingly, the most susceptible ecosystems are those that operate in a narrow niche and are limited in their geographic coverage, such as coldwater streams, tidal marshes, beaches and dunes, and freshwater wetlands. These also are among the environments that provide human settlement with the greatest ecological services—conditions that support necessary aspects of the state's food web and also buffer human settlement from storms and coastal impacts. Temperature, drought, inward migration of inundated areas, and increased runoff all jeopardize the ability of these fringe ecosystems to support necessary biodiversity and geophysical functions.

Public health extends beyond the literal health of the community to address those necessary aspects of settlement that support human life and reduce the risk of disease. Extreme storms with the potential to knock out power and destroy homes and commercial buildings can lead to temporary homelessness or the inability to reach necessary services, such as food supplies and medical assistance. Both late-summer tropical storm and an unseasonably early snowstorm in 2011 knocked out power for nearly 800,000 households and raised a stark awareness of the potential impacts of increasingly volatile weather. Many commercial areas and downtowns were unaffected because of lower tree cover or underground power lines, so they were able to provide services at local restaurants and hotels. However, it is not difficult to imagine a scenario in which

storm refugees cannot reach such assistance. At the same time, nonacute factors related to air quality, urban heat island, and ozone conditions take a lasting toll through asthma and other decreases in lung function or inflammation of airways, which tend to affect urban dwellers and poorer communities disproportionately. These neighborhoods are already more susceptible to the health threats of current pollution than are the more metropolitan residents, and that situation will be compounded by climate change.

Though the draft strategies and implementation plans have yet to be released, the four groups presented initial recommendations with a common theme: the need for better data. The state will require two categories of information to prioritize actions based on finding the appropriate balance between cost and minimization of risk. First, a more detailed review of the impacts of climate change on Connecticut's specific geographies and ecosystems is essential to understand future challenges. Second, specific information on current conditions, such as the exact height of rail infrastructure or exact location of biodiversity resources, is needed to understand what is at risk.

New Jersey

The final recommendations report mandated by the New Jersey Global Warming Response Act of 2007 includes a chapter on adaptation (New Jersey Department of Environmental Protection 2009). It describes the need to plan for the inevitable impacts of climate change and the planning process to identify areas of risk and reduce the state's vulnerability over the next century. This process is to be inclusive and involve representatives from government, business, academia, and the civic community. Six areas for further research and planning align closely with Connecticut's recommendations, but they are organized slightly differently and some important elements are added.

Despite the report's lack of depth in terms of adaptation planning, it presents some specific recommendations of interest. These include a Blue Acres program to purchase storm-damaged properties for recreation, as well as storm-water or coastal impact management and rolling coastal easement programs so that state-controlled coastal buffers migrate inland as the area in need of regional management changes over time.

Two considerations not included in other adaptation plans in the New York region are potential increases of in-migrants to New Jersey and impacts on the state's investments. In an era of universal climate impacts, the Northeast may experience fewer adverse consequences than other regions, so the report suggests the need to plan for significant migration into the region from other parts of the country. Additionally, many of New Jersey's financial resources, including pension funds and other aspects of its portfolio, are invested in areas and sectors that could be vulnerable to the ramifications of climate change. A necessary step in adaptation will be to redirect investments to sectors that will be less prone to losses related to climate impacts.

Regional Agencies

Two regional infrastructure agencies, the Port Authority of New York and New Jersey (PA) and the Metropolitan Transportation Authority (MTA), also are conducting adaptation planning. Recognizing that the majority of its infrastructure lies within or directly adjacent to the City of New York, the PA (2011) is working closely with the city through the NPCC and PlaNYC 2030 on adaptation strategies. It also has specific initiatives underway at its airports, which are very susceptible to rising sea levels and storms, even in the short term. In 2008 the MTA (2008; 2009) convened a Blue Ribbon Commission on Sustainability that focused on the opportunities available to reduce electricity demand within the system, among other measures. It calls for attracting two-thirds of projected population and employment growth into transit-oriented centers organized around the MTA's subway, commuter rail, and bus networks. Given the susceptibility of the subway and rail infrastructure to coastal impacts and inundation, the MTA has also created an internal adaptation team to identify appropriate planning and response strategies to limit the impact of climate change on the critical infrastructures they manage (Jacob 2001; MTA 2009).

New Consortium for Sustainable Development

In the winter of 2010, officials from several major cities in the tri-state region began to discuss a collaborative approach to economic development. With a shared set of assets, including robust transit, walkable downtowns, housing options, and innovative economies, representatives from Newark, New Jersey, New York City, and Stamford, Connecticut, recognized that together they had a set of complementary skills that could increase their joint competitiveness dramatically by building a stronger network. Concurrently, the federal government was beginning to take a new approach to coordinating planning among its agencies through place-based programs to benefit regions already implementing policies to achieve livable communities.

Regional Plan Association (RPA) and the original cities that met to enhance their shared competitiveness led the formation of a new consortium to attract federal financial support. The New Jersey representatives eventually went their own way, but the New York–Connecticut Sustainable Communities Consortium eventually included four metropolitan planning organizations: the New York Metropolitan Transportation Council plus three Connecticut-based groups, the Southwestern Region Metropolitan Transportation Organization, Greater Bridgeport–Valley Metropolitan Planning Organization, and South Central Council of Governments.

Nine cities—Bridgeport, New Haven, Norwalk, and Stamford in Connecticut; Mount Vernon, New Rochelle, White Plains, and Yonkers in New York's Hudson Valley; and New York City—two New York counties (Nassau and Suffolk on Long Island), and two regional planning organizations (Long Island Regional Planning Council and RPA) were also involved. With approximately

15 million residents and a regional annual economy greater than \$800 million, this consortium was the largest in the country to receive support for regional planning from HUD.

This new effort includes both regional and local components. At its heart is a network of transit-oriented developments that collectively can increase the amount of location- and energy-efficient housing dramatically. Each of the projects presents hundreds of acres of underutilized land and brownfields that can house the next generation of the region's residents in transit-rich and sustainable neighborhoods. These plans comprise the metropolitan area's greatest opportunity to reduce vehicle miles travelled and the resulting transportation emissions significantly. These new neighborhoods, within walking distance of the nation's most robust transit network and the largest concentrations of employment outside of Manhattan, will form the foundation of a regional mitigation strategy by means of interventions to the built environment.

Acknowledging the need to adapt to inevitable climate impacts, this initiative will enable the region to take its most significant step toward confronting this challenge. Using New York City and its miles of coastline as a test case, the consortium will conduct an analysis to determine the best strategies to increase the area's resilience to sea level rise and coastal storm effects. This planning process and the lessons learned will be replicable in communities throughout the tri-state region and the nation, and will set the benchmark for preparing communities to manage the trade-offs as coastal cities continue to grow during the twenty-first century.

Toward a Coastal Adaptation Strategy

Despite making progress in developing climate adaptation strategies, the New York region is still threatened by potentially catastrophic impacts of climate change, and its highly decentralized governance structure makes it difficult to develop a comprehensive climate adaptation strategy for the entire metropolitan area. While the incremental steps now being taken by all three states, many municipalities, and major public authorities can lead to a broad system of adaptation measures, these efforts may not be adequate to meet the challenges posed by the most severe projected impacts.

Three broad categories of adaptation strategies will have to be implemented in coordination with one another and at different levels of government to prepare the New York metropolitan region for sea level rise and storm surge: retreat, resilience, and protection. Retreat and resilience must begin immediately across the region, and planning for protection must accompany assessments of the changing impacts of the first two categories.

Considering Strategic Retreat

As sea levels rise and as coastal storms and storm surges increase in frequency and intensity, some portions of the coastline will not be able to continue to

support human habitation. Although property values along the region's entire coast are high, some areas will not be able to justify the significant investment needed to prevent repetitive loss of value from storm impacts. Two tests should be applied to determine whether additional public resources should be deployed for the protection of vulnerable areas. The first test would determine if critical infrastructure of regional and local significance, such as transportation, energy, or wastewater treatment facilities, is present and needs to be reinforced. The second test would determine whether the concentration of employment, housing, and other activities is such that the revenues generated in those areas are high enough to offset public costs associated with repeated reconstruction following floods or other disasters. Low-density residential and second-home communities without critical infrastructure would be the most likely targets for relocation and retreat.

This strategy could be implemented through administratively simple (but politically difficult) changes in federal flood insurance and disaster relief programs that would preclude rebuilding in flooded areas following major storm events. Residents receiving flood insurance or disaster payments would be required to reinvest these funds outside of designated retreat areas. In addition, local, state, and federal beach nourishment, flood prevention, and infrastructure investments would be prohibited in these areas. Because of the political challenge inherent in withdrawing public support from flood-prone areas, it may be necessary to phase in these policy changes following major flood events.

Analysis at the regional or state scale is necessary to determine which communities will be most susceptible to climate impacts and which ones are likely to have the greatest imbalance between the cost of postdisaster public bailouts and future tax revenue. To build political support for these actions, it may also be necessary or desirable to create transfer of development rights (TDR) programs to provide financial incentives for relocating development away from flood-prone areas to safe upland districts. TDR programs have been utilized in a variety of urban and suburban settings across the Northeast to achieve similar outcomes, but some ingenuity will be required to adapt these programs to this new policy goal.

Increasing Regional Resilience

Many stretches of the coastline contain critical, immovable infrastructure, and other areas have concentrations of high-value development and dense populations that preclude relocation or any market-based transfer scheme. Some communities have both types of resources, and all of them will need to be made more resilient to potential climate impacts so that temporary flooding, heavy rains, and storm surges can be absorbed by the built environment in a way that results in temporary inconvenience rather than long-term damage. Much of the region's urban transportation, wastewater, and electricity generation infrastructure is located just above—or often below—sea level. This resilience strategy

will combine a variety of actions that typically are implemented at the site level and target protection efforts taking a different approach to development in the path of potential flooding to work with water rather than against it.

Site level protection can take many forms, but it must always involve small-scale design interventions that remove critical pieces of the region's infrastructure from the path of flood events. The two broad types of intervention involve (1) creating small barriers to water intrusion and (2) removing elements from the path of water. The subway systems of New York City and Newark, for example, are located largely below ground and many sections are below sea level. For all but the most significant events, small and simple changes in design can prevent a deluge from cascading down stairs and into the portals of these subway systems.

At the new South Ferry subway station at the southern terminus of the #1 train, or 7th Avenue Local line, the subway portal was raised one step (approximately eight inches) above sidewalk level so that a passenger steps up once before descending the staircase into the system. This additional step essentially serves as a miniature levy, protecting this portal from surrounding waters. Similar interventions could be instituted on the roadways surrounding highway tunnels, in the form of speed humps, and at a larger scale in the form of dikes situated around airport runways and energy and wastewater facilities.

To remove aspects of infrastructure from the path of water, electrical devices, computer systems, and other critical support systems for buildings or infrastructure could be raised to a height sufficient to place them above projected flood levels rather than being situated at or below ground level. Working with water in these ways creates a site level design paradigm that enables buildings and infrastructure to manage water rather than attempt to block it or to funnel it into stormwater collection systems. This approach has benefits in dealing with both increased storm intensity and coastal storm surge. As rain events become more severe, stormwater will need to be collected and retained on site in order to avoid combined sewer and stormwater overflows and flooding. All aspects of green infrastructure, including green roofs, rain barrels, rain gardens, street trees, and permeable pavement, should be implemented on private parcels and in public rights-of-way. These measures should be mandated in critical basins and incentivized throughout the region.

Within the floodplain and the coastal impact zones, the ground floors of buildings should be designed to be flooded without serious mechanical or property damage. Roadways along water bodies should act as temporary reservoirs for increased flow, and their drainage should be designed to fulfill this role. Living quarters and mechanical systems should be at elevations above the potential flood height to limit damage. The current building codes in New York City and many other parts of the region already include such specifications for future development, but it will be necessary to retrofit existing buildings to meet these standards as well. While urban design objectives of active ground floors and

walkable waterfronts may be in conflict with raising active uses above the flood line, these difficulties can be overcome when both adaptive responses and good urban design are planned in conjunction from the outset.

Building Protection

Regardless of how successful retreating from the most vulnerable coastal areas and making critical infrastructure and densely developed areas more resilient prove to be, in the long run the region may require the kind of flood barriers already installed in some other developed countries, such as the Netherlands, United Kingdom, and Japan. Given the lead time needed to construct such a complex system, the region should have begun to assess the need for such actions already.

Professor Malcolm Bowman and his colleagues at the State University of New York at Stony Brook have proposed that retractable flood barriers be erected at three key points around New York Harbor to protect those areas with the highest intensity of development and activity at the region's core. To protect the entire harbor, barriers would need to be erected at the Verrazano Narrows, at Arthur Kill in Perth Amboy, New Jersey, and near the Whitestone Bridge, where the Upper East River flows into Long Island Sound (Bowman et al. 2004). This system would prevent storm surges from flooding the most densely populated, low-lying, and flood-prone areas around the harbor's Upper Bay, the Lower Hudson and East Rivers, and Newark Bay. An additional barrier would likely need to be constructed at the gateway to Jamaica Bay between Rockaway Beach and Coney Island to protect vulnerable Queens neighborhoods in addition to those of Manhattan, the Bronx, Brooklyn, Staten Island, and New Jersey that the three core barriers would protect.

The SUNY Stony Brook researchers have modeled the barriers' projected ability to protect the urban core against the impacts of storm surge events using three sea level rise scenarios—3.7, 9.7, and 17.8 inches—to approximate conditions in 2030, 2050, and 2080 (Kim, Simmons, and George 2009). The barriers would reduce the maximum water height within the walls by 60 inches and would increase the outside height only up to 8 inches as the water tapers off rapidly into the sea. Results would include reductions of flooded land by 25 percent, affected population by 20 percent, property value impacts by 35 percent, and hazardous material and waste sites impacted by 50 percent (Kim, Simmons, and George 2009). The value to the region would be immense, though the cost would be tremendous and no clear quantification of the cumulative impacts of retreat and resilience measures has been performed.

Given the long timeframe of construction, cost estimates for these structures are neither comprehensive nor definite, but some numbers are available. The Verrazano Narrows storm surge barrier linking Staten Island and Brooklyn was estimated in 2009 to cost approximately \$6.5 billion with an estimated annual maintenance cost of \$75 million (Jansen and Dircke 2009). Combining

that harbor-entrance barrier with lower-cost designs for narrowing the East River and Arthur Kill waterways could protect the entire harbor at a total cost of \$10 billion. Despite the magnitude of the threat, the probability of severe events actually occurring remains relatively low. Many other policy demands compete for the resources necessary to pay for these barriers. Consequently, no action has been taken on these proposals, but more in-depth studies are necessary and should be coordinated across state lines in the coming years. This analysis will be increasingly important as the potential benefits of the existing shorter-term actions and site-level strategies are better understood.

The experience in cities that have erected flood barriers suggests that repeated devastating floods must occur before political support can be galvanized to invest huge sums in these systems. London's Thames Flood Barrier was erected after ruinous flooding in 1921 and 1953. The Dutch Delta Works system of flood barriers was built following the catastrophic floods of 1953, when 1,800 people died and extensive property damage occurred. Similarly, the hurricane barriers in Stamford, Connecticut, Providence, Rhode Island, and New Bedford, Massachusetts, were built only after disastrous flooding was caused by major hurricanes in 1938 and 1955. It may be that in New York, too, experiencing an extreme event will be necessary before progress in building flood barriers is made.

If climate change and sea level rise forecasts prove to be accurate, it is only a matter of time before such events will occur. Thus, it is prudent to be prepared to protect the tens of millions of people who will be living and working in the New York region in the years and decades to come. Both immediate responses and long-term planning are necessary to prepare the region for the challenges the region will face in a new and changing climate.

A Regional Approach

Just as the GHGs emitted by power plants, transportation systems, and buildings do not respect political borders as they enter the atmosphere, the impacts of global warming are indiscriminate in their geographic distribution. In nearly every state and local plan beginning to tackle this challenge, policy recommendations tout a regional approach. Yet to date the initiatives neither demonstrate cooperation nor share significant information across state or other jurisdictional lines. The Regional Greenhouse Gas Initiative (RGGI) was established to acknowledge that the northeastern states are tied to one another in their quest to reduce GHG emissions within this region, and these states also must work together on an adaptation strategy.

The New York metropolitan area's coastline spans Connecticut, New York, and New Jersey, and the river corridors that will flood during intense storm events are shared with several states beyond the borders of the tri-state region. Partnerships among various governments will be necessary to address the challenge of climate change. For example, the threat of coastal impacts along the

Atlantic Seaboard could be managed more effectively by collaborative efforts among New York, New Jersey, Rhode Island, Delaware, and other states. The coastal impacts along Long Island Sound are best dealt with by a partnership between New York and Connecticut. The critical infrastructure of New York City and its harbor is of importance to the states and authorities of the tri-state region in addition to the federal government. Mitigation planning has demonstrated that local initiatives become increasingly effective when municipalities partner at the regional scale. A partnership that involves states at the megaregional scale—the scale of the Northeast—will be more effective at achieving adaptive action than policies enacted by any one state individually.

While some U.S. metropolitan regions spill into adjacent states or occur along a river border between states, only New York spreads across a geography that takes in more than three states with hundreds of miles of coastline and the bulk of its population concentrated on three low-lying islands. The larger Northeast Megaregion consists of a continuous, urbanized corridor along a vulnerable coast across 14 states and the District of Columbia. The interdependence of these communities has led to their success over the past half-century, and collaborative planning for climate adaptation will help prepare both the Northeast Corridor and the New York metropolitan region to face the changes of the next 50 years or more. Failing to work together across political boundaries in a calibrated response to the risks associated with global warming will jeopardize not only the economic competitiveness of this region but its habitability for generations to come.

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Figure 2.1 Southeastern Atlantic Coast States

Source: Weiss and Overpeck, University of Arizona



dark blue overlay areas = low-lying coastal areas of ≤ one meter elevation vulnerable to future sea-level rise

Chapter 2

Southeastern Atlantic Coast States

Lauren Brown, Colin Quinn-Hurst, Phil Emmi, and Reid Ewing

The southeastern Atlantic coast of the United States, with low-lying topography in the path of Atlantic Ocean weather, is particularly vulnerable to sea level rise and extreme weather events (figure 2.1). The region already experiences floods, coastal erosion, wildfires, droughts, and hurricanes. Anthropogenic climate change and rising sea levels are likely to result in increases in both the frequency and severity of extreme weather events as well as in associated impacts on coastal communities (Nicholls et al. 2007). Both population growth in coastal areas and the limited land available for development lead to significant human exposure to natural disasters throughout the coastal states (McMullen and Jabbour 2009; U.S. Global Change Research Program 2009). From North Carolina to Florida, such threats hold implications for economic, social, and environmental policy, to which they are just beginning to respond.

Impacts of Climate Change

Temperature Rise

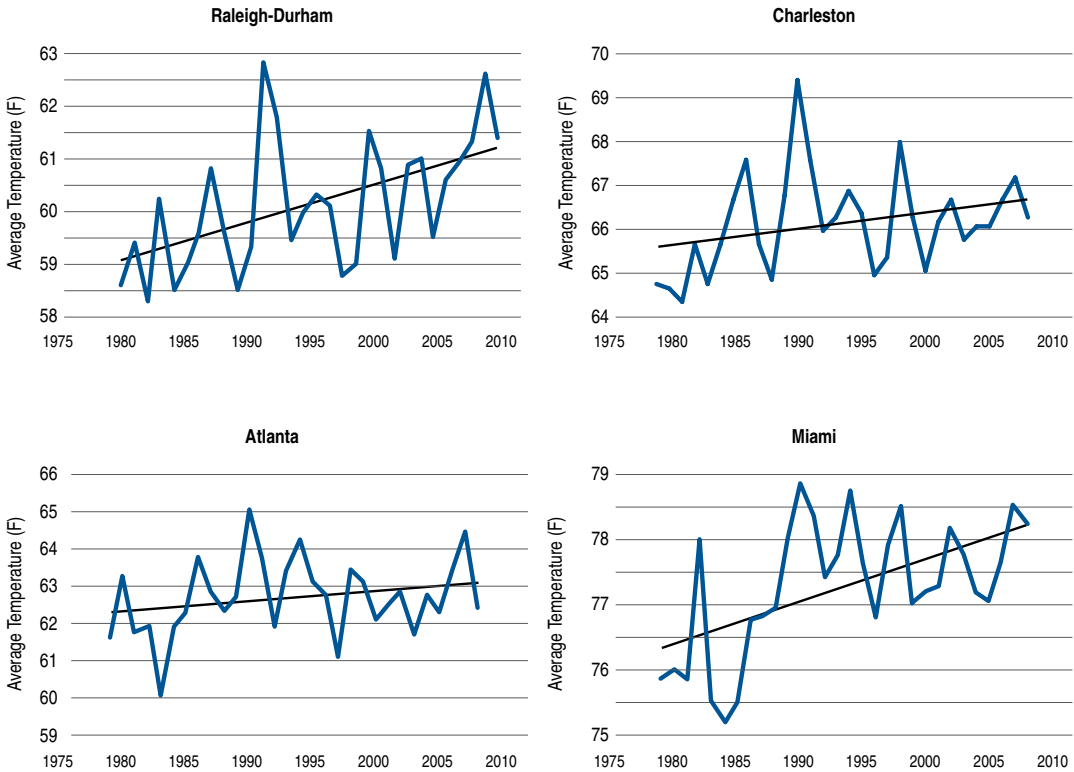
Based on trend lines, over the past 30 years average annual temperatures in the Southeast have already risen between 1°F and 3°F. The examples in figure 2.2 are typical for the region. As modeled by the Intergovernmental Panel on Climate Change (Meehl et al. 2007, 762), average global temperature would rise 2.0°F to 5.2°F by 2100 in the best-case scenario, and this assumes a coordinated global shift toward clean technology and an information-based economy. The worst-case scenario—an associated temperature rise of 11.5°F over the next century—assumes continued industrial globalization that remains dependent on fossil fuels (Meehl et al. 2007).

Though regional variations in temperature are difficult to project, the southeastern states can anticipate continued warming across all seasons. Temperatures are projected to rise 4.5°F by 2080 under a low emissions scenario, and 9°F under a high emissions scenario. The number of very hot days—those exceeding 90°F or 100°F—is expected to rise faster than the number of days with average temperatures, putting extra stress on people, agriculture, livestock, ecosystems, transportation, and other infrastructure (U.S. Global Change Research Program 2009). Florida, for example, could have more than 165 days

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Figure 2.2 Annual Average Temperatures at the Airports in Raleigh-Durham, Charleston, Atlanta, and Miami

Data source: NOAA <http://www7.ncdc.noaa.gov/IPS/>



per year over 90°F, a 275 percent increase from the roughly 60 days experienced during the 1960s and 1970s (figure 2.3).

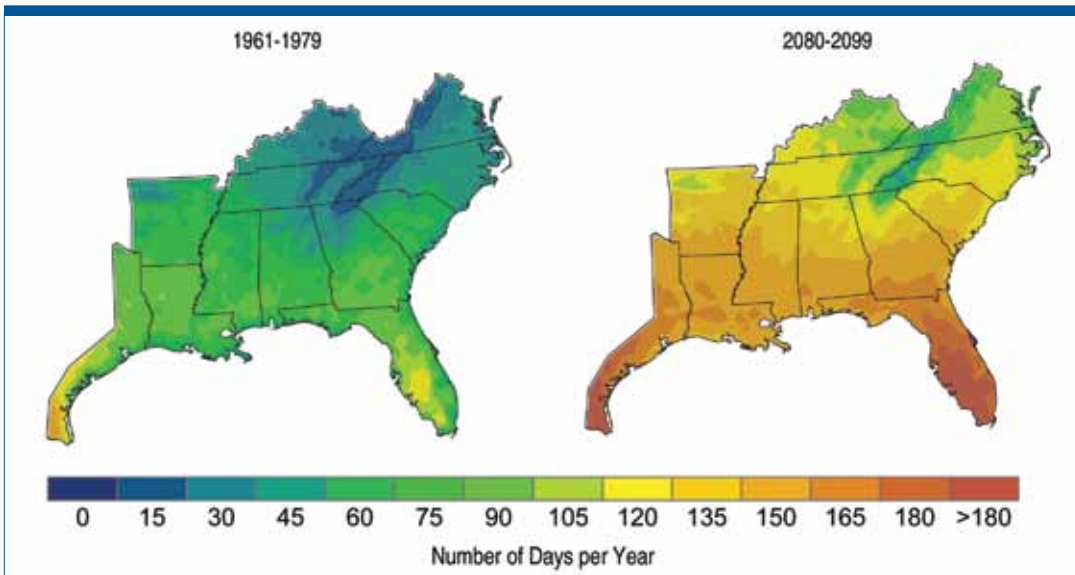
Recent research both confirms the conclusions of the IPCC’s Fourth Assessment Report, published in 2007, and indicates a more rapid rate of change in global mean temperature (Allison et al. 2009; McMullen and Jabbour 2009). Carbon dioxide has accumulated in the atmosphere faster than predicted even in the worst-case scenario, and this has led to faster-than-expected temperature rise and more pronounced “fingerprints” of climate change, such as sea level rise, ocean acidification, and increases in storm severity (Emanuel, Sundararajan, and Williams 2008; Rahmstorf 2007).

Sea Level Rise and Flooding

Under all future scenarios, warming trends increase the temperature of the oceans, which absorb the majority of heat associated with global warming. Increases in ocean temperature lead to sea level rise, heavy precipitation events, and shoreline erosion (McMullen and Jabbour 2009; Stanton and Ackerman 2007).

Figure 2.3 Days per Year with Peak Temperature Exceeding 90°F

Source: U.S. Global Change Research Program (2009, 112).



The IPCC Fourth Assessment Report (Meehl et al. 2007) predicts by 2100 a sea level rise from 0.18 to 0.38 meters (m) under the best-case scenario and from 0.26 to 0.56 m at the worst-case scenario. The IPCC affirms only limited sea rise over the course of the twenty-first century because no consensus has been reached regarding quantifiable effects of dynamic ice change in glaciers, ice caps, and continental ice sheets (McMullen and Jabbour 2009).

Since publication of the IPCC Fourth Assessment Report, the question of future sea level rise has been studied extensively. Loss from glaciers is now occurring at nearly twice the former baseline rate. Measurements also show an increasing rate of ice discharge from the Greenland and Antarctic ice sheets (Allison et al. 2009). While no precise methods for modeling future contributions to elevated sea levels from dynamically changing glaciers, ice caps, and ice sheets, have been agreed upon, twenty-first century limiting values have been estimated (table 2.1).

Locally, the impacts of sea level rise vary according to the rate of rise relative to adjacent shorelines. While some portions of the U.S. coast currently experience rising land mass, the majority of shorelines are subsiding by up to 0.6 m per century (Milne et al. 2009). Over the past half-century, relative sea level

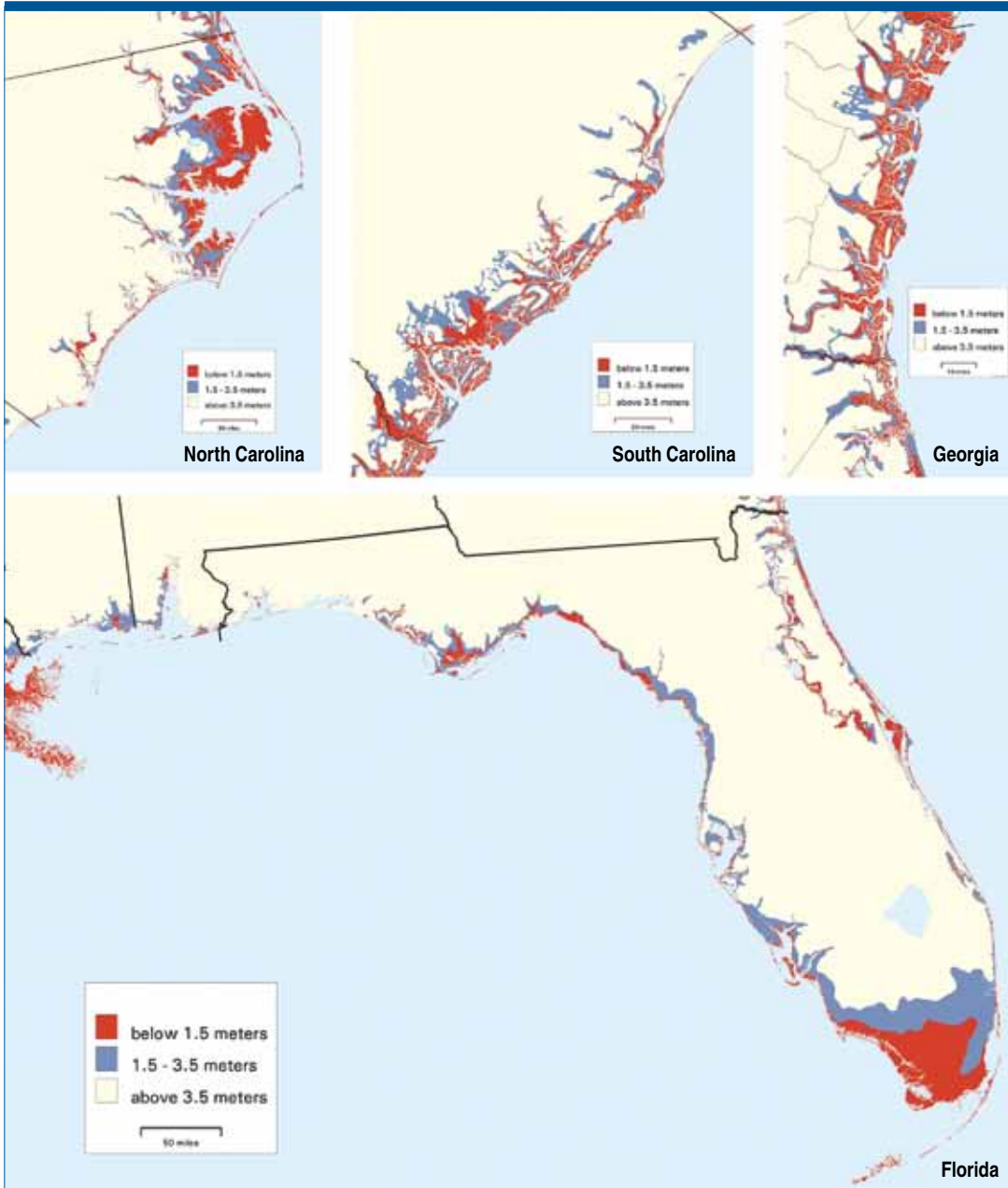
Table 2.1 Differing Estimates of Global Sea Level Rise

Author	Sea Level Rise by Year 2100
Meehl et al. (2007)	0.18–0.59 m (7–23 in.)
Rahmstorf (2007)	0.5–0.14 m (20–55 in.)
Solomon (2009)	0.4–1.9 m (16–75 in.)
McMullen and Jabbour (2009)	0.79–2 m (31–79 in.)

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Figure 2.4 Land Vulnerable to Sea Level Rise on the Atlantic Coast of Southeastern United States

Source: Titus and Richman (2001).



rise along the Southeast's Atlantic coast has been on the order of 0.05 to 0.1 m. Local variation beyond this range is typically due to subsidence and may be found near Charleston, South Carolina, where relative sea level rise has been 0.15 m over the past half-century (U.S. Global Change Research Program 2009).

James G. Titus and Charlie Richman (2001) prepared maps of the Atlantic coastal areas of the southeastern United States that are vulnerable to sea level rise and include lands inundated by sea level rises of 1.5 m and 3.5 m, as seen in figure 2.4. Most of the coastal areas affected are depositional landscapes and intertidal wetlands.

The vulnerability of Florida's southeastern coast is clear, including populated areas such as Fort Lauderdale, Miami, and Miami Beach (Stanton and Ackerman 2007). Figure 2.5 reveals in detail the hazard imposed in four coastal regions by a 1-meter sea level rise.

Hurricanes and Storm Surges

Due to climate change, hurricanes will likely become more intense, with higher peak wind speeds and heavier precipitation. Examination of historic hurricane records from the past 50 years shows a pronounced upward trend in hurricane power and frequency. Emanuel, Sundararajan, and Williams (2008) have linked the increasingly intense cyclone activity in the North Atlantic basin to rising tropical sea-surface temperatures. Incremental changes in sea level lead to large increases in heights during extreme storm events. Even with a moderate sea level rise (below the predictions in the IPCC Fourth Assessment Report), extreme storms that are currently expected to occur every 100 years will begin to occur every several months (Hunter 2008).

Figure 2.5 Sea Level Rise and Inundation of Coastal Communities at a Rise of 1.0 meters

Source: Architecture 2030 (2009). Images © 2007 Google and © 2008 2030, Inc.



The vast majority of Florida's population is settled near the coast, so increased storm activity will directly impact nearly 95 percent of residents living in areas that have not been built to withstand the projected storm intensities (U.S. Global Change Research Program 2009). Additionally, a significant amount of the state's key infrastructure—including roadways, ports, and water treatment facilities—is also located near the coast. This pattern of infrastructure placement puts the functional resources of the state at risk from both rising sea level and storm surges.

Loss of Beaches and Wetlands

Areas most vulnerable to rising sea levels include depositional landscapes, such as beaches, barrier islands, and spits; and intertidal wetlands, such as salt marshes, sandflats, mudflats, and mangroves. Generally, sea level rise deepens coastal waters, increases the size of breaking waves, and accelerates erosion of the depositional landscapes. Barrier islands will experience more intense erosion of seaward edges, more frequent wash overs, and a landward drift of residual dunes. Narrow beaches are likely to disappear altogether, and beaches fronting salt marshes or lagoons will be over washed, while landward landscapes will be invaded by the sea.

The Bruun rule posits that the extent of landward beach-profile recession will be from 50 to 100 times the rise in sea level; thus, for every meter of increase in sea level rise, beaches will recede by 50 to 100 m (Bruun 1962). Many resort beaches are less than 30 m wide, and following the Bruun rule, that type of beach could be inundated by a half-meter sea level rise—an eventuality that could occur by mid-century if McMullen and Jabbour's (2009) predictions prove accurate.

Although historically dismissed as swamps and often drained for development, intertidal wetlands have come to be widely recognized for the important ecosystem services they provide. Wetland soils and vegetation contribute to greenhouse gas (GHG) mitigation through intensive productivity. They retain, recover, and remove excess nutrients and pollutants from stormwater, and they also aid in soil formation and nutrient cycling, providing a broad diversity of habitat for resident and migrating species. Beyond that, they stabilize shorelines by reducing erosion, dampen storm surges, dissipate strong winds, protect against flooding, and reduce damage to life and property during severe storms (Daily et al. 1997; Mitsch and Gosselink 2000).

Though considerable uncertainties remain for predicting how the southeastern coast will respond to the effects of climate change, many scientists agree that coastal wetlands have tipping points. When their limits are exceeded, congruent landforms become unstable and undergo irreversible changes (Cahoon et al. 2009).

Growth of wetland vegetation can adapt to a degree of change in sea level. In intertidal zones, for example, salt marshes have been seen to alter

their elevation relative to sea level by trapping sediment loads and accumulating vegetative detritus. Under certain conditions, salt marshes may be able to keep ahead of rising sea levels through a process of accretion. Marshes will respond more actively in parts of the South Atlantic coast, where nutrient and sediment loads tend to be high. If sea level rise occurs at a slow rate, a marsh will both elevate itself and migrate slowly inland. Its capacity to do this is maintained so long as relative sea level rise does not exceed 1.2 centimeters per year (Morris et al. 2002). This capacity may protect selected wetlands during the early years of the present century, but may fail should sea level rise accelerate beyond identified thresholds as is expected (Tibbetts 2007).

Mangroves represent an important wetland type in South Florida. In regions with little sediment input, the maximum rate of relative sea level rise that mangroves can sustain is estimated to be 0.2 m or less per century, or less than 2.23 mm per year. Present rates of sea level rise in the region range between 2.03 mm per year at Naples and 2.79 mm per year at Vaca Key (Zervas 2009). Thus Florida's mangroves may well fail as sea level rise accelerates beyond the 2.23 mm per year threshold (Twilley 2007).

In addition to the vulnerability of coastal landforms, rising seas are also likely to leave large urban areas such as Miami-Dade County susceptible to storm damage as wetlands and mangroves are lost. This, in turn, may affect the county's water supply as ocean water reaches the Biscayne aquifer (Miami-Dade County 2007). Warmer temperatures, rainfall variability, and coastal inundation are apt to increase saltwater intrusion and elevate groundwater salinity, particularly in areas with limited freshwater recharge (Scavia, Field, and Boesch 2002).

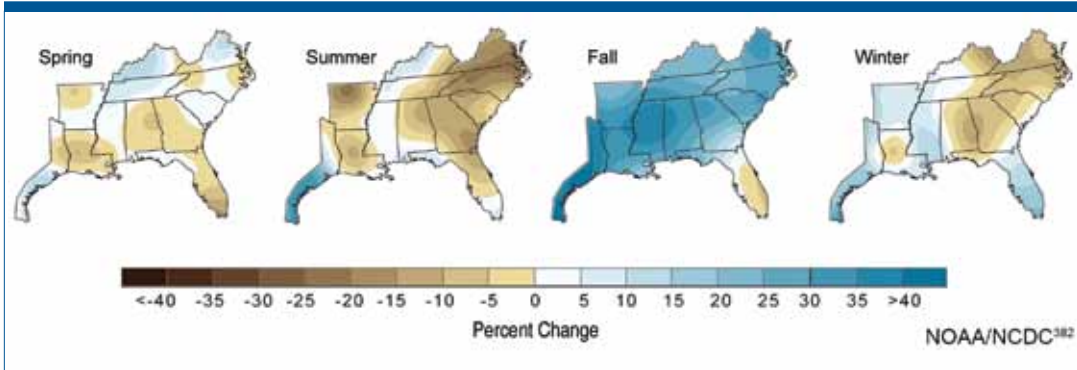
Drought and Wildfires

Higher temperatures, surface water evaporation, and increased variability in rainfall can all lead to drought, which now represents a distinct threat to southeastern states (figure 2.6). While average precipitation in the Southeast has increased by 30 percent since the early 1990s, summer and winter precipitation declined by nearly 10 percent in the eastern part of the region. Over recent decades the percentage of the Southeast region experiencing drought has increased. Despite a projected overall increase in annual rainfall due to high-precipitation events, consistent moderate rainfall will decrease, which can impact the recharge of freshwater aquifers (Stanton and Ackerman 2007). Such circumstances contributed to the drought in Georgia in 2007 and led to \$1.3 billion in economic loss (Flanders, McKisick, and Sheperd 2007). An association also exists between wildfires and climate change. As hotter, drier summers combine with the spread of insect species that negatively impact tree health, large amounts of dry, dead wood ripe for burning are created.

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Figure 2.6 Seasonal Change in Rainfall, Southeastern United States, 1901–2007

Source: U.S. Global Change Research Program (2009, 111).



State Responses to Climate Change

Even though the southeastern coast of the United States is currently among the nation's least developed regions, it contains one-third of its fastest growing counties. Much of the growth is concentrated along the coast, where sea level rise and increased storm intensity will affect land use and development. This growth often takes the form of urban sprawl with its low-density, single-use development that generates high vehicle miles traveled (VMT) and elevated demands for residential space cooling, all of which contribute to climate change (Ewing et al. 2008). Currently, the four southeastern coastal states contribute a significant percentage of the country's GHG emissions. From 2000 to 2005, southern cities and suburbs increased their carbon footprints faster than any other region of the country (Brown, Southworth, and Sarzynski 2008). Given these patterns, the region now recognizes the need to address climate change through both adaptation and mitigation, and state efforts are currently underway.

Florida

Due to its low-lying topography and susceptibility to tropical storms, Florida is especially vulnerable to sea level rise and extreme weather events. The state's main adaptation strategies focus statewide on these risks, and some local governments have adopted these approaches in their own plans. Florida's mitigation strategies are some of the most ambitious in the country, and many Florida cities and counties also participate in nationwide initiatives such as the International Council for Local Environmental Initiatives' (ICLEI) Local Governments for Sustainability program and the Mayors' Climate Protection Agreement.

In 2007 Governor Charlie Crist signed a set of three executive orders—07-126 through 07-128—aimed at reducing Florida's GHG emissions and increasing its energy efficiency. The first required the Department of Environmental Protection (DEP) to create a GHG measurement system and an

environmental scorecard for the state and set a goal for 40 percent emissions reduction by 2025. Executive Order 07-127 required electric utilities to reduce emissions back to 2000 levels by 2017, to 1990 levels by 2025, and 80 percent below 1990 levels by 2050. It also adopted a 22 percent reduction in vehicle emissions by 2012 and a 30 percent reduction by 2016.

The final executive order created the Governor's Action Team on Energy and Climate Change, which went on to establish a statewide climate action plan that addressed both adaptation and mitigation. During the 2008 legislative session, the governor and legislature created the Florida Energy and Climate Commission, the appointed members of which implemented the action plan by conducting annual assessments. The commission also ran incentive programs and provided policy recommendations to the governor and legislature.

Additionally, the U.S. Department of Energy, Florida Energy Office, and Florida Green Building Coalition worked together to create the Green Local Government Designation Standard. This voluntary standard offers a comprehensive list of strategies to achieve GHG reduction and provides guidelines for education programs, ordinances, and incentives for sustainable development.

To address coastal areas and population growth in other high-hazard locations, the Florida Coastal High Hazard Study Committee has recommended management strategies for critical erosion, shoreline change, and beach management. Though originally not intended to address sea level rise and increased storm intensity, the committee's reports have recommended restricting development from hazardous shoreline areas, thus promoting an important adaptation strategy. To deal with intensified drought conditions, the state's 2007 Drought Action Plan includes relevant adaptation measures including the reuse of reclaimed water, the capture and reuse of agricultural irrigation water, and seawater desalination.

Florida's Energy and Climate Change Action Plan. This plan's final report outlines 50 specific policy recommendations for energy supply and demand, cap-and-trade plans, transportation and land use, agriculture, forestry, waste management, and government policy and coordination (Center for Climate Strategy 2008). If all strategies were implemented, the state would surpass by 34 percent the GHG emissions reduction goals set in the governor's executive orders (table 2.2).

The plan begins with a climate science research agenda and a scientific advisory council that will advise state government on research matters. It then identifies and establishes long-term funding to support research with the aim of protecting this funding from short-term economic or political cycles. The research agenda seeks to conduct climate assessments necessary for the protection of Florida's ecosystems and biodiversity and to enhance support for mapping, monitoring, and modeling of climate impacts.

Table 2.2 Florida’s Annual Emissions: Reference Case Projections and Impact of Action Team Recommendations

Source: Center for Climate Strategy (2008, 15).

Annual Emissions (MMtCO ₂ e)*	1990	2000	2005	2017	2025
Reference case projections	248.8	315.0	336.6	405.0	463.3
Reductions from recent actions (Exec. Order 07-127)				40.6	108.7
Projected GHG emissions after recent actions				364.4	354.6
Target emission levels				315.0	248.8
Total GHG reductions from action team recommendations				82.6	189.8
Difference between action team reductions and target emission levels				-33.2	-84.0
Projected annual emissions after quantified action team reductions				281.8	164.8

*MMtCO₂e = million metric tons of carbon dioxide equivalent

Florida’s plan also addresses local comprehensive planning, with regional agencies providing financial and technical assistance to local governments in order to ensure timely updates of local plans. It supports local government review of coastal management elements so that necessary amendments that will enhance coastal resilience in the face of sea level rise will be identified. Regarding the Florida Administrative Code and other statutes, regulations, and policies, the plan seeks review by the state’s attorney general to determine potential conflicts between private property rights and the responsibility of state and local governments to safeguard communities.

Protection of ecosystems and biodiversity takes center stage in Florida’s approach. The state’s plan aims to ensure the health and resilience of Florida’s terrestrial, freshwater, and marine natural communities through redundant representation of habitats and species and protection of connecting corridors. The plan also discourages future reliance on bulk hardening, or reinforcement, to stabilize estuarine and beach shorelines, stating that shoreline hardening should be considered only after completion of a cumulative assessment of impacts on coastal ecosystems. Additionally, the plan supports policies and regulations that clearly define when, how, where, and under what circumstances emergency beach stabilization is allowed.

Regarding fish and wildlife, the plan supports assessment of vulnerability to climate change, identifying the most vulnerable species in order to enhance their chances of survival over the next 50 years. Water resource management also plays a role, and the plan identifies and quantifies the potential effects of

various climate scenarios on existing potable water supplies, emphasizing source water availability and quality.

In addressing the built environment, the plan requires the Florida Building Code to incorporate design criteria that can resist future loads related to climate change and to specify a minimum service life of 50 years. Florida recognizes the need to incorporate adaptation as a design criterion for new infrastructure, making relevant training in architecture, engineering, and construction management a condition for licensing. In a related approach, the plan provides for public outreach through adaptation training and a major public education campaign.

With this suite of strategies, the Florida plan incorporates the best in adaptation and goes further by comprehensively integrating research, planning, ecology, the built environment, and public education. This model plan complements the range of mitigation strategies also pursued by the state. Its integrated and comprehensive approach represents a new state-level standard for addressing climate change in the region.

South Florida. As a planning and public policy agency, the South Florida Regional Planning Council (SFRPC) reviews local governments' comprehensive plans and plan amendments to ensure their consistency with the Strategic Regional Policy Plan. The council also coordinates with the Florida Department of Transportation, other state and federal agencies, counties, cities, and nonprofits to make certain that local plans are consistent with the regional plan. Through energy-related sections of the plan, the SFRPC provides "fuel-neutral" policy direction, by which it seeks to avoid preferential treatment in government policy of one fuel over another. In conjunction with the Florida Gold Coast Clean Cities Coalition, it tracks vehicles using alternative fuels in Broward, Martin, Miami-Dade, Monroe, and Palm Beach Counties.

The SFRPC also prepared a Climate Change Community Toolbox to help decision makers understand how to carry out adaptation planning. In addition to a compendium of current information on adaptation strategies and processes, the toolbox includes a series of maps that consider long-term sea level rise. SFRPC coordinates the Southeast Florida Regional Climate Change Compact, which was adopted by each of the counties as of 2010. The compact includes a Regional Climate Change Action Plan. Goals include establishing a baseline of GHG emissions for the region and coordinating emission reductions from the transportation sector, the built environment, and land use. In early 2011, development of this action plan continued through a series of work group meetings.

Miami-Dade County was one of the first counties in the Southeast to adopt a GHG emissions reduction plan that targets land use, transportation, energy use, and solid waste in order to reduce CO₂ emissions. Officials estimate

Blakely Disaster Readings

an annual average reduction of 2.5 million tons of CO₂ resulting from these mitigation measures (Miami-Dade County 2007). In 2008 Miami-Dade also became one of the first counties to join the Cool Counties Program, which calls for an 80 percent reduction in GHG emissions by 2050, thus reinforcing the county's existing efforts in climate change mitigation (Conservation Leaders Network n.d.).

MiPlan, the City of Miami's climate action plan, outlines mitigation strategies to reduce by 2020 the city's GHG emissions by 25 percent below 2006 levels. This plan focuses on emissions reductions available through energy efficiency in buildings, renewable energy, reduced automobile and fossil fuel dependency, and more efficient land use and zoning. Miami is one of the only municipalities in the Southeast to have a local climate action plan that incorporates both mitigation and adaptation.

Miami's Office of Sustainable Initiatives addresses climate change mitigation through energy policy and education. In an effort to reduce carbon dioxide emissions, the city is promoting energy conservation and efficiency within its own buildings. For example, along with its reliance on passive solar energy, Miami City Hall has an efficiency retrofit of its lighting and a 2008 green purchasing ordinance requiring all products bought for city buildings to meet Energy Star guidelines.

Broward County offers GHG inventory training, conducts climate change leadership summits, and issues emissions reduction strategies. It also encourages its 28 city and town governments to sign on to the Mayors' Climate Protection Agreement and to agree to reduce GHG levels by 2012 to 7 percent below 1990 levels. The majority of them have joined. The cities do not state this reduction goal in their own current local plans and policies, however.

The comprehensive plan of the City of Fort Lauderdale includes a section on sustainability. While it never mentions climate change or greenhouse gases, it does cover energy conservation as well as public investments in alternative transportation. The city's environmental initiatives do not refer to climate change either; instead they focus on water, landscaping, and trash recycling.

Central Florida. After signing the Mayors' Climate Protection Agreement in 2007, the City of Orlando created an internal green team made up of staff members from all municipal departments. The team created Green Works, an environmental action agenda and outreach tool that outlines goals and includes efforts to make the city more energy efficient. As part of this program, city and Orange County staff from planning, permitting, facilities, purchasing, capital improvement, housing, and other departments participated in a training course for Leadership in Energy and Environmental Design–New Construction (LEED-NC), and since then a number of LEED-certified fire stations and private sector projects have been constructed.

Georgia

Georgia is one of 12 states in the country that, as of this writing, has not created a climate change commission or advisory group and has no climate action plan completed or in progress (Pew Center on Global Climate Change 2009). However, the Comprehensive Master Development Plan for Georgia's coastal region peripherally references sea level rise and it recognizes that rising sea levels affect coastal development and destroy wetlands. At the local level, some municipal plans will incorporate climate change impacts into land management and protection plans "as tools become available" (City of Columbia 2008, 131).

Though Georgia does not have a climate action plan, the state enacted legislation in 2001 that requires all utilities, whether investor-owned or municipal, and electricity cooperatives to offer customers net metering. Photovoltaic (PV) systems, fuel cells, and wind turbines up to 10 kilowatts in capacity (for residential applications, or up to 100 for commercial purposes) are among the eligible technologies. In April 2008 Governor Sonny Perdue issued an executive order establishing energy efficiency programs and statewide coastal development plans. It directs state agencies to reduce energy consumption to a level 15 percent below what it was in 2007. Georgia also has a statewide net metering program that requires utilities to purchase excess power from customers who generate energy using systems for solar photovoltaic, fuel cell, and wind energy (DSIRE 2011).

Coastal region. Affiliated with the University of Georgia, the Georgia Sea Grant Program conducts research into shoreline change rates and coastal hazards on barrier islands, and the resulting data could influence adaptation strategies on the state's Atlantic islands. The program also manages the Governors' South Atlantic Alliance program, a regional agreement for coordinated coastal planning, which is discussed further in the "Interstate Coordination" section later in this chapter.

At the county level, in an effort to make it the "greenest county in Georgia," the Chatham County-Savannah Metropolitan Planning Commission funds the Chatham Environmental Forum. Focus areas for the forum include energy and climate change, as well as initiatives for sustainable transportation, green building, and GHG reduction. The forum also develops for the area climate change action plans, which are scheduled for completion in 2012. Despite the commission's effort to address climate change, the 2006 plan for Chatham County and Savannah makes no mention of rising sea levels or plans for either mitigating or adapting to climate effects.

Atlanta. Though Georgia lacks statewide and regional plans, Atlanta and some other cities have taken a leading role in climate change mitigation. In October 2006, Atlanta hosted the U.S. Conference of Mayors' second National Summit on Energy and the Environment, which focused on implementing a goal

to make all new buildings carbon neutral by the year 2030. Two years later Atlanta created an Office of Sustainability with a goal of reducing the city government's carbon footprint by 7 percent by 2012. To reach this goal the city completed government building, lighting, and energy efficiency retrofits, while also passing a green-building ordinance that requires all new city construction and major renovations to be LEED-Silver certified.

In late 2010, the mayor's office put forth the City of Atlanta Sustainability Plan, which established multiple goals to address climate change as well as transportation, water conservation, air quality, green space, and local food systems. In developing this plan, the city conducted a sustainability inventory and researched best practices, which informed selection of future projects. Current projects include a residential energy efficiency rebate program, an alternative fuels plan, and an energy performance contract for city facilities. Among these projects is the proposed Community Climate Action Plan to be completed by 2012.

North Carolina

North Carolina formed a Climate Action Plan Advisory Group (CAPAG) to recommend to the governor and legislature specific policies focusing on reduction of GHG emissions through energy efficiency programs. The group's proposals also include a comprehensive list of state adaptation policies and preliminary recommendations addressing flooding; the forestry, fishing, and tourism industries; public health; and water supply and quality.

In 2007 Governor Mike Easley created a Renewable Energy and Energy Efficiency Portfolio Standard. Under this law, by 2021 electricity-producing public utilities must meet 12.5 percent of retail electricity demand through renewable energy or energy efficiency measures, and membership corporations and municipalities that sell electric power in the state would have to meet a standard of 10 percent by 2018. Renewable sources include solar, wind, and geothermal energy; hydropower; ocean current or wave energy; and biomass resources.

Other state actions relate to adaptation. The Coastal Management Program carried out by the North Carolina Coastal Resources Commission, for example, prohibits development of new houses in coastal areas that are likely to erode in the next 30 to 60 years. The state climate office is using weather modeling and monitoring to develop decision-support tools for the agriculture community. The National Centers for Coastal Ocean Science assist in a number of research projects to assess North Carolina's vulnerability to sea level rise. In one effort, researchers modeled different scenarios of sea level rise and inundation brought about by storms. These scenarios accounted for static sea level rise, tidal changes, winds (e.g., nor'easters), and hurricane storm surges (Center for Sponsored Coastal Ocean Research 2009).

Coastal region. The City of Greensboro signed the Mayors' Climate Protection Agreement in 2007, and the following year the city council created the Community Sustainability Council, an advisory group with a specific goal of reducing GHG emissions. The sustainability council took responsibility for the development of an energy efficiency and conservation strategy and a GHG action plan as well as implementation strategies. On January 4, 2011, the City of Greensboro accepted the council's sustainability action plan, which provides a GHG inventory and projections, a set of policies and strategies, along with methods for implementation. Policies set broad goals in eight topic areas that range from waste reduction to transportation and land use. To implement these goals, strategies provide methods that increase development densities, establish a sustainability account, develop green building standards, reduce solid waste in city operations, and promote urban agriculture.

Greensboro also hosts a number of green initiatives that do not address climate change mitigation directly, but have the effect of reducing greenhouse gases. Bike lanes and sidewalk construction projects encourage active modes of transportation with low emissions, while city buildings receive energy efficient enhancements like LED lighting, motion sensors, and Energy Star equipment and appliances. Additionally, the city's vehicle fleets are currently becoming less dependent on gasoline.

The Triangle. North Carolina has few regional or local planning efforts that address climate change adaptation, though some cities and counties pursue mitigation. Orange County joined ICLEI in 2003 and now takes part in its Cities for Climate Protection Campaign. The county, along with the cities of Chapel Hill and Carrboro and the town of Hillsborough, now leads efforts to inventory GHG emissions, identify reduction measures, and create a climate action plan.

Durham's Environmental Affairs Board, which is primarily a citizen advisory board, focuses on GHG emissions reduction. Working with Durham County and the metropolitan planning organization, it helped to create a greenhouse gas inventory and local action plan. The City of Durham itself adopted a GHG emissions reduction target in 2007, requiring by 2030 a 50 percent government reduction and 30 percent community reduction from 2005 baseline levels. The city hired a sustainability manager in 2008 to help implement the action plan.

Raleigh has signed on to the Mayors' Climate Protection Agreement, ICLEI, and the Sierra Club's Cool Cities Program. The city's comprehensive plan outlines 13 policy recommendations and 12 action items relating to energy security and climate change preparedness. These recommendations concern mitigation and cover a range of topics, such as incentives, retrofits, LEED buildings, renewable energy, and sustainable transportation.

South Carolina

South Carolina's state government formed the Climate, Energy and Commerce Advisory Committee in February 2007. The committee's final report, released in August 2008, focuses mainly on mitigation and also addresses adaptation and vulnerability to climate change (CECAC 2008). This report remains the primary statewide document guiding climate policy in South Carolina. The adaptation section encouraged the state to develop a climate, energy, and commerce action plan, and it contains the committee's analyses and recommendations to reduce GHG emissions and enhance energy and economic policy by 2020. The plan outlines 51 specific policy recommendations for climate change mitigation, such as incentives to promote recycling and improve design and construction of government buildings. Economic opportunities for renewable energy sources are also presented, along with recommendations for further assessment of adaptation strategies.

The state legislature has passed several laws relating to renewable energy, energy efficiency, and transportation. One of these acts provides biomass energy incentives by removing legislative caps on tax credits for equipment that produces biomass energy. A green building act requires appropriate standards for any state building of 10,000 square feet or larger. All state agencies are required to prepare energy conservation plans with a goal of reducing consumption by 20 percent below 2000 levels by 2020 (Pew Center on Global Climate Change 2009).

Coastal region. Citizen and nonprofit groups have developed policies to reduce the impact of climate change on specific coastal communities. Bluffton Township, a model coastal community, uses a transfer-of-development-rights tool to move growth away from sensitive shoreline (Coastal Conservation League 2009).

In 2005, the City of Charleston signed the Mayors' Climate Protection Agreement, committing the city to the initiative's 7 percent reduction in emissions by 2012. To reach this goal, Charleston seeks to create a more fuel-efficient vehicle fleet, retrofitting traffic and exit signs with LED lighting, and also retrofitting city buildings. To help implement climate mitigation strategies within its internal operations, the city also created a staff green team of more than 20 voting members from various departments.

The Charleston Green Committee (2010), a local citizen's group has prepared and submitted its climate action plan, the Charleston Green Draft Plan. With working committees focusing on transportation, buildings, land use and planning, and waste management and recycling, the group intends to reduce emissions and create sustainable development patterns. The plan was received as guidance by the city council, and the mayor and a rotating committee of council members will administer it.

Midland region. After signing the Mayors' Climate Protection Agreement in 2006, the City of Columbia created its Climate Protection Action Committee (CPAC), a volunteer citizen group charged with researching and providing recommendations on climate mitigation strategies. CPAC developed a 65 action-item climate action plan, and it also runs a voluntary green business program that provides Columbia businesses with advice and technical resources geared toward adopting green business practices. The city's 2008 comprehensive plan includes a few of CPAC's recommendations, such as a requirement for LEED-certified city buildings.

Interstate Coordination

While the strategies developed by the four states examined here seem to operate largely independently, a notable interstate effort seeks to coordinate regional decisions. The governors of Florida, Georgia, North Carolina, and South Carolina signed a partnership agreement in May 2009, which formed the Governors' South Atlantic Alliance. Its purpose is to identify regionwide research needs and build an action plan to address these needs. The alliance specifically addresses climate change, sea level rise, and increased storm intensity. Its recent actions have included forming focus groups and partnerships throughout the region that culminated in a final regional plan in conjunction with the South Atlantic Regional Research Plan.

In January 2011, the alliance released its final action plan, which the group will review every year at its annual meeting and update every five years. The technical teams for various issue areas will carry out the action plan through implementation procedures that address the specific details with a timeline for completion, which typically will be 12 to 18 months in duration. In this process, the executive and steering committees and the technical teams receive guidance and participation from supporting partners, such as federal agencies, nongovernmental organizations, academic institutions, and the private sector. While structured to create cooperation, membership in the alliance is voluntary and nonbinding. The effectiveness of this approach remains to be seen, as it has not been implemented yet. With further development and participation from each state and locality, however, the alliance may eventually provide a model regional framework.

Policy Implications

With impacts from climate change imminent, the coastal states of the Southeast recognize the need to carry out both mitigation and adaptation strategies. They approach development and implementation in three primary ways: by developing climate action plans, creating separate adaptation plans, or addressing issues as they arise without an overall plan (table 2.3). The states' efforts share a few general approaches. First, the city, region, or state forms an interdisciplinary climate action committee. Second, the committee quantifies expected

Blakely Disaster Readings

Table 2.3 Adoption of General Approaches to Climate Change

	Florida	Georgia	North Carolina	South Carolina
Climate action plan	Completed 2008 by Action Team on Energy and Climate Change		Completed 2007 by Climate Action Plan Advisory Group	Completed 2008 by South Carolina Climate, Energy, and Commerce Committee
Climate change adaptation plan	Completed 2007 by Florida Climate and Energy Commission			
No plan		No state level plan or advisory group		

Table 2.4 Implementation of Climate Change Strategies

	Florida	Georgia	North Carolina	South Carolina
Created a climate action committee	X		X	X
Determined specific impacts and effects for the region	X		X	X
Partnered with nearby states and localities	X	X	X	X
Created a climate mitigation plan	X		X	X
Created a climate adaptation plan	X			

impacts related to climate change. Finally, the committee creates a climate action plan for mitigating and adapting to change. Throughout this process, the climate action committee coordinates with government agencies at the local, regional or statewide levels (table 2.4).

The resulting plans set goals for reducing emissions and identify specific state, regional, and local strategies to address climate change. Objectives stem from these strategies, and those pursued by the southeastern coastal states include: incentives for renewable energy production and use, public utility mandates for renewable energy production, public building efficiency requirements, vehicle fleet efficiency standards, preparation for drought, and coastal development restrictions.

While these four states share some strategies, Florida’s approach stands out, perhaps due to the state’s extreme vulnerability to climate change and the consequences of the threats. Among them is increased drought, which affects water supplies, agriculture, and habitat while leading to more wildfires. Tor-

rential rains will create more flooding, and higher temperatures and flooding may lead to insect infestation and insect-borne diseases. Additionally, bleaching of coral reefs and other adverse effects on marine life and fisheries may result from higher temperatures, and ecological changes will inevitably affect the Everglades and the state's other natural systems. Through comprehensive, integrated responses to these challenges, Florida has developed a model of mitigation and adaptation planning worth emulating by other states and jurisdictions in the southeastern region.

This overview of Florida's approach reveals a few key principles, some of which appear in local and metropolitan plans throughout the southeastern coastal states. As a suite of programs, these strategies represent the best in both individual requirements and comprehensiveness utilized in the southeastern coastal region. The key approaches pursued in Florida include: providing public education, regulating the built environment, protecting water supplies, prioritizing habitat and species protection, de-emphasizing technological solutions that impair ecological functions, requiring reviews by regional agencies and the state's attorney general, requiring sharing of feedback among regional and local agencies, mandating climate assessments, and ensuring short- and long-term funding for ongoing research and monitoring. Individually, these approaches may enhance climate change plans in a variety of other regions; as a combined program, they provide a model for the entire southeastern Atlantic coast.

The efforts of the Governors' Southeast Atlantic Alliance encompass the entire coastal region and offer the potential for greatly enhanced coordination of model programs on a broader regional scale. A key aspect of this approach involves clear and direct communication among executive leadership, planning committees, and those responsible for implementation, not to mention collaboration within and among the four states. Additionally, the alliance involves partners from other levels of government, the public and private sectors, and community groups. As such, this broad-scale partnership may prove pivotal for the entire coastal region in addressing climate change.

But a question clearly remains: Will the plans and strategies currently pursued in the southeastern states sufficiently counteract the intense climate change impacts expected in the region? Internationally, the favored approach focuses on overshooting expected impacts by preparing for the worst. To achieve this level of preparation, the region must expand its programs rapidly and coordinate the very best of the local, state, and regional efforts now underway.

Future Directions

The expected impacts of climate change will likely require the southeastern coastal states to adopt a more organized regional approach. Many existing efforts set ambitious goals and identify best practices, but they are localized to a single city or state and lack tangible, cooperative strategies for regional implementation. The sole existing regional body—the Governors' South Atlan-

tic Alliance—addresses the effects of climate change on coastal and oceanic systems, but it functions in a research capacity rather than as a policy-focused organization. Its recently completed action plan both identifies the need to assess the impacts of climate change and outlines goals to conduct numerous long-term vulnerability studies, but it expresses little interest in mitigating these impacts.

As the only regional entity operating in an area of the United States that is predicted to be among the hardest hit by climate change, the alliance should have a greater leadership role in creating sustainable policies among all 12 southeastern states, or a new regional body should be assembled. For direction, these states can look to other regions of the country that are leading the way in climate change adaptation and mitigation. A 12-state Southeast initiative modeled on existing efforts would set mitigation and adaptation goals and provide policy direction to accomplish them. This initiative could utilize best practices emerging from such regional initiatives, such as the establishment of a regional cap-and-trade program.

U.S. Regional Initiatives

Existing initiatives in the West, Midwest, and Northeast provide examples for the Southeast. More ambitious collaborative actions, policy directions, and mitigation efforts are now underway in all three regions, including the Western Climate Initiative (WCI), the Western Governor's Association (WGA) Adaptation Plan, the Midwest Energy Security and Climate Stewardship Platform from the Midwest Governor's Association (MGA), and both the Regional Greenhouse Gas Initiative (RGGI) and the Transportation and Climate Initiative (TCI) in the northeastern and Mid-Atlantic states.

The WCI includes 12 U.S. states, five Canadian provinces, and five Mexican states. Its main focus is a regional cap-and-trade program to reduce GHG emissions 15 percent below 2005 levels by 2020. The initiative requires the partners to set an overall regional goal to reduce emissions; develop a market-based, multi-sector program to achieve that goal; and participate in a GHG registry. The first phase of the plan is to be implemented in 2012 and then followed by a cap on emissions in 2015.

In 2009 the WGA recognized the need for collaboration, when it began compiling its adaptation plan. WGA is organized similarly to the Governors' South Atlantic Alliance, but includes a larger region and a close focus on climate change issues. Through a work group of western-state experts, WGA created a report of climate change adaptation strategies tailored to the region. The original work group continues to review climate change legislation and resulting impacts on the region as well as conducting further modeling research.

Member states of the MGA released in 2007 its Midwest Energy Security and Climate Stewardship Platform, which outlines several goals and policy options for the participating states. The platform highlights the region's grow-

ing biofuels industry, energy efficiency potential, prospects for underground storage of captured carbon, considerable wind power potential, and manufacturing capabilities. The current focus is on a GHG reduction proposal that will establish a cap-and-trade program.

The RGGI includes 10 northeastern and Mid-Atlantic states and focuses on implementing a cap-and-trade program to reduce the CO₂ emitted from regional power plants. RGGI capped these emissions, while allowing sources to trade emissions allowances at quarterly auctions. The program began in 2009 by capping emissions at then-current levels, but its goal is to reduce emissions 10 percent by 2018.

Formed more recently, in 2010, the TCI focuses on expanding transportation options and mitigating the transportation sector's effect on climate change, public health, and air quality. This initiative was formed by environment, transportation, and energy agencies in the northeastern and Mid-Atlantic states, rather than by their governors. These agencies will establish and fund the Transportation, Energy, and Environment Staff Working Group, which will direct the initiative's planning and will seek public and private funding for projects.

Regional Best Practices

As the only area in the United States that does not have a regional initiative addressing climate change, the Southeast has the opportunity to learn from the established programs that outline a number of effective practices for setting and achieving regional goals, several of which are described below.

Committees and work groups. Each initiative's action committees and task forces help implement developed policies. The WCI, for example, designates committee members from each of its member states and provinces to design emissions reductions policies. Designated task force members then implement the established goals. To facilitate further collaboration with regional initiatives beyond its membership, WCI selected two representatives to work as liaisons with other states and regional initiatives. Using a similar model to focus on expanding regional transportation options, the TCI engages 90 policy makers. State-based representatives facilitate a master plan for regulating fuels and transportation, then each state takes responsibility for implementation within its purview.

Membership levels. Both the WCI and the Midwestern Greenhouse Gas Reduction Accord designate state members to be partners or observers. Partner states are responsible for leading the organization and making final decisions, designating their representatives, and participating in working committees. Observer states are welcome to participate in the working committees, but are not responsible for final decisions. Observer states often become partner states after a period of time.

Regional emissions targets. Most of the existing regional initiatives set emissions targets and then use action plans and committees to reach them. The WCI aims to reduce GHG emissions to 15 percent below 2005 levels by 2025, and members of the Midwestern Greenhouse Gas Reduction Accord have agreed to a reduction target of 60 to 80 percent below 2010 emissions levels. The New England Governors/Eastern Canadian Premiers Climate Change Action Plan, a parallel effort to the RGGI, calls for reducing GHG emissions to 10 percent below 1990 levels by 2020.

Transportation fuels. The transportation sector is responsible for around 30 percent of GHG emissions. On this basis, most regional agencies include transportation and fuels associated with it in their goals and action plans. In 2008 the WGA developed a plan and adopted policies for advancing alternative transportation fuels in the western United States. While the plan's principal impetus is to address concerns of oil shortages, price spikes, and national security, the governors of the member states believe alternative fuels also can reduce global warming impacts from transportation.

In 2009, over objections from the oil industry, governors in the RGGI's participant states and Pennsylvania signed an agreement to develop low-carbon fuel standards, with the aim of reducing GHG emissions from cars and trucks. MGA established an advisory group in 2010 to make biofuels sourced in the Midwest competitive with fuel standards in other states and regions of the United States. The governor-appointed group members included a geographical cross-section of regional stakeholders whose experience brings to bear work in agriculture, government, industry, and nongovernmental organizations.

Cap-and-trade. Three regional initiatives in the United States have developed cap-and-trade program plans. Such a program sets an overall emissions cap while allowing companies to trade emissions allowances. They thus achieve cost-effective reductions. States that are members of the MGA account for 14 percent of total U.S. GHG emissions, and are still in the process of developing their cap-and-trade program. The WCI recently released recommendations for design of a cap-and-trade program for its constituent states, while the RGGI is already implementing its own cap-and-trade program aimed at regional power plants.

Trading emission allowances keeps costs low because the method provides flexibility in how and when reductions are made. For example, entities that reduce their emissions below the number of allowances they hold can sell excess allowances or bank them for later use. Selling excess allowances to another entity allows the seller to recoup some of its emissions-reduction costs, and banking allowances lessens future compliance costs.

The RGGI was the first mandatory, market-based CO₂ emissions reduction program in the country. It sets a cap on carbon dioxide emissions from power plants and allows sources to trade emissions allowances at quarterly auctions. This program began by capping emissions at current levels in 2009, and by 2018 it will have been responsible for 10 percent emissions reduction. States sell nearly all emission allowances through auctions and invest proceeds in consumer benefits such as energy efficiency, renewable energy, and other clean energy technologies, thus increasing the clean energy economy and creating green jobs in each state.

Southeastern Regional Climate Initiative

Many of the southeastern states already are working toward achieving ambitious mitigation and adaptation goals, but a stronger regional body is required in order to use existing state and local adaptation and mitigation efforts to form cohesive goals for the region as a whole. For such an organization, states could choose whether to start as partners or observers, with the partners working closely with one another to develop an action plan and implementation steps that will achieve the outlined tasks. Nine general priorities, which are based on this chapter's review of climate plans in the southeastern coastal states, should be reflected in an interregional compact (table 2.5).

Several current conditions make the Southeast region suitable for a cap-and-trade scheme. Among the four coastal states, more than 179 coal-fired generating stations are in operation. North Carolina produces a disproportionately large amount of CO₂ and ranks fourteenth in the nation, only slightly behind California, a state with a population that is four times larger (Source Watch 2010). The cap-and-trade program already in effect in the Northeast provides a model for the Southeast, and in the future a larger regional cap-and-trade program could connect the entire East Coast in a manner similar to initiatives such as the WCI and RGGI.

Blakely Disaster Readings

Table 2.5 Climate Change Priorities and Strategies for the Southeastern Coastal States

Priority	Suggested Strategies	Exemplary Locales
1. Reduce GHG emissions Possible methods include: • improve energy efficiency • increase renewable energy production • improve waste management and recycling operations • reduce automobile dependence • improve the efficiency of land use	Address energy efficiency in government operations through ordinances and educational programs	Florida, Georgia, South Carolina, and North Carolina Miami and Orlando (FL) Atlanta (GA) Greensboro and Raleigh-Durham (NC) Charleston and Columbia (SC)
2. Set specific, challenging, measurable targets for both emissions and energy consumption reductions	Ongoing annual environmental scorecards and assessment programs	Florida, Georgia, and North Carolina Miami and Orlando (FL) Atlanta (GA) Greensboro and Raleigh-Durham (NC) Charleston and Columbia (SC)
3. Embrace innovative strategies to reduce energy consumption	Institute net metering to encourage renewable energy production by individuals; offer training in design standards (e.g., LEED-NC)	Florida, Georgia, and North Carolina Miami and Orlando (FL) Atlanta (GA) Greensboro and Raleigh-Durham (NC) Charleston and Columbia (SC)
4. Restrict development in hazardous and fragile shoreline areas that are likely to erode	Coastal management plans; and transfer of development rights programs	Florida, Georgia, and North Carolina Chatham County (NC)
5. Convene climate science research framework	Include agenda and institute funded advisory council	Florida and Georgia
6. Protect ecosystems and biodiversity in terrestrial, freshwater, and marine habitats	Prioritize preservation of vulnerable species; utilize the transfer of development rights to preserve sensitive shoreline	Florida, Georgia, and South Carolina
7. Reduce dependence on bulk hardening to stabilize shorelines (Exception: specifically defined conditions that require emergency beach stabilization)	Prioritize coastal wetland preservation to create buffering from storm surges	Florida and Georgia
8. Enhance new buildings and developments to withstand potential storm loads	Require new buildings and development to meet design criteria for specific storm surge conditions	Florida
9. Promote financial incentives for biofuels; develop standards for renewable fuel		Florida

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Blakely Disaster Readings

Figure 3.1 New Orleans

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 3

New Orleans

Douglas J. Meffert and Joshua A. Lewis

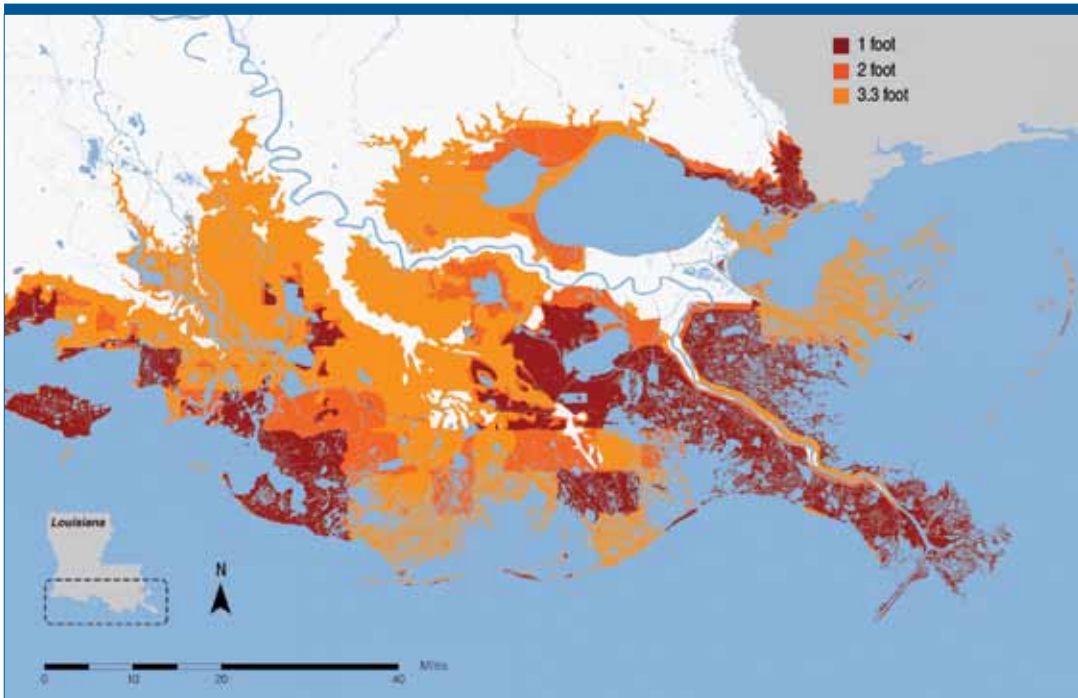
For centuries historic port cities built on river deltas have had to deal with the dynamic nature of river and estuarine systems and related periodic flooding. Yet their strategic locations for waterborne commerce and their wealth of natural resources maintain their role as regional economic engines despite the vulnerabilities they face due to climate change. New Orleans, in particular, represents an instructive “urban laboratory” in which to examine climate change adaptation and mitigation: In addition to having among the world’s highest rates of coastal erosion and relative sea level rise, the city experienced a systemic shock to its entire urban infrastructure in August 2005 when Hurricane Katrina struck (figure 3.1). While the prolonged flooding that resulted presented many challenges to recovering the city’s natural and built environment and community services, the hurricane also created an opportunity for innovation in metropolitan planning on a scale unprecedented in recent U.S. history.

The climate change–related sea level rise, which is expected to range from 3 to 10 millimeters (mm) per year over the next 50 years in coastal Louisiana, exacerbates the susceptibility of the New Orleans metropolitan area and the rest of coastal Louisiana (Tornqvist et al. 2008). When one takes into account both the subsidence endemic to Louisiana’s deltaic coast and the global sea level rise, recent estimates of relative sea level rise estimate the Gulf of Mexico could increase by 0.6 to more than 2 meters (m) over the next century (Day and Giosan 2008; Young and Pilkey 2010). This rate of relative sea level rise is the highest in the United States. Figure 3.2 illustrates several possible impacts of sea level rise projections, which range from approximately one to three feet.

Although relative sea level rise and potential increased intensity of hurricanes and flooding events are the primary contributors to the increased vulnerability of New Orleans and coastal Louisiana, the region faces other projected climate changes as well. Historically, Louisiana’s climate has been variable, although climate change could exacerbate or shift this variability with some estimates projecting increases of up to 10°F for winter low temperatures and as much as 7°F for summer high temperatures. Although extreme rainfall events increased in Louisiana throughout the twentieth century, overall rainfall, which averages between 40 and 70 inches annually, is likely to decrease in coastal

Figure 3.2 Comparison of Current Coastline of Louisiana Delta with Predictions for Sea Level Rise by 2100

Source: Jonathan Tate



Louisiana through the twenty-first century and could create additional stress to coastal wetland habitats.

Despite these recent events and dire predictions, urban and rural populations in Louisiana’s coastal zone have long coexisted with the region’s natural flooding propensity. In particular, many small towns in the deltaic plain prioritize residential land use along the limited levee areas of bayous and former distributaries of the Mississippi River in order to remain above sea level and minimize risks associated with flooding and storm surge. During this century, however, many communities that heretofore have been able to sustain themselves near sea level will succumb to sea level rise while those on the ridges of the former Mississippi River distributaries that remain above sea level will no longer have the wetland buffers that historically have protected them from diurnal sea level fluctuations, intermittent storms, and less frequent but increasingly catastrophic hurricane and tropical storm surges.

For many of these towns, residential relocations are inevitable. The BP Deepwater Horizon oil release in 2010 worsened this situation and may compound the damages to wetlands in yet unforeseen ways. Moreover, given the need for some relocations, the State of Louisiana has an opportunity to re-examine its future land use priorities in the delta plain and implement both structural and nonstructural interventions that will maximize the inherent eco-

conomic productivity of these systems while minimizing economic and cultural losses and social justice dilemmas.

Both the prevailing gradual environmental trends (e.g., relative sea level rise and coastal wetland loss) and acute threats (hurricanes and flooding) increase the vulnerability of the New Orleans metropolitan region. The pre-Katrina trend was already one of dramatic historical wetland loss because the marsh habitats, vestiges of former Mississippi River delta lobes, are subject to natural compaction and deterioration. This tendency, however, is exacerbated by relative sea level rise and other anthropogenic interventions, among them building up levees along the Mississippi River, oil and gas exploration, and wetland conversions to agriculture.

Current plans include restoration of as much of this marsh as quickly as possible, primarily through adaptation measures including restoration of natural delta building, marsh creation from use of dredged material, water control structures, and such hard structures as dikes and levees (CPRA 2007; LRA 2007). Because the most interior marshes provide particular ecological services as well as storm surge protection to more densely populated areas, including New Orleans, they have received conservation and restoration prioritization. The most prominent feature of occupied landscape currently identified for abandonment is the modern (“bird’s foot”) delta of the Mississippi River. Some plans call for ultimately utilizing this alluvial material for restoration of marshlands located proximate to more densely populated areas.

While a larger regional levee system in South Louisiana is proposed to provide 100-year protection for about 120,000 rural residents in coastal areas, thousands of others remain outside of the reach of planned protection systems (Walsh 2007). People living in the delta lobe (e.g., Boothville-Venice), for example, must face the ultimate abandonment of these lands to accommodate marsh creation through the beneficial use of dredge material that has been prioritized particularly for presently degraded marsh in Barataria, Terrebonne, and Breton Sound basins. So far, relocation is based primarily on residents’ voluntary actions. During the next several decades, larger towns inside existing and proposed protection systems and cities such as New Orleans and Louisiana’s capital, Baton Rouge, will likely serve as population clusters for people seeking higher ground.

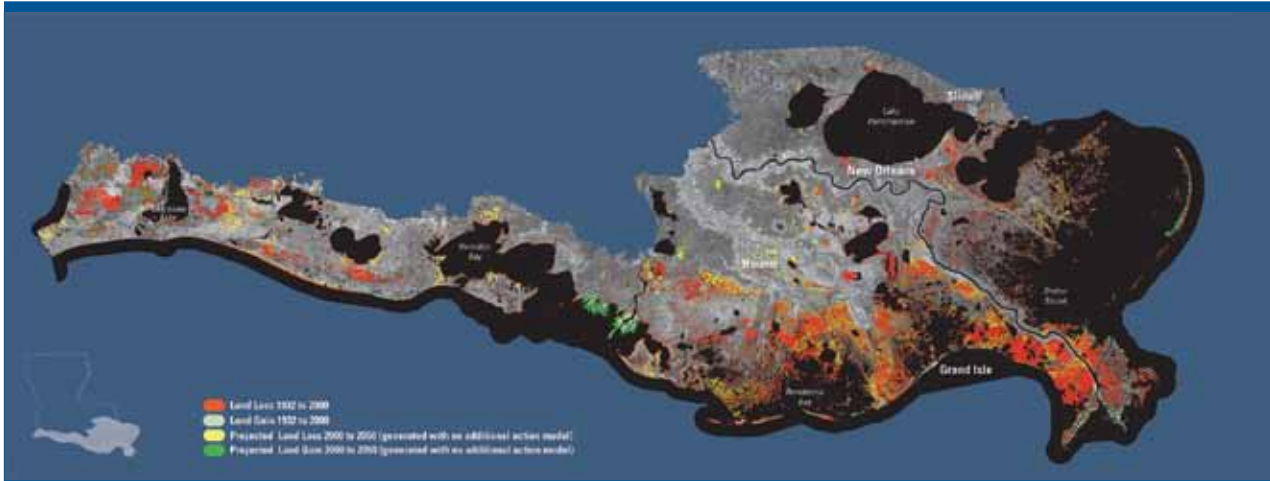
Historical and Geological Background

Creation and Loss Along Louisiana’s Coast

Louisiana’s coastal zone was formed from sediments deposited as the result of a series of 16 major Mississippi River deltaic episodes over the past 7,000 years, which created a region of coastal wetlands that covers 3.3 million acres of the state (Cowan and Turner 1988; Good et al. 1995; Turner and Rao 1990). Over the last 200 years, however, wetlands in the United States have

Figure 3.3 Existing and Projected Coastal Wetland Loss and Land Gain in Louisiana

Source: Barras et al. (2003)



been drained, dredged, filled, leveled, and flooded for urban, agricultural, and residential development. Since 1930 Louisiana alone has lost 2,300 square miles of coastal wetlands—the highest such rate of loss, not only in the United States, but throughout the world (CPRA 2010). Although these coastal wetlands represent 30 percent of those in the contiguous United States, they are experiencing 90 percent of the country’s coastal wetland loss overall (CPRA 2007; Dahl 2000) (figure 3.3). The causes include cumulative natural and human-induced impacts.

Beginning in the eighteenth century and accelerating after the record flood in 1927, the construction of artificial levee systems has eliminated the overbank sediment contributions of flood flows from the Mississippi River to southeastern Louisiana (Kesel 1989; Turner and Rao 1990). In addition, during the past two centuries, dredging navigation channels, oil and gas exploration and production, land reclamation, the construction of commercial and industrial facilities, and the fur industry’s introduction of invasive nutria species into the habitat, have all further damaged the coastal region in terms of primary and secondary wetland losses. These activities have reduced new accretion, lessened freshwater inflow, increased saltwater intrusion and wave energies on fragile interior marsh substrate, and destroyed emergent vegetation that otherwise would bind sediments and produce organic matter.

Extrapolating from the current rate of land loss, by the year 2050 Louisiana will have lost more than one million acres of coastal wetlands, an area larger than the state of Delaware (Meffert et al. 1997). By 2050, the Gulf of Mexico will continue to advance as far as 33 miles inland, transforming previously productive wetlands into open water and leaving major towns and cities, such as New Orleans and Houma, exposed to open marine forces of the Gulf of Mexico (CPRA 2007).

As this coastal land-loss trend continues, Louisiana also is sustaining major economic and social losses, including damages, control costs, and insurance claims from floods and hurricanes. Among the sectors and operations affected are oil and gas infrastructure; private land and residences; commercial seafood production; commercial hunting and trapping; recreational hunting and fishing; shipping; channel and river maintenance; drinking water; water quality improvements; and employment. According to an estimate compiled by the



The combined effects of dredging the Mississippi River Gulf Outlet, subsequent wave energies and saltwater intrusion, and decreased freshwater and sediment supply from the Mississippi River have degraded the marsh in Breton Sound. Before its closure, protection efforts included a combination of breakwaters and shoreline rock barriers.

Photograph © Douglas Meffert.

Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCW-CRTF 1993), when functional values and those of roads, waterways, and oil and gas infrastructure are considered alongside biologic productivity, the value of Louisiana's coastal wetlands exceeds \$100 billion. These resources provide the largest fishery landing in the lower 48 states, the country's largest fur harvest, 21 percent of its natural gas supply, and protection for waterborne cargoes that represent 25 percent of the nation's total exported commodities (CPRA 2007). Since many of these benefits and services are of national importance, the entire United States, not just Louisiana, stands to lose a vast economic resource.

New Orleans: An Urban System in a Wetland Ecosystem Context

Paradoxically, for most of the twentieth century New Orleans was sustained by enhanced drainage of its delta subsurface along with increased efforts to manage land and water (e.g., with levees and floodwalls) at the city's perimeter and regional environs. U.S. Census Bureau estimates indicate, however, that New Orleans' population reached its peak of 627,585 residents living on 36.8 square miles in 1960 and declined to 484,674 living on 66.7 square miles by 2000. Those who remained in the metropolitan region during this period often moved to low-lying suburban parishes and, among those who continued to live in Orleans Parish, many moved to new low-lying areas of reclaimed wetlands that had been drained to accommodate suburban-style

development within the parish's incorporated area. Decreased population combined with almost doubling the city's developed footprint resulted in a reduction of more than 50 percent in population density. Measured as population divided by occupied area (excluding parks, fields, forests, wetlands, water bodies, etc.), the city's density declined from 17,053 residents per square mile in 1960 to 7,266 in 2000 (Campanella 2007). During this same period, coastal Louisiana was experiencing one of the highest coastal wetland loss rates in the world.

The long-term viability of New Orleans depends on restoring its coast on an unprecedented scale, which will be phenomenally expensive. Estimated costs associated with maintaining and restoring Louisiana's coastal wetlands are in the tens of billions of dollars. While such restoration occurred on a very small scale prior to 1990, larger-scale efforts were not employed until 1990, when Senators John Breaux and J. Bennett Johnson enabled passage of the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). That legislation led to an influx of state and federal funding of approximately \$50 million per year that was intended for Louisiana coastal wetlands restoration projects. In the late 1990s, the continued loss of wetlands and increased vulnerability of New Orleans was widely discussed and debated among scientists, engineers, and policy makers.

During the twentieth century hope was widespread that it was still possible to restore and retain the historic wetland footprint of coastal Louisiana. Over the past 10 years, however, the impacts of Hurricanes Katrina and Rita and the mounting body of research regarding Louisiana's vulnerability to sea level rise is creating a greater consensus that a sustainable Louisiana coast will be considerably smaller than it has been historically.

Post-Katrina Opportunities for Restoration

Early in the twenty-first century, additional funding streams for coastal restoration were developed, including the Coastal Impact Assistance to States Program (CIAP) established by the Energy Policy Act of 2005 and the Louisiana Coastal Area (LCA) program, which authorized approximately \$2 billion for 15 small- to large-scale projects through the U.S. Water Resources Development Act of 2007. The immensity of the wetland loss problem, however, and the unlikelihood of re-establishing this historical coastal footprint was launched into the general public consciousness in 2005, when Hurricanes Katrina and Rita resulted in the conversion (loss) of approximately 217 square miles of wetland to water statewide (CPRA 2007). Around metropolitan New Orleans, where the wetlands historically formed a critical storm surge buffer, the loss of coastal marshes during that year greatly exacerbated the city's future vulnerability to storms.

While Louisiana's current coastal restoration efforts are funded by a variety of state and federal sources, the additional billions of dollars needed



Degraded cypress tupelo swamp in the Bayou Bienvenue wetland area adjacent to New Orleans and its Lower Ninth Ward

Photograph © Joshua A. Lewis.

for large-scale coastal renewal depend largely on the Gulf of Mexico Energy Security Act (GOMESA) championed by Louisiana's Senator Mary Landrieu and former Senator Pete Domenici of New Mexico and passed by Congress in December 2006. Through GOMESA, the four oil and gas producing states bordering the Gulf of Mexico (Alabama, Louisiana, Mississippi, and Texas) began in 2007 to receive dedicated funds from federal oil and gas leases explicitly to support coastal conservation, restoration, and hurricane protection. Starting in 2017, these funds could amount to hundreds of millions of dollars annually. It is ironic that Louisiana depends on nonrenewable fossil fuels for restoring its coast, and it is these same energy sources that emit the greenhouse gases (GHG), such as carbon dioxide, that exacerbate vulnerability from sea level rise and more intense hurricanes powered by warmer gulf waters.

The BP Deepwater Horizon oil spill in 2010 illustrates issues regarding wetlands protection and increases the tension between the environmental sustainability of Louisiana's coast and the region's primary economic sectors, including oil and gas exploration and fisheries. Senator Landrieu convened a coalition of experts, whose recommendations were presented to an interagency working group established by President Barack Obama's Council on Environ-

mental Quality. The result could be a new Congressionally authorized entity, perhaps analogous to the Tennessee Valley Authority or the Denali Commission, that would govern and implement a coordinated coast-wide restoration, protection, and water management plan.

The proposal for a new authority would consolidate and reform existing state and federal coastal restoration, shipping, and flood control programs and transfer to a new agency all of these responsibilities, many of which presently are overseen by the Army Corps of Engineers. This agency would assume control of the majority of the civil works budget of the New Orleans District of the Army Corps of Engineers along with other relevant programs administered by disparate federal agencies, including the Departments of the Interior, Agriculture, and Commerce. The efforts to establish this new authority, along with draft legislation proposed to Congress, seek to accelerate the timetable for revenue sharing established by GOMESA to generate as much as \$1 billion annually to support long-term coastal restoration.

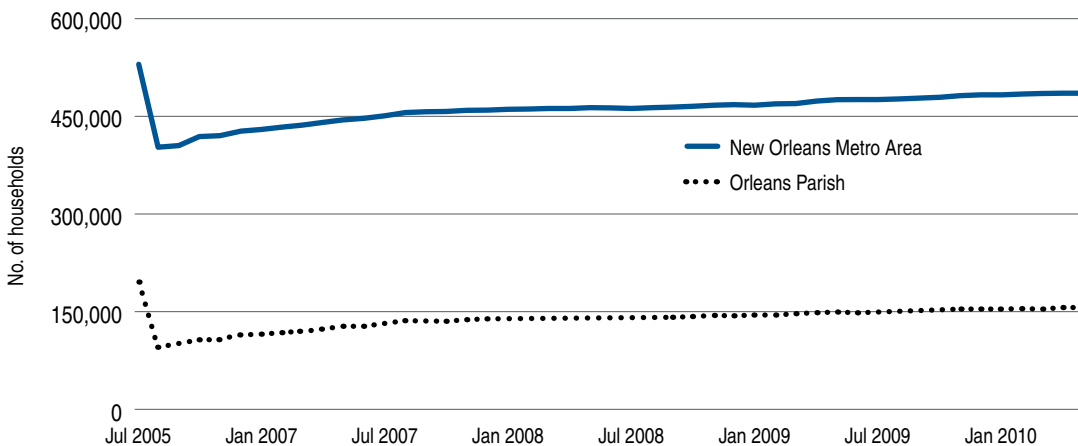
Following the BP Deepwater Horizon oil spill, President Obama appointed Navy Secretary Ray Mabus to oversee long-term restoration along the Gulf Coast. In addition to examining the proposed new authority described above, Secretary Mabus established a complementary energy-transition initiative to ensure that investments in renewable energy research and technology development would help ensure environmentally benign energy generation for the nation's long-term needs. At the same time, it is recognized that continued dependence on oil and gas is important for near-term energy demands and revenue generation for coastal restoration. Renewable energy investments focused on Louisiana's natural renewable resources (e.g., hydrokinetic energy in the Mississippi River, biofuels from agriculture and wind energy from oil rig platform networks) would help secure additional economic gain and offer the region an opportunity for climate change mitigation.

New Orleans Metropolitan Area Institutional Planning

Since Hurricane Katrina, much has been written and debated about how and where in New Orleans its displaced residents should live. Many of these opinions and recommendations suggest rebuilding—or relocating—with the expectation of future flooding, which would result in clustering populations in the areas deemed safest from natural disaster and enhancing natural processes to the greatest extent possible. Since Hurricane Katrina, New Orleans' residential population has rebounded from a low of 70,000 residents in October 2005 (based on U.S. Postal Service estimates) to 343,829 in 2010 (based on 2010 census data). According to the Greater New Orleans Community Data Center (GNOCDC) analysis of U.S. Postal Service delivery statistics, the number of households receiving mail in Orleans Parish and New Orleans metropolitan area reached 164,337 and 493,087, respectively, as of December 2010 (figure 3.4).

Figure 3.4 Households Receiving Mail in the New Orleans Metropolitan Area, July 2005–February 2010

Source: Greater New Orleans Community Data Center.



Note: New Orleans metropolitan area includes the parishes of Orleans, Jefferson, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany. For more information on using U.S. Postal Service Delivery Statistics to track the repopulation of New Orleans and the metropolitan area, contact the Greater New Orleans Community Data Center.

To address the changing needs of the city and its residents, five overarching, sometimes conflicting, planning processes have been established in recent years.

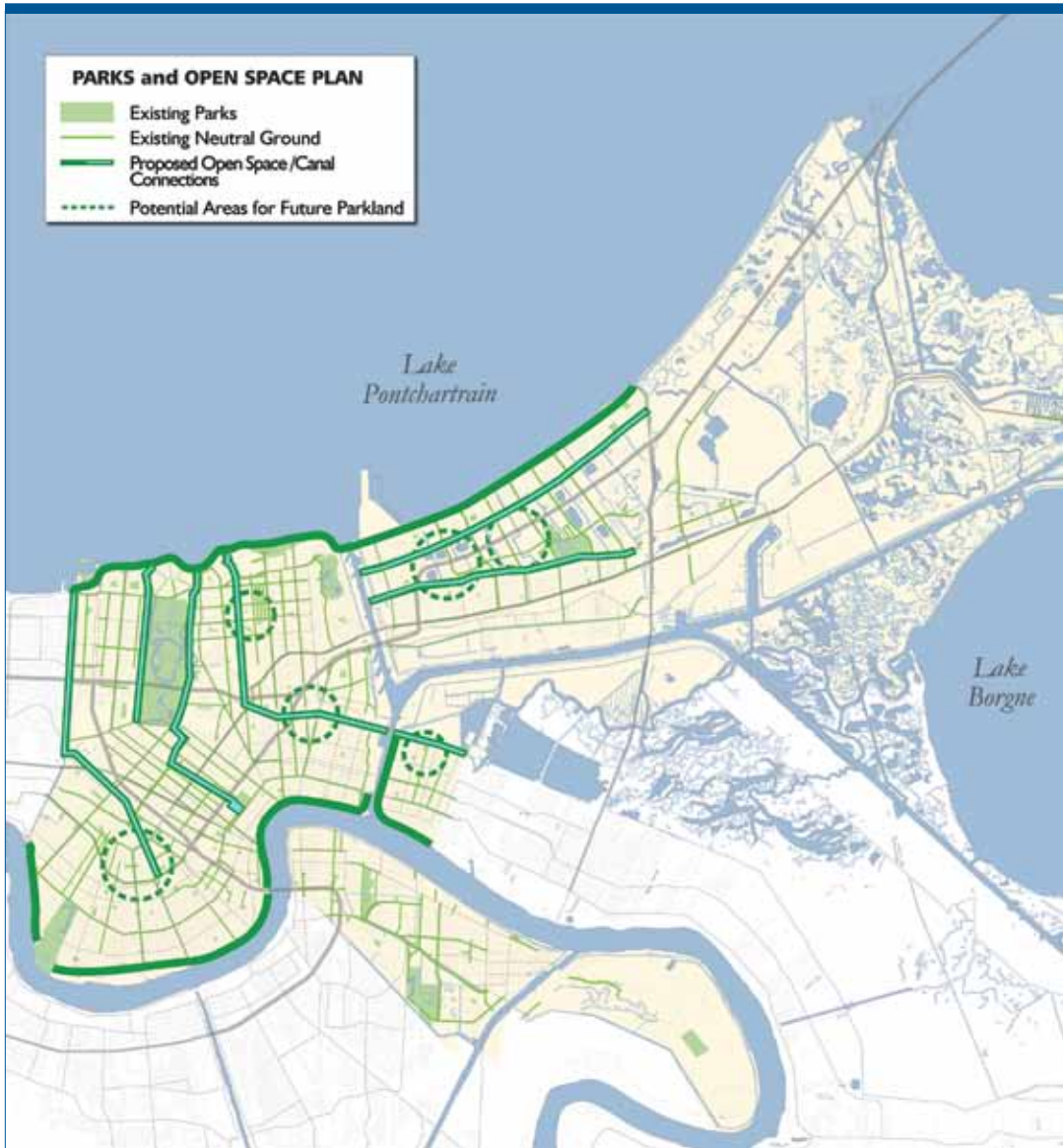
Bring New Orleans Back Commission

Less than two months after Hurricane Katrina made landfall, the Bring New Orleans Back Commission (BNOBC) became the first major post-disaster planning initiative. While the BNOBC action plan did not address climate change explicitly, it included a general recommendation for converting low-lying areas into greenspace through market-based buyouts that offered residents of those areas the chance to relocate to higher ground that is less prone to flooding. However, the commission’s message and the now-infamous “green dot map” (figure 3.5) that accompanied it were delivered before sufficient work on community engagement was complete and, since no financial mechanism was in place to guarantee compensation, the BNOBC suffered significant rejection from politicians and neighborhoods alike.

Ultimately, recommendations from the various BNOBC committees were presented publicly and accepted by then-mayor C. Ray Nagin. The mayor issued a final report, *Rebuilding New Orleans*, which summarized these recommendations six months after the commission was formed, but a lack of continued funding effectively prevented their implementation (Nagin et al. 2006). This report made no mention of climate change, but it did endorse adaptation measures, including enhancement of local and regional flood protection efforts,

Figure 3.5 New Orleans Parks and Open Space Plan, with Potential Areas for Parkland Indicated

Source: Prepared by WRT (Wallace Roberts & Todd design firm) for BNOBC.



Note: Presented to the general public by the BNOBC Urban Planning Committee, 11 January 2006.

that would return these protection systems to their original designs (protection from a 1-in-100-year flooding event) and regional wetland restoration to reduce storm surge, which was to be funded by oil and gas production revenues.

Two City Plans

The subsequent city council effort, the New Orleans Neighborhoods Rebuilding Plan (NONRP), led by Lambert Group, abandoned any suggestion of specific

locations of open parkland in damaged, low-lying areas, although increasing residential density was encouraged for sections of town less prone to flooding (Fields 2009). This plan focused only on the areas that had flooded due to Hurricane Katrina, however, so it was not a systemic citywide plan. This effort then prompted development of the Unified New Orleans Plan (UNOP), which had the goals of expanding the planning scope to include the entire city and to synthesize into a unified report the recommendations from BNOBC, NONRP, and other emerging neighborhood-based plans. While UNOP supported so-called sustainable projects, generally it was not confined to the availability of financial resources or the realities of likely residential populations in the city's various districts. The plan has been viewed as an ideal wish list of each district's desired projects, and neighborhoods are now re-examining the plan in terms of likely and practical investments.

To facilitate funding and implementation of community-supported projects outlined in NONRP and UNOP, the City of New Orleans formed a new Office of Recovery Management (ORM), which later evolved into the Office of Recovery and Development Administration (ORDA). As such, it oversaw aspects of recovery as well as city planning, safety, and permits. Given that the city had already endorsed repopulation throughout the entire pre-Katrina footprint (through the NONRP and UNOP processes), ORDA identified 17 zones for targeted investments (ORM 2007). The selection basis for these zones centered on clusters in which limited rebuilding dollars could achieve the greatest impact in both areas severely damaged by flooding (e.g., the Lower Ninth Ward and New Orleans East) as well as less-heavily damaged areas. The funding ORDA anticipated to facilitate these investments was identified as a combination of traditional community development block grants (CDBGs), disaster-CDBG supplements through the Louisiana Recovery Authority, Federal Emergency Management Agency (FEMA) public assistance grants, hazard mitigation grants, city bonds (including "blight bonds"), and other sources. Although ORDA did not endorse a smaller city footprint, it did promote voluntary land swaps by which homeowners in low-lying areas could exchange their property for lots in higher, less flood-prone parts of the city.

New Orleans Master Plan and Comprehensive Zoning Ordinance

In 2008 Goody Clancy, an architecture and urban design firm based in Boston, Massachusetts, was hired by the City of New Orleans to develop a draft master plan and a comprehensive zoning ordinance that, if adopted, would have the force of law. In Orleans Parish this planning process is dedicated to providing recommendations for built and natural habitats that will be sustainable within the parish boundaries, with the recognition that jurisdictional oversight would exist only within the incorporated boundary of Orleans Parish. The highest priority for infrastructure is a systemic plan and agency coordination and investments that will improve resistance to floods and hurricanes (table 3.1).

Table 3.1 Guiding Principles and Key Features of the Draft New Orleans Master Plan

Source: Goody Clancy

Guiding Principles	Master Plan Key Features
<ul style="list-style-type: none"> • New Orleans’ future must be shaped by an honestly optimistic assessment of risks and opportunities. • Geography and water shape value and culture as well as drive risk. • New Orleans cannot survive as a viable community if it must evacuate frequently. • A 1-in-100-year flood protection level, while essential, is not adequate; it is less than the city and the nation were committed to prior to Hurricane Katrina. • The levees, pumps, and wetlands the city currently relies on are all that can be expected for the foreseeable future. • The state’s and the Army Corps of Engineers’ master plans are not substitutes for effective action at the city level because the authorization, funding, and construction process for bold and effective action on next-generation storm protection, coastal restoration, and climate change will be measured in decades. The city does not have this time. • The ways New Orleans chooses to live with its levees, pumps, and wetlands can increase its near-term protection and resilience. • Although risks are not uniform across the city, no part of it is immune from risk. Plan for water, not against it. • No part of the city should be left out of its recovery and redevelopment, but the timing and nature of recovery and redevelopment will and does vary. • It is not possible to immunize the city from risk; we must make it resilient to risk. 	<ul style="list-style-type: none"> • A 1-in-500-year minimum level of protection from storms • A city that has to evacuate only under extraordinary circumstances • A city planning for both current <i>and</i> future risks—specifically those associated with rising seas • A city that views water as an asset • Land use and water management practices that reduce risk, enhance land values, and increase resilience to water, storms, and other environmental hazards • Plan for and reduce subsidence at the city level • Plan for and manage interior hydrology and stormwater to reduce flooding risk • Encourage regional cooperation and planning • Support and advocate for improvements to long-range storm protection system • Support and advocate for coastal conservation and restoration at state and federal levels • Support and advocate for effective responses to rising seas and climate change • Encourage residents to “build smart” • Harden essential infrastructure against risks of wind and water • Community involvement—shared responsibility, collective benefit • Develop “smart evacuation” options (e.g., choose locations within a community when appropriate) and accommodate evacuees when they return

This planning process also established a Sustainable Systems Working Group (SSWG) with a research and community outreach process that was completed late in 2009. Sustainable recommendations in the master plan contained climate change adaptation and mitigation measures related to the following elements:

1. Community facilities and services
 - a. Major components of nontransportation-related infrastructure, including water and sewer, electric, gas, and waste disposal

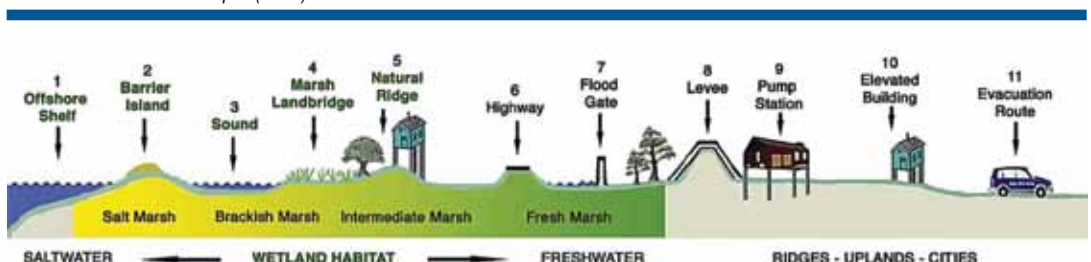
- b. Location, typology, and characteristics of key community facilities, including schools, libraries, community centers, health clinics, police, fire, courts, and criminal justices
2. Transportation, including all roads, bridges, public transit, pedestrian amenities, bicycle, port, and airport infrastructure and systems
3. Broad aspects of sustainability, environmental quality, and resilience as they relate, in particular, to green design, energy efficiency, flood protection, stormwater management, hazard mitigation and emergency preparedness, and coastal restoration.

The January 2010 draft of the master plan includes a general recommendation that the City of New Orleans create a climate plan that addresses how the city should respond to global warming (Goody Clancy 2010: 4). Adaptation and mitigation measures recommended to respond to changing global weather patterns in the near term include reducing neighborhood flooding by preserving wetlands within and outside of the city’s levee system and, following the anticipated completion of current levee reconstruction efforts, elevating houses above projected 500-year flood levels (generally three to six feet). This master plan recognizes that the future safety and resilience of New Orleans depends on multiple lines of defense from storm surge and relative sea level rise (figure 3.6), and that natural and built systems can provide such defenses (Lopez 2006). This strategy entails coastal wetlands and barriers, levees and pumps, internal drainage improvements, and land use planning and regulation. The plan also stresses that placemaking in New Orleans must be sustainable by interrelated strategies, including responding to natural systems; conserving energy; enhancing public and personal health; enhancing food production and distribution; protecting water resources; and addressing climate change.

In the winter of 2009 to 2010, the New Orleans City Planning Commission approved the new master plan’s recommendations for future land use, which will serve as the foundation upon which the city will implement the “force of law” provisions of the 2008 amendment to the city charter. While the Master Plan and Comprehensive Zoning Ordinance (CZO) project offers an opportu-

Figure 3.6 Concept of Multiple Lines of Defense for Restoration of Coastal Louisiana

Source: Lopez (2006).



nity to include resilience strategies, the city's structural and nonstructural land use needs depend on the contextual large-scale coastal restoration that is outside the jurisdictional boundaries of Orleans Parish.

The land uses recommended by the planning commission have not deviated from land uses related to zoning that were in place prior to the master planning development. However, suggestions have been offered for exploring numerous land uses in residentially zoned areas to which residents have not returned. For example, from the public comments received during the master plan development, a high priority was placed on using the Dutch system of water management exemplified by the Room for the River program, adopted by the government of the Netherlands in 2006, to hold more water within the city by constructing more canals and retention ponds and repairing and improving pumps and levees. Paradoxically, due to concerns about flooding, mosquito-borne disease (one of the main public health concerns that resulted in wetland dewatering in the first place), and a prevailing notion that the best way to manage water is to keep it outside of the city's boundaries, little public support exists for instituting a comprehensive water management system or using parks or vacant land for water storage. These seemingly contradictory impulses still remained to be resolved and included in a recommended citywide master plan or strategy.

State Buyouts of Residential Properties

Further complicating the transition from residential to other land uses—including introduction of more natural habitats such as water, greenspace, and urban forest into areas of the city where a low percentage of residents are returning—is a lack of public trust in both government and developers. Maps produced during the immediate aftermath of Hurricane Katrina by the Urban Land Institute (ULI) and the BNOBC's Urban Planning Committee depicted portions of low-lying residential areas as converted into wetlands or greenspace (figure 3.7). These images were introduced to homeowners prior to development of the Road Home program, which provided voluntary buyouts and restoration grants. Thus, these proposed conversions to nonresidential uses were generally perceived not only to decrease the market value of surrounding residential property, but also as a potential plot aimed at denying residents the right to return to their former homes. The maps and proposed land uses were met with public hostility and in 2006 became important artifacts in a contentious and racially charged mayoral election.

In particular, the public discourse regarding the fate of the Lower Ninth Ward neighborhood spawned accusations that an effort was being made to dispossess landowners in favor of industrial development or greenspace. Mayor Nagin publicly responded to criticism leveled at the ULI and BNOBC maps by stating emphatically that the return of African-American residents was his priority, and that no neighborhood would be targeted for abandonment or conver-

sion to greenspace (Baum 2006). Even though Nagin categorically ruled out the use of eminent domain, many areas of the city have been slow to repopulate.

As of February 2010, more than four years after Hurricane Katrina, in numerous areas of New Orleans fewer than 50 percent of the former residents have returned. Green and Olshansky (2009) evaluated the extent to which New Orleans homeowners exercised buyout options offered in the Road Home program (i.e., selling their property to the Louisiana Land Trust rather than returning to their pre-Katrina property). Figure 3.8 shows that numerous significant clusters of sellers participated in this voluntary program. Not surprisingly, all of these clusters are in lower-lying areas that suffered the greatest impact from the post-Katrina flooding. In several cases, they are also in regions of the city that the BNOBC Urban Planning Committee recommended for potential land use changes to encourage open parkland.

Coastal and Neighborhood Planning for Recovery and Restoration

The Mississippi River Gulf Outlet

Navigation canals have altered the hydrology of coastal Louisiana fundamentally. Before the National Environmental Policy Act of 1970, dredging a canal in the coastal swamps and marshes required little more than the economic impetus and land rights to move forward. One of the more significant sources of wetland loss on the eastern flank of New Orleans is the controversial Mississippi River Gulf Outlet (MR-GO) channel, known locally as “the Mr. Go.” The controversy about the channel illustrates both the failures of ecosystem

Figure 3.7 Prospective Renderings of the Hoffman Triangle Neighborhood in Mid-city New Orleans

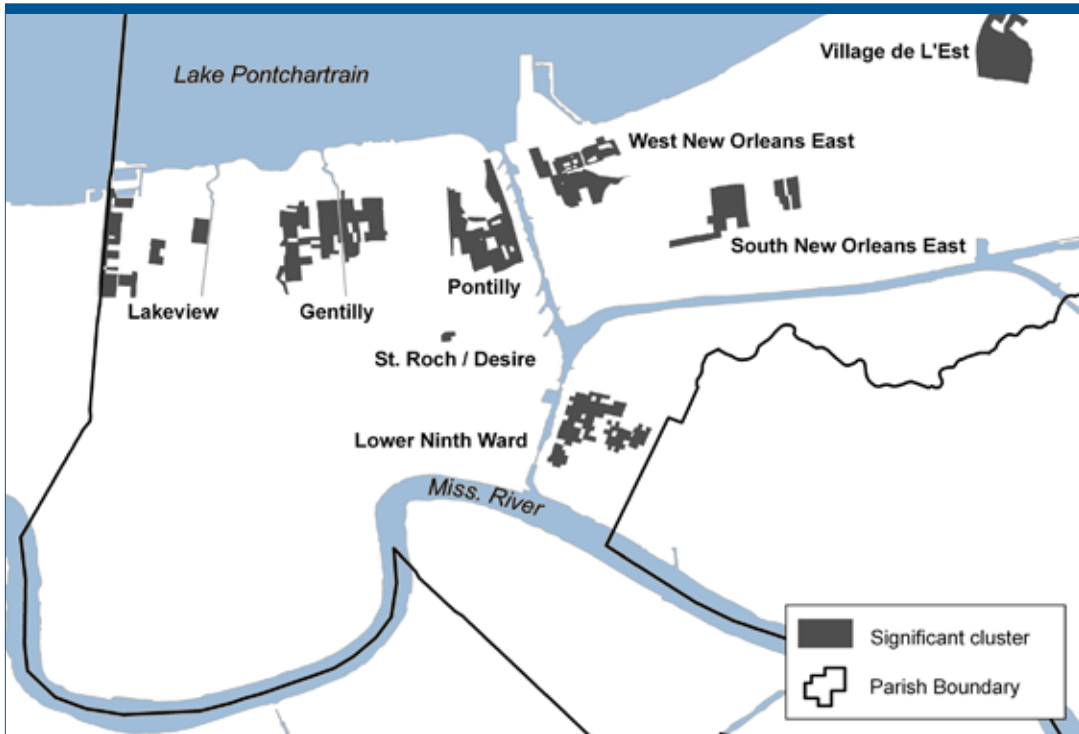
Source: <http://dutchdialogues.com/2010/05/03/dutch-dialogue-2/>



These renderings contrast current residential development trends (top) with proposed water-management interventions similar to those used in flood-prone areas in the Netherlands.

Figure 3.8 Significant Census Block Clusters in Which Many Homeowners Sold Their Property

Source: Green and Olshansky (2009).



management in the region and how the trauma of Hurricane Katrina catalyzed citizens, politicians, and government agencies to take measures to address the degradation of the city’s eastern marshlands and the associated flood risks to the metropolitan area.

Authorized by Congress in 1956, completed in 1968, and closed in 2008, the MR-GO was a major navigation canal dredged by the U.S. Army Corps of Engineers for the Port of New Orleans as a shortcut for deep-draft ships to enter the port’s Inner Harbor Navigation Canal (figure 3.9). Historically, larger ships were required to access Port of New Orleans facilities via the lower passes of the Mississippi River. In contrast to the river’s circuitous route and shifting sand bars, the MR-GO was a 75-mile straight shot, designed to a depth of 36 feet, and a width of 500 feet. The channel’s banks were largely unprotected from wave action, and in some areas it widened to more than twice its design width (USACE 2007). Saltwater from the Gulf of Mexico crept inland through the channel, penetrating the swamp forests dominated by cypress and tupelo trees. In just 15 years, the cypress and tupelo forests along Bayou Bienvenue, some within the city’s political boundaries, exceeded their salinity thresholds and transformed into open water and patches of marsh grass. The resultant loss of storm surge buffering services, biodiversity, and the devastation of the local fishing and trapping industries were immense.

By 1990 nearly 70,000 acres of wetlands had been destroyed or transformed (USACE 2007).

Although the potential impacts of the project were apparent to some observers from its inception, prior to Hurricane Katrina social movements advocating for the channel’s closure were largely fruitless. In the wake of the 2005 hurricanes, however, MR-GO became synonymous with the Corps of Engineers’ failures during the twentieth century, and debates raged regarding whether Katrina’s storm surge was in fact ushered into the city via the channel. Articles from the *Times-Picayune* and other media outlets frequently referred to MR-GO as a “hurricane highway.” Intense criticism from environmentalists and local politicians, who lobbed charges of poor management of the project at the Corps of Engineers, brought Congress to enact the Water Resources Development Act of 2007, which mandated closing the channel. Two years later, a landmark federal court decision found the Corps liable for certain flood damages in Orleans and St. Bernard Parishes due to its negligent management of the MR-GO (*Robinson v. United States*, Civ. A. No. 06-2268 [2009]).

The closure and restoration plan for the MR-GO is extensive and incorporates much of the Pontchartrain Basin, Lake Borgne, and the Mississippi Sound (USACE 2009). The closure plan includes three chief components, the first of which is a rock salinity dam installed between New Orleans and the Gulf of Mexico in hopes of restoring historical salinity regimes. The second component is a comprehensive ecosystem restoration plan being developed by the Corps of Engineers to restore swamp and marsh ecosystems over a vast territory. More than \$100 million was authorized for this project, but the funding apparatus that will underpin this extensive restoration is still uncertain. For example, as of July 2010, surface oil from the BP oil spill had been observed throughout the restoration area, so perhaps the Obama administration will allocate oil spill funds for this ecological restoration.

A formally separate but related storm surge barrier built across the marshes where the MR-GO and the Gulf Intracoastal Waterway intersect—an area sometimes referred to as “the funnel”—is the final major

Figure 3.9 MR-GO Navigation Canal and Other Waterways East of New Orleans

Source: NASA Landsat imagery processed by Joshua Lewis.



component of the plan. This surge barrier is the largest domestic design-build civil works project ever undertaken by the Corps of Engineers (USACE 2010a). It is designed to prevent hurricane storm surges from entering the Inner Harbor Navigation Canal, which flooded much of eastern New Orleans following Hurricane Katrina.

The MR-GO case demonstrates that, while agencies like the Corps of Engineers are often insufficiently responsive to degrading ecological conditions and other slowly changing variables, such as climate change–induced sea-level rise, large, politicized disasters like Hurricane Katrina and the BP Deepwater Horizon oil spill can initiate sweeping reforms if the actors and events cooperate.

The Lower Ninth Ward

Community-based planning efforts in New Orleans have explored several strategies that embrace sustainability concepts for rebuilding and land use, and the Lower Ninth Ward offers a promising case study. As early as June 2006, the Lower Ninth Ward and its Holy Cross Neighborhood produced a sustainable restoration plan that contributed to the NONRP and UNOP processes. Key concepts examined in the plan include structural improvements, such as energy efficiency and renewable energy, and naturalistic interventions for open or degraded spaces that promote safety, survivability and, ultimately, carbon neutrality (e.g., cypress swamp restoration and urban forestry).

For example, in the areas at lower elevations in the Lower Ninth Ward, the community is supporting restoration of the adjacent Bayou Bienvenue in order to provide storm surge protection, wastewater assimilation from the neighborhood's water treatment plant, carbon sequestration, and recreation services. For residential areas that experienced little home reoccupation and a high percentage of participation in the state's buyout option, ideas have been proposed that range from urban farming and forestry to community gardens and parks. In January 2010, the Lower Ninth Ward's Center for Sustainable Engagement and Development (CSED) initiated a re-examination of the Holy Cross Neighborhood's 2006 goals in the context of repopulation realities to assess community support for investments in land use, transportation and infrastructure, and building and energy efficiency goals that support climate change mitigation and adaptation.

If a new residential use does not materialize for the properties throughout the city that were bought out through the state program, a land use change and new "active" use would likely increase the market value for surrounding repopulated parcels in those neighborhoods, making the result very fortuitous. But whether these clusters will see significant permanent land use changes that incorporate water and/or park systems remains to be seen. However, with maintenance of community engagement—continued CSED engagement in the Lower Ninth Ward, for example—the passive stormwater runoff and retention as well as the aesthetic and recreational ecosystem services of these adaptation

measures can lead to greater community support for investments in such interventions. To that end, the city and its residents' ability to see water not only as a threat, but also an asset—to live *with* water rather than *against* it—will be a critical evolution from norms that currently prevail.

Nonprofit and industry investments in demonstration projects for sustainable architecture throughout New Orleans have also provided a variety of climate mitigation examples. In the Lower Ninth Ward, investments in sustainable rebuilding by the Make It Right Foundation and Global Green have either completed or at least started building 80 homes (75 for Make It Right). All received the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification, and Make It Right anticipates building more than 70 additional LEED-certified homes. If successful, in relative terms these efforts would comprise the highest concentration of LEED-certified residential units in the United States.

In addition, in 2006 Sharp Solar collaborated with the Holy Cross Neighborhood Association, Lower Ninth Ward Neighborhood Empowerment Network Association, CSED, Preservation Resource Center, and the Alliance for Affordable Energy to donate ten solar panels for community centers and neighborhood residents. While these panels obviously will not be responsible for a significant reduction in the city's overall carbon footprint, their installation catalyzed the city's first solar power retrofit of a historic home and its inaugural demonstration of net metering, setting the stage for systemic citywide reductions in GHG emissions through renewable energy, advancement of city and state incentives for installation of renewable energy technologies, and development of policies for a renewable energy portfolio standard for the city's single electric provider, Entergy New Orleans.

Though the relationship between the Army Corps of Engineers and the Lower Ninth Ward's civic groups has always been contentious, the closure of the MR-GO has created new opportunities for building trust and collaboration. For example, the MR-GO restoration plan will include recreational features intended to build upon an existing neighborhood initiative to reconnect residents to the wetland area that lies just to the north of their community (USACE 2010b).

Scale Mismatches in Regional Planning and Land Use Governance

As described previously, part of the challenge facing New Orleans' master planning and zoning ordinance process is that it depends on complementary regional plans implemented on the parish and state levels. On this scale, regional planning is subject to a fragmented, uncoordinated land use planning and governing structure. The recent escalation in the costs of restoration and levee protection along with the decline in the price of domestic oil and gas revenue from Louisiana, which reduces the state's ability to generate matching revenue for coastal restoration and protection projects, adds fur-

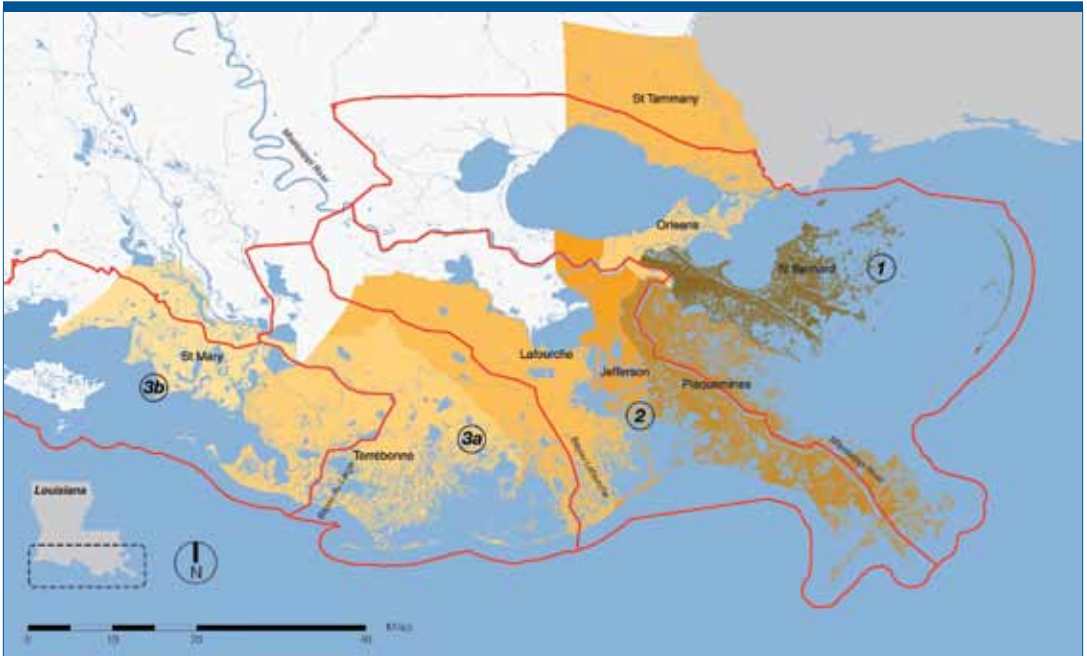
ther obstacles to implementing the coastal plan. Even with adequate funding and access to land, the construction of more robust levees and restoration of wetlands will likely take at least a generation to implement. By the end of this century, the dramatic wetland loss coupled with the relative sea level rise that is occurring in many parts of deltaic Louisiana may leave salvageable for human habitation only the thin ridges that flank the Mississippi River, various bayous in rural coastal Louisiana, and the dense, impounded urban areas near and below sea level.

Systematic planning interventions in coastal Louisiana are further complicated by mismatches between the natural boundaries and those of the jurisdictions that hold the requisite regulatory authority or planning capacity. Figure 3.10 shows four of the five coastal ecosystem-based planning units (based on combinations of major watersheds and basins) overlaid on jurisdictional boundaries governed by parishes. Jurisdictional mismatches exist because settlement and subsequent local governance in coastal Louisiana tend to straddle the high ground on coastal bayou and river levees, while the hydrologic-based planning units of the Coastal Protection and Restoration Authority (CPRA) are often demarcated by these same waterways, which is counterintuitive to most watershed-based planning in areas with greater vertical topography.

On this spatial scale, New Orleans is exemplary of a municipal land use authority that has planning and regulatory jurisdiction over just a fraction of the pertinent area. The official regional planning commission for the five parishes around New Orleans is a policy body that has no regulatory authority and falls short in terms of geographic coverage relative to the larger coastal system and the ecosystem planning units labeled 1 and 2 in figure 3.10.

Agencies of the state and federal governments are positioned to maintain and protect the larger system and to regulate uses that impact coastal waters and wetlands, but they may have neither the mandate nor political will to intervene in land use matters that involve private property. These agencies include Louisiana's Office of Coastal Protection and Restoration (OCPR) and the Louisiana Recovery Authority (LRA), and at the federal level FEMA, the Environmental Protection Agency, and the Army Corps of Engineers. Since Hurricane Katrina, however, the state has integrated its levee protection and coastal restoration programs (formerly under the state's Departments of Transportation and Natural Resources, respectively) in the new OCPR (CPRA 2007). Through this office, the state produced the first coastal master plan for large-scale restoration in 2007 and provided annual updates in subsequent fiscal year plans (CPRA 2009; 2010; and 2011). A second master plan is due in 2012.

Linking coastal restoration to its economic value supporting climate change mitigation, Louisiana currently is promoting itself as a leader in GHG sequestration by establishing standards for and quantifying the volume of

Figure 3.10 Planning Units of Louisiana's Coastal Protection and Restoration Authority Master Plan*Source: Jonathan Tate.*

Note: Numbers reference hydrologic planning units. Shaded areas indicate parish (county) boundaries.

GHGs captured as a result of coastal restoration and other vegetative plantings. The carbon-sequestration benefits of Louisiana's coastal wetland and forested habitats are emerging as increasingly significant drivers in the exploration of various land use policies that promote restoration and conservation of these private and public lands. For example, an acre of restored bottomland hardwood in the lower Mississippi floodplain could sequester up to 300 tons (average of 100 tons per acre) of carbon dioxide over the next 100 years (Wayburn 2009). In addition, the highly productive, brackish marshes of Louisiana's coastal zone contain among the highest amounts of organic soil carbon in the United States, thus representing even greater opportunities for carbon sequestration (Markewich and Russell 2001).

Disaster Plans

New Orleans Disaster Preparedness

Hurricane Katrina catalyzed a series of plans for both disaster recovery and planning for future disasters. Orleans Parish adopted an official hazard mitigation plan in December 2005 with a 2010 update completed in March 2011. The city's Office of Homeland Security and Emergency Preparedness Hazard Mitigation Unit has the following objectives.

Blakely Disaster Readings

- Communicate hazards and risks to New Orleans residents in coordination with the Offices of Emergency Preparedness, Communications, and Recovery; the LRA; Governor’s Office of Homeland Security and Emergency Preparedness; FEMA; and Army Corps of Engineers;
- Develop comprehensive solutions, policies, and programs to manage hazards and risks in coordination with the Department of Safety and Permits, Office of Emergency Preparedness, and City Planning Commission;
- Build long-term capacity in hazard mitigation and risk reduction, including acquiring funds for hazard mitigation projects;
- Include knowledge about hazards and risks in city planning and project development processes; and
- Incorporate hazard mitigation and risk reduction principles and requirements into the city’s master plan and municipal code.

Related action items in the city’s hazard mitigation plan include:

- Enhancement of the metropolitan area’s levee system to withstand a Category 5 hurricane;
- Providing Orleans Parish with a review of the maintenance and strength of the levee system in coordination with the relevant levee district;
- Ensuring that the city’s codes are consistent with FEMA regulations;
- Development and maintenance of a comprehensive geographic information system that includes disaster planning, preparation, and recovery data;
- Enhancing public awareness of vulnerability and promote the purchase of flood insurance;
- Developing a comprehensive program to protect vital records; and
- Participation in and support of regional and state efforts for coastal restoration.

By addressing areas with high-frequency flood risk as well as those with low-frequency but high-consequence flood risk, the city’s current proposed final master plan supports demonstration projects consistent with Louisiana’s coastal master plan. It includes:

- Property buyouts in low-lying, high risk areas allowing for relocation elsewhere in the city, state, or United States;
- Relocation to new elevated structures in the same or adjacent neighborhoods;

- In-place elevation of damaged structures (minimum of 3 and maximum of 15 feet);
- Secondary levees and floodwalls (with height up to 6 feet) around critical public facilities or commercial buildings;
- Dry flood proofing of commercial buildings (installation of external water-proof walls up to 4 feet in areas with a history of flooding up to 3 feet at most); and
- Hardening of critical facilities through elevating pumps, generators, electrical wiring, etc., and moving operations above the first floor.

In terms of evacuation, the city's master plan suggests that New Orleans' long-term economic viability will be threatened if mandatory evacuations of a week or more occur in any given year. To date, the Corps of Engineers has been authorized and mandated by Congress to establish only a 1-in-100-year level of flood protection by 2011, mandated by Congress to establish only a 1-in-100 year level of flood protection by 2011—a standard deemed insufficient by the National Academy of Sciences and the City Planning Commission. The city has endorsed a minimum level of protection for a 1-in-500-year flooding event (Goody Clancy 2010:9). While long-term strategies eventually may eliminate the need for large-scale evacuation, potential annual evacuation plans will remain critical in New Orleans for years to come.

Given the gross inadequacy of the city's evacuation plans before Hurricane Katrina, its government and the U.S. Department of Homeland Security developed a new city-assisted evacuation plan (CAEP) to aid any residents who lack means to leave the city during a mandatory evacuation. This plan was still in its infancy in 2008, when Hurricane Gustav triggered the first post-Katrina mandatory evacuation. City, state, and federal agencies were involved at various stages in the operation. No "shelters of last resort," such as the Louisiana Superdome during Hurricane Katrina, would be open for residents who stayed behind.

At the municipal level, hundreds of citizen volunteers were mobilized to help staff evacuation points and ensure that the cumbersome process went relatively smoothly. More than 20,000 residents were safely ushered to hurricane shelters throughout the southeast. The evacuation before Hurricane Gustav also led a group of volunteer coordinators to found Evacuteer.org, a nonprofit charged with recruiting and mobilizing volunteer assistance for the CAEP. Evacuations are always economically and socially disruptive, but New Orleans' experience with Hurricane Gustav demonstrated that if a major storm again threatened, the city's infrastructure and the various institutions and agencies could successfully evacuate the population to safety and direct them back to their homes once danger abated.



The Inner Harbor Navigation Canal surge barrier is the largest design-build civil works project ever awarded by the U.S. Army Corps of Engineers.

Photograph © Joshua Lewis.

Regional Disaster Preparedness

Human populations worldwide will continue to occupy urban areas that are vulnerable to the impacts of both slow variables (e.g., sea level rise, periodic flooding) and threshold events, such as natural disasters. The Gulf Coast of the United States has an ongoing history of severe storms. A major hurricane has hit somewhere along the coast every year since 1994, with 26 named storms and 14 hurricanes making landfall during 2005 alone. One of the reasons that Hurricane Katrina caused so much damage is that currently more than 10 million people—3.5 times the population that lived there in the 1950s—live in U.S. coastal counties and parishes along the Gulf of Mexico (NCMGCEC 2006). The integration of coastal restoration and levee protection during the aftermath of Hurricanes Katrina and Rita has resulted in more investments in hurricane protection projects that are governed through the CPRA.

Since Hurricane Katrina, numerous articles and reports have linked the theoretical underpinnings of coastal science, engineering, architecture, landscape architecture, and urban planning and design with basic land use and other germane coastal policies to provide recommendations for future planning of the urban/rural form of New Orleans and its surrounding deltaic landscape (Blakely 2007; Costanza, Mitsch, and Day 2006; CPRA 2007; Laska and Morrow 2006; Tornqvist and Meffert 2008). Most documents emphasize adaptation as well as mitigation and recognize that adaptive measures are necessary, given the rapid rate of relative sea level rise and increased salinization of freshwater

and brackish coastal marsh habitats in the region. In general, recommendations include maximizing incorporation of natural ecological processes in community-based planning and design and minimizing deleterious environmental impacts of built infrastructure elements. Specific recommendations vary among publications, but most include one or more of these general concepts.

1. Work with natural hydrology and propensity for flooding, and encourage (a) building on higher ground and increasing residential density in such areas; and (b) promoting decreased residential density in lower-ground and floodable structures.
2. Restore natural landscapes, such as graduated boundaries and topography between deepwater systems and uplands, using natural processes (e.g., diversions of the Mississippi River) to attain maximum provision of ecosystem services, including storm surge and infrastructure protection.
3. Implement flood control, disaster preparedness, and landscape interventions on a neighborhood scale, and institute primary transportation corridors (e.g., terraces; polders; and drainage enhancements, including bayous, canals, and permeable surfaces).
4. Use sustainable architectural practices that bring into the equation renewable and efficient energy, decreased flooding propensity, and materials reuse, both for renovating existing structures and constructing new structures.
5. Maximize community participation and restore social capital—diversity, environmental justice, and social networks—at every phase of planning, design, and implementation.

The Influence of the Netherlands on Climate Adaptation in New Orleans

The Netherlands' policies and practices regarding storm protection and water management provide useful tools that are influencing Louisiana's current climate change adaptation as well as the state's retrospective examination of its historic coastal landscape manipulations and periodic flooding. In terms of historic drainage of coastal ecosystems in order to promote urbanization and other land uses, it was Albert Baldwin Wood's patented hydraulic pumps, invented in New Orleans and presented in 1913, that the Netherlands, China, Egypt, and India ultimately adopted (Campanella 2008).

Since Hurricane Katrina, a number of intellectual exchanges have occurred between Dutch and Louisianan stakeholders on "living with water," both on an urban scale as well as in a larger, coastal context. These dialogues have culminated in master planning aids including the *Dutch Dialogues* (Meyer et al. (2009), with support from Waggonner & Ball Architects, the American Plan-

Table 3.2 Mississippi and Rhine Rivers Compared

Source: Meyer et al. (2009).

	Mississippi River	Rhine River
Length	6,275 km	1,320 km
Average depth	at New Orleans: 60 m	at Arnhem: 8 m
Average discharge	16,000 m ³ /sec	2,000 m ³ /sec
Extreme discharge	48,000 m ³ /sec	12,000 m ³ /sec
Sediment transport	170 million tons/year	0.4 million tons/year

ning Association, Delft University of Technology, and the Netherlands Water Partnership, as well as New Orleans’ master planning process executed through Goody Clancy.

Louisiana and the Netherlands face similar challenges in terms of living with an abundance of water as well as the similar sizes of their respective

deltas, although significant contrasts in scale and size of their respective rivers are also recognizable (table 3.2). The Mississippi River is 10 orders of magnitude greater than the Rhine in terms of average discharge and 425 orders of magnitude greater in terms of sediment transport, thus offering more potential for rebuilding deltaic habitats to offer natural storm surge protection and other ecosystem services; but there is much more demand for maintaining the large deltaic system of coastal Louisiana.

Nearly 27 percent of the Netherlands’ land is below sea level, and that area is home to 60 percent of the country’s population (9.48 million people). In terms of planning and governance, the Dutch have developed water boards that historically have governed the planning and construction of flood control structures to protect people, farmland, and cities. In the twentieth century, the construction of major flood control structures deemed necessary to protect large regions of the country from increased storm and flooding threats from the North Sea enhanced the applied scientific and engineering advisory capacities of these boards. Delft Hydraulics, created in 1927, was the first of these organizations, and it was followed by the Netherlands Organization for Applied Scientific Research (TNO) in 1932, GeoDelft, and sections of the Rijkswaterstaat later in the century.

In 1953, the North Sea flood inundated the coastlines of the Netherlands and England, killing nearly 2,000 people and inundating 850 square miles of land. The total damage at the time was 895 million Dutch guilders (€5 billion, or approximately US\$7 billion in 2011 currency). In response to this disaster, the country instituted its first Delta Commission to develop plans that would prevent future flood disasters and constructed Delta Works, one of the most ambitious public works projects in modern history. The current system has more than 1,800 miles of sea dikes and 6,200 miles of inner canal and river dikes. In addition, the system includes approximately 300 structures that support navigation and flood control between the diked systems. While these engineering solutions have protected the Dutch from severe flooding

since 1953, they also exacerbated the erosion of approximately 1,000 square miles of coastal wetland into open sea, which is roughly comparable to the 2,300 square miles of coastal wetland lost in Louisiana during this same time period.

In terms of climate change impacts, not only will the Netherlands suffer from the effects of sea level rise, but more severe summer droughts and periods of more intensive rainfall in the winter are likely to become commonplace (De Wit 2009). Most of the climate change adaptation efforts in the Netherlands have centered on spatial planning efforts to give water more space. This policy, known as the Netherlands' Room for the River approach involves lowering dikes in targeted areas to improve flood protection in other areas that are home to large populations or valuable infrastructure. While it may seem counterintuitive, the practice of allowing certain natural habitats or farmlands to flood during high river stages can reduce the vulnerability of nearby urban centers.

A New Orleans analog was constructed in response to the 1927 Mississippi River Flood and first opened in 1937. The Bonnet Carré Spillway located 12 miles west (upstream) of New Orleans was built as a flood control measure. This 1.5-mile-wide, mechanically controlled concrete weir constructed parallel to the Mississippi River generally has been opened only when the river approaches its flood stage of 17 feet. With 250,000 cubic feet per second capacity, the spillway has been opened nine times during its 80-year history (Scallan 2008). Floodwaters are released into Lake Pontchartrain north of New Orleans and ultimately flow out into the Gulf of Mexico. Sediments deposited in the spillway and the lake have been used for multiple urban environmental projects ranging from coastal restoration (e.g., the LaBranche Wetlands) and as clean top soil to remediate lead-contaminated residential land and schoolyards in New Orleans. Not only could future projects use natural systems as flood control solutions, they could utilize these diversions to restore and create new wetlands as well. For population centers in both the Netherlands and New Orleans, increased water storage practices, such as catch basins, green roofs, gardens, recreation parks, waters squares, and pervious surfaces, are encouraged in existing and future urban development strategies.

In terms of governance and process, Louisiana's coastal policy stakeholders are looking at the Dutch model for large-scale watershed planning and policy that could support the proposed authority to oversee coastal restoration. Under the leadership of Senator Landrieu, a coalition comprised of local, state, and federal agencies; academic and nongovernmental organizations; industry; and community stakeholders convened in the fall of 2009 and throughout 2010 to formulate ways to apply the collective partnerships forged in the Netherlands to multiscale water and coastal restoration and climate change adaptation for natural habitats, rural communities, urban centers, and associated economies and cultures.

Conclusions

As a deltaic city, New Orleans has always been situated in a dynamic landscape. The rates of relative sea rise and coastal erosion for the New Orleans region are among the highest in the world. That factor combined with the region's relationship to the predicted increased intensity and, possibly, frequency of hurricanes, makes New Orleans particularly vulnerable to climate change. Thus, it provides valuable clues for adaptation of vulnerable deltaic cities worldwide in terms of sea level rise, flooding, and hurricane impacts associated with climate change.

The increased susceptibility of New Orleans and coastal Louisiana does not argue for abandonment of the region. In addition to its rich cultural heritage, New Orleans and its surrounding coast provide vast tangible economic value to the world in terms of fisheries, oil and gas production, and waterborne commerce. Based on increased understanding of the limited ability of Louisiana's coastal wetlands to maintain sufficient elevation relative to the rising sea level, the future design of the natural and built environment must also accommodate periodic flooding and increased vulnerability to storm surge.

In New Orleans and along the Gulf Coast, the prevailing urban and regional planning responses to climate change have emphasized adaptive measures rather than those accommodating mitigation. In terms of climate change adaptation in city planning, for example, New Orleans has enforced raising homes to new base flood elevations established after Hurricane Katrina. Its master plan's land use recommendations do not promote new developments in remaining wetland areas within the city's boundaries. These measures are dependent on enhanced levee and floodwall protection around the metropolitan area and regional coastal restoration efforts that are largely governed by the State of Louisiana and the Army Corps of Engineers.

Many opportunities for mitigation remain, such as increased GHG sequestration through restoration of natural delta processes and wetland creation; GHG regulation of oil and gas industries in the state; GHG reductions effected through increased use of renewable energy sources; and energy efficient construction methods as an integral part of disaster recovery. These measures are still in early stages of development, however, and are largely voluntary and market-driven on local, state, and federal levels. GHG regulation of oil and gas industries, in particular, is not supported at the local, state, or federal congressional-delegate levels because revenue streams arising from these industries are a major component of Louisiana's economy and, paradoxically, remain the most reliable near- and long-term source of funds to support Louisiana's coastal restoration. In addition, coastal restoration projects implemented to date have generally been smaller in scale and more limited in terms of restoring large-scale natural processes. Much remains to achieve in terms of realizing Louisiana's wetland potential for carbon sequestration.

Examples of mitigation in municipal planning and disaster recovery in New Orleans remain merely anecdotal demonstrations, rather than systemwide policies. For example, while the New Orleans City Council has considered a renewable energy portfolio standard, this policy is still in the development stages and does not have full support of the city council. As a positive, albeit ironic advance in local mitigation, the devastation to New Orleans and surrounding coastal areas has catalyzed unique demonstrations in GHG mitigation exemplified through low-carbon construction, energy efficient architecture, and installation of solar and other renewable energy approaches throughout the city, none of which existed there before Hurricane Katrina, and are unlikely to have been implemented on the current scale without that impetus.

The challenge ahead rests primarily on two issues: limited funding and land use policy implementation at the city scale as well as that of the coastal region. The BP Deepwater Horizon oil spill represents the second recent major disaster to hit the Louisiana coastal region and, as with Hurricane Katrina, it provides a window for dramatic policy innovation as well as new funding streams to support large-scale restoration. Since the 1930s, the Louisiana coast has advanced 20 miles toward New Orleans due to coastal erosion. The added impacts of relative sea level rise will convert New Orleans into a coastal city by 2100. By then, 50 percent of it may be below sea level, unless coastal restoration efforts, including re-establishment of large-scale delta building over millions of acres, are successful.

Accomplishing this goal will require enormous monetary investment and the relocation of tens of thousands of residents into areas that will be less prone to flooding, such as locations at higher elevations and those with greater levee protection in the more densely populated areas. While Louisiana has a long record of rapid implementation of land takings in order to accommodate adaptive measures, such as levees and pumps, its record on takings or other creative land use options that would maintain private landownership for large-scale coastal restoration adaptive measures is limited. From this perspective, the science and engineering behind citywide and coastwide adaptation is well studied, whereas the legal and financial hurdles require much greater investment in decision making and new directions for policy.

Due to the contentious nature of each coastal restoration project and the need for federal monies, collective action among state and local political actors is imperative for securing funding. Future state-originated coastal master plans will acknowledge that not all parts of Louisiana's coast can be sustained, and a spending-averse Congress is unlikely to fund a program that it considers unrealistic. Congress is also unlikely to fund projects that are in the midst of litigation, or those for which local opposition is sufficiently vocal to attract third-party players, such as news media and other actors in civil society.

Although future coastal master plans will acknowledge that community relocations are necessary, reaching consensus on projects that will likely dis-

rupt and transform ecosystems and force communities to relocate is daunting to say the least. After Hurricane Katrina, the suggestion of mandatory moving of residences within the parish boundaries was met with such opposition that these proposed relocations quickly became untenable for local politicians. How this same phenomena plays out for rural coastal parishes in the decades to come remains to be seen, but targeted relocations clearly will be necessary.

Local and state leaders must address this inevitability head on and support concomitant, fair monetary compensation. More specifically, the state will need to identify coastal parish properties where residential relocations or other land access will be necessary for implementation of large-scale restoration and flood control, consistent with its coastwide master plan. For these properties, where voluntary land use transitions cannot be achieved, takings or other land access mechanisms will be necessary and property owners should be compensated with the fair market value of their properties or their use. Without this proactive approach to relocations, it is unlikely that Louisiana will get the national political and financial support it needs for large-scale coastal restoration.

The visibility of Hurricane Katrina and the Deepwater Horizon oil spill demonstrated to Louisiana's urban residents as well as Americans across the country the critical condition of the state's coastal wetlands. This added a new cadre of engaged citizens and national environmental organizations working to fund of restoration projects. This new paradigm introduces ample enthusiasm, but also another layer of political complexity. Parish-level restoration advocates are perhaps most likely to support projects that generate ecosystem services within their parish's boundaries. For example, the perception that coastal restoration projects are designed to protect and generate services only for New Orleans is widespread in nearby St. Bernard Parish. Growing resentment by rural-parish governments can be seen in public hearings concerning the MR-GO ecosystem restoration plan. In one such meeting, St. Bernard Parish President Craig Taffaro emphasized his view that "St. Bernard Parish is more than a barrier for the rest of metropolitan New Orleans." (Taffaro 2011) To an extent these tensions are unavoidable, but historical animosity between communities must not be inflamed by an approach to restoration that rewards competition between parishes to secure projects they perceive as being most favorable to their residents.

Regarding urban planning in Orleans Parish, local planners, managers, and leaders remain challenged in terms of implementing projects prioritized as a result of the UNOP process and the 2010 comprehensive zoning ordinance. The official 2010 census population of Orleans Parish is 343,829 residents, which is approximately 120,000 fewer residents than the pre-Katrina population and roughly 50 percent of the city's population in the early 1960s, when the city's footprint was half its current size. Between March 2007 and August 2010, the number of unoccupied addresses declined by 30,000, but nearly 64,000 residential and commercial properties in the city remained unoccupied (GNOCDC

2010). This population decline is expected to cause Orleans Parish to lose at least three districts in the state's House of Representatives and one state senate seat. In addition, the current expectation of a 1-in-100-year level of flood protection is one that the city deems insufficient to attract new residents and industries into the area and, yet, no funding stream has been identified to increase the protection level. Local leaders must support and implement creative uses (e.g., parks and urban gardens) for vacant lots in which residential use will not recur. These investments will improve the adjacent property values and serve the residents who have come back to these respective neighborhoods.

Looking toward the end of the twenty-first century, reasons for both optimism and pessimism exist. On one hand, although the City of New Orleans has no jurisdiction over the state's other coastal parishes, the environmental crisis combined with current governmental leadership is fostering new municipal partnerships with the state. From these partnerships, creative models are emerging for large-scale watershed management, and funding is being used to address the challenges of climate change while preserving the economic, ecological, and cultural services that the region provides to the United States and the world. Numerous challenges remain for metropolitan planning in New Orleans. The city's viability and survival into the next century is not guaranteed and greatly depends on the achievement of massive coastal protection and restoration goals on a scale never before attempted in the world.

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Blakely Disaster Readings

Figure 4.1 Los Angeles–San Diego
Source: Weiss and Overpeck, University of Arizona.



Chapter 4

Los Angeles–San Diego

Kenneth C. Topping

Southern California has a significant water problem that is difficult to solve, and it is getting worse. Since the early twentieth century, rapid growth has been enabled by water brought from distant places through nearly 1,000 miles of canals and tunnels. More than 21 million residents in the region now rely substantially on imported water for their daily needs (figure 4.1). Southern California has long exploited remote water sources, but recent lawsuits have impeded the extent to which the region may continue to draw on them.

At the same time, climate change is diminishing these water supplies, together with the long-term sustainability of the entire region. Oceanic and atmospheric warming is altering the water cycle, bringing early snowmelt, and leading to less water storage in distant mountain ranges. Floods and droughts are both more frequent and more intense. Longer-lasting heat waves coupled with declining precipitation increase the frequency of wildfires, which in turn call for adequate water supplies and pressure to combat them. Sea level rise is necessitating redesign and replacement of coastal infrastructure systems.

Two-thirds of California's water supply originates in the northern third of the state, but the majority of the state's population resides in the southern third, which relies on regular deliveries from the Los Angeles Aqueduct, Colorado River Aqueduct, and State Water Project to meet basic water needs. Figure 4.2 shows the complex system of federal, state, and locally sponsored canals, pipelines, and tunnels that move water among regions both within and beyond California.

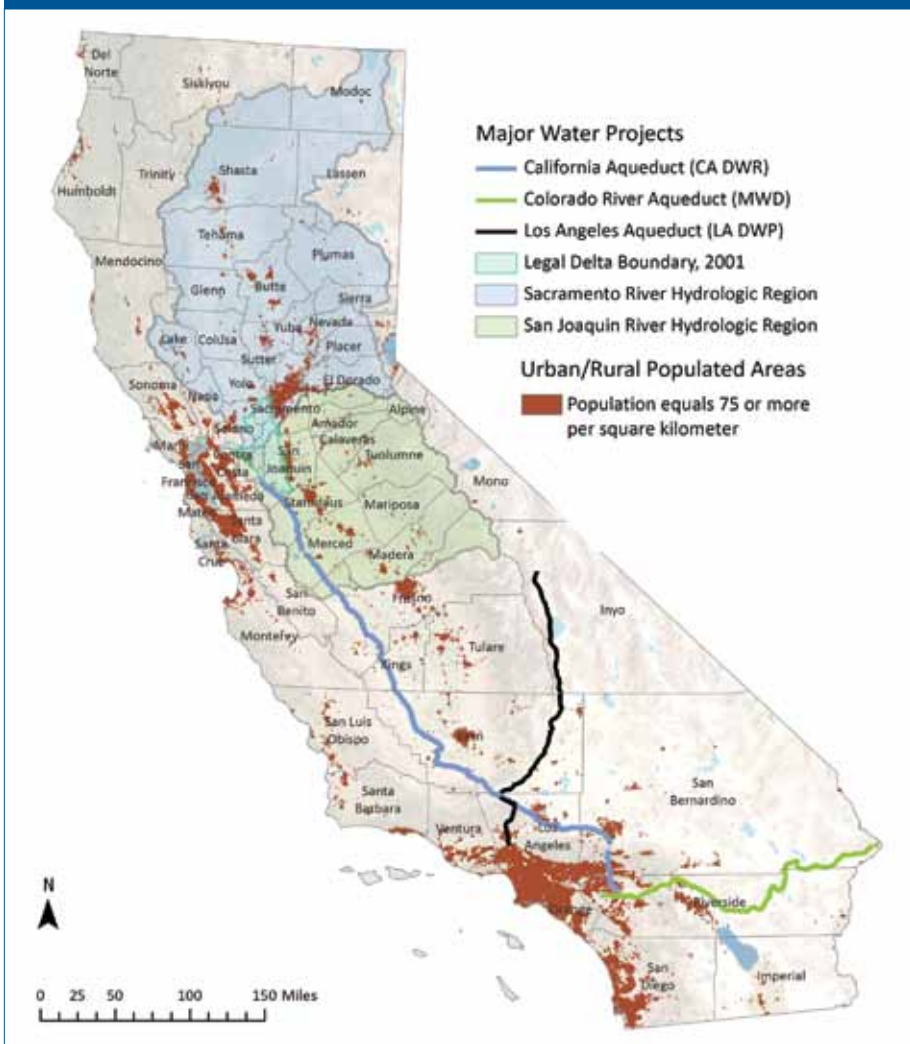
Although California has a wide variety of climatic and biotic zones, much of the state's natural water supplies are declining. According to the *2009 California Climate Adaptation Strategy (CAS)*, released in December 2009 by the California Natural Resources Agency:

California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities. The state's water supply system already faces challenges to provide water for California's growing population. Climate change is expected to exacerbate these

Blakely Disaster Readings

Figure 4.2 California's Major Water Projects

Source: ORNL LandScan2007™/UT-Battelle, LLC 2005–2007; American Community Survey (ACS) 3-year estimates and 2000 U.S. Census County Division (CCD); California Dept. of Water Resources; California Dept. of Fish and Game; ESRI Data & Maps. Prepared by Carol Schuldt, California Polytechnic State University.



challenges through increased temperatures and possible changes in precipitation patterns. We can expect to experience more frequent and larger floods and deeper droughts.... Planning for and adapting to these simultaneous changes, particularly their impacts on public safety and long-term water supply reliability, will be among the most significant challenges facing water and flood managers this century. (CNRA 2009, 7)

As climate change threatens to diminish external water supplies serving Southern California, major adjustments will be needed to address future

water and land use planning and to modify the region's water production and consumption practices substantially. Major adjustments will also be needed to adapt to intensified impacts of natural hazards such as earthquakes, floods, and wildfires, as well as the relatively new phenomenon of sea level rise. Unless future planning is focused on both climate change mitigation and adaptation, the potential for catastrophic consequences is likely to grow. To understand this challenge in greater depth, we examine how this region grew and the nature of its existing water sources and uses.

Historical Growth Factors

Since the founding of Los Angeles in 1781, Southern California has grown rapidly into a sprawling megaregion covering thousands of square miles that are framed by the Pacific Ocean and several mountain ranges and spill into nearby deserts. During successive cycles of population growth before and after World War II, Los Angeles symbolized the farthest reaches of westward migration in the United States. Now, with more than 21 million residents, Southern California owes its size and dynamic growth to a variety of complex factors, the most important of which has been its ability to import water over long distances.

Before 1848, when California became a state, a series of land grants from the Spanish crown had shaped the broad outlines of the region's early development. Used initially for ranching, these land holdings later formed the boundaries for subdivisions promoted by speculators marketing land to eager buyers from the East and Midwest, who were seeking healthier, more comfortable living in Southern California. Factors fueling this historic growth over the last two centuries include:

- an abundance of developable land;
- a temperate Mediterranean climate;
- arrival of the railroads and the regional streetcar system;
- marketing of Los Angeles as an ideal destination for westward migration;
- aggressive development of roads, railroads, ports, and airports; and
- importation of water from other regions.

In the late nineteenth and early twentieth centuries, Los Angeles flourished as a fledgling settlement, growing from a population of about 5,000 in 1890 to more than 100,000 by 1900. Through the early efforts of prominent figures, such as Phineas Banning, railroads continued to expand, and later they influenced development of a port at Wilmington, next to Long Beach. Large-scale rapid growth was also triggered by development of a regional electric streetcar system started by Henry Huntington in 1901. This Red Car system

ultimately included more than 1,000 miles of track extending from downtown Los Angeles to San Pedro, Torrance, Long Beach, Santa Monica, Pasadena, San Bernardino, Fullerton, and other corners of the region. The streetcar system sparked real estate development around widely scattered small town centers that served citrus and other agricultural industries. When it became apparent that this growth might eventually outstrip the natural water supply, efforts were initiated to bring water over hundreds of miles from other regions through aqueducts. Prominent among these were the Los Angeles and the Colorado River Aqueducts.

Los Angeles Aqueduct

Major water management efforts in the early 1900s were led by Los Angeles real estate interests, including the *Los Angeles Times*' publisher Harrison Gray Otis, to promote a bond election to fund transport of water from the Owens River, some 215 miles away. Following a campaign that publicized the possibility of imminent drought, voters in 1905 authorized \$2.5 million for purchase of Owens Valley water rights. A second election in 1907 authorized \$23 million for construction bonds (Carle 2000). Led by water system superintendent William Mulholland, the city built an aqueduct to bring water from the Owens River to a large reservoir in the northern San Fernando Valley and then to other parts of the city through the Los Angeles River (figure 4.3). Easements granted by Congress for the aqueduct's passage over federal lands permitted construction of the first segment, which was completed in 1913 (City of Los Angeles 1916).

Construction of the Los Angeles Aqueduct helped create the market conditions to encourage extensive investments in agricultural and residential development and further expand the city's boundaries and population. By 1920, the city reached 576,000 residents, surpassing the population of San Francisco for the first time.

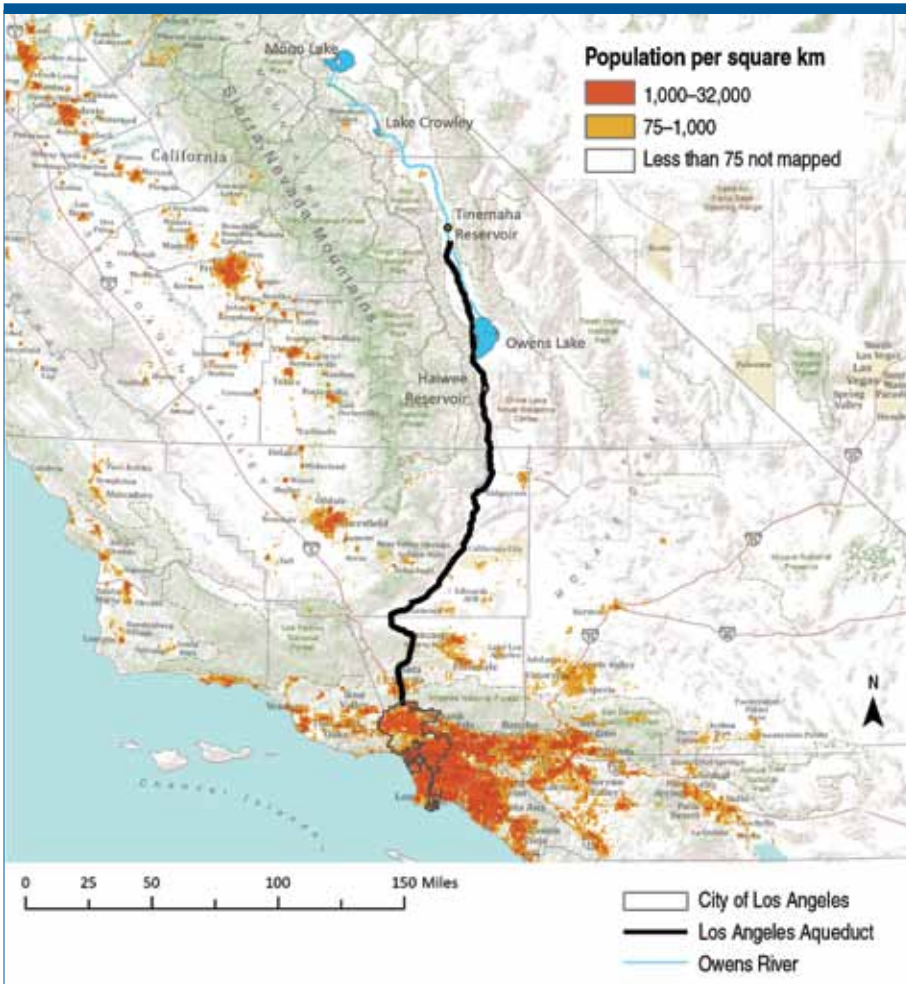
In 1930 California voters approved a \$40 million bond issue authorizing the purchase of expanded land and water rights in the Owens River Valley and construction of the Mono Basin Aqueduct, which extended the project to Mono Lake, 280 miles from the city. Diversions of water from Mono Lake streams began in 1941, and by 1970 groundwater pumping and Mono Basin diversions increased to fill this second aqueduct. The history of aqueduct development was rife with conflicts between Los Angeles and Owens Valley interests. In 1972, Mono County filed a lawsuit against Los Angeles, but it eventually stalled, and additional pumping of the groundwater basin by the city was halted (Carle 2000; Erie 2006; Sauder 1994).

The Colorado River Aqueduct

Completion of the Los Angeles Aqueduct helped the city, but the problem of providing water to outlying areas remained unaddressed. Rejecting the idea of

Figure 4.3 The Los Angeles Aqueduct

Source: ORNL LandScan2007™/UT-Battelle, LLC 2005–2007; American Community Survey (ACS) 3-year estimates and 2000 U.S. Census County Division (CCD); LA County Dept. of Regional Planning; California Dept. of Water Resources; ESRI Data & Maps. Prepared by Carol Schuldt, California Polytechnic State University.



annexation into Los Angeles, a group of about 250 delegates from 38 cities and communities formed the Colorado River Aqueduct Association in September 1924. Legislation was introduced in 1925 and passed in 1927 to form the Metropolitan Water District of Southern California (MWD). The district was incorporated in 1928, after voters in 11 cities decided to join the new district. The number of members grew to 13 cities by 1931 (O'Connor 1998). A \$220 million construction bond was approved by voters in 1931, and by 1941 the 242-mile Colorado River Aqueduct was completed, allowing water deliveries to begin (figure 4.4).

Until the 1940s the MWD was comprised solely of cities, but after World War II most new members were municipal water districts. It grew to include

Figure 4.4 Metropolitan Water District of Southern California (MWD) Boundary and the Colorado River Aqueduct

Sources: MWD; California Dept. of Forestry and Fire Protection (CAL FIRE); ESRI. Prepared by Carol Schuldt, California Polytechnic State University.



27 member agencies in six counties: Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura. The primary source of revenue for the MWD was a property tax included in the authorizing legislation. Although initially influenced by the City of Los Angeles, the MWD's governance eventually shifted to a wide-ranging mix of elected and appointed directors who held varying allocations of votes (O'Connor 1998).

Due to its instrumental role in providing supplemental water to Southern California, the MWD became a powerhouse in land development. By 1950, the City of Los Angeles population was just under 2 million, halfway to its present level of 4 million. By 1970, Los Angeles, Orange, San Diego, and Ventura Counties had tripled their combined population to a total of 10 million, nearly half of the region's present count. Between 1984–1985 and 1994–1995, the MWD average annual use of water directly delivered to member agencies increased by nearly 1.8 million acre feet. Top users included the San Diego County Water Agency (496,815 acre feet); City of Los Angeles (238,474 acre feet); and Municipal Water District of Orange County (208,434 acre feet) (O'Connor 1998, 12–13). By 1999, the MWD was providing 60 percent of the water used by nearly 18 million people living in coastal counties, from Ventura to San Diego, including 27 water agencies and 127 cities (Carle 2000; Erie 2006).

State Water Project

It became evident in the 1950s that continued growth would require additional water deliveries to supplement the Los Angeles and Colorado River Aqueducts. At the urging of the MWD and other Southern California interests, the state legislature passed the Burns-Porter Act, which authorized a \$1.75 billion bond issue to construct the State Water Project (SWP). This bond would be used to implement a major north-south transfer of water via San Francisco Bay and the Sacramento–San Joaquin River Delta, including multiple reservoirs and conveyance systems.

In 1960, California voters approved a ballot measure ratifying the Burns-Porter Act. Construction of the first major section of the SWP was completed, and initial deliveries of water to Southern California were made in 1973. By 1997 the Coastal Branch of the aqueduct system was completed, linking the SWP to Santa Barbara and San Luis Obispo Counties. From 1952 to 2007, SWP construction costs totaled about \$6.4 billion (California Legislative Analyst's Office 2008).

In 1982, legislation authorizing an \$11.6 billion bond to build a canal in the delta was put on a statewide ballot through a signature petition. The proposed Peripheral Canal was designed to end the pumping of water through the delta itself by moving fresh water past tidal waters, thus delivering it more efficiently to the south. Environmentalists opposed this canal fearing alteration of delta ecosystems. The measure was defeated in June 1982 by a substantial majority (63 percent of the electorate), and it proved to be a turning point in the established trend toward ever-increasing Southern California water imports via the SWP (Carle 2000; Erie 2006).

A federal court ruling in 2007 required a reduction in water exports via the delta because the state and federal water pumping projects were placing the already endangered delta smelt at risk of extinction. To comply with the order, the state reduced pumping. In 2008 a separate court ruling stated that a U.S. Fish and Wildlife Service biological opinion related to water management operations did not adequately protect sensitive populations of fish, including salmon. This issue remains the subject of ongoing legal actions and counteractions by various interests. However, the U.S. Supreme Court on October 31, 2011, declined to hear on appeal by farmers of a lower appellate court ruling protecting the delta smelt.

These court cases highlighted the reality that two major California water delivery projects, the SWP and the federal CVP (Central Valley Project), rely on water flowing through the delta as their main source of supply. A majority of Californians rely on such water for all or part of their drinking water. Additionally, approximately one-third of the state's cropland uses water flowing through the delta (California Legislative Analyst's Office 2008).

The Role of the Federal Government

Since the beginning of the twentieth century, California's water dilemmas have grown out of ambitious water development by federal, state, and local gov-



State Water Project Aqueduct, Central Valley, California

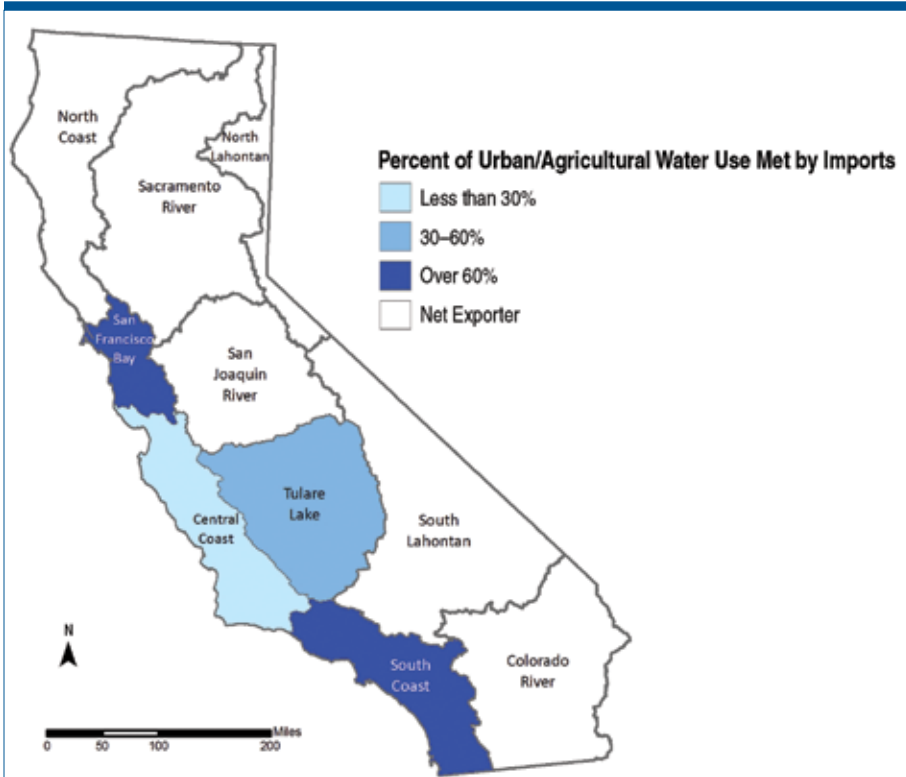
Credit: Courtesy of California Dept. of Water Resources.

ernment agencies. Beyond Southern California, federal policy has supported importation of water to other regions, including the San Francisco Bay Area and the Central Valley. In 1913 a federal law authorized construction of the O’Shaughnessy Dam on the Tuolumne River to create the Hetch Hetchy Reservoir, which would then provide supplemental water for the City and County of San Francisco. Construction of the federally funded Central Valley Project began in the 1930s, during the Great Depression, and was completed in 1951 (Carle 2000).

As a result, the federal government now owns California’s largest surface water storage capacity of nearly 17 million acre feet in 10 reservoirs on multiple river systems (California Legislative Analyst’s Office 2008). Furthermore, the federal court rulings restricting SWP pumping over the past decade have led the state to reconsider the possibility of reviving the Peripheral Canal or alternate project to convey fresh water around or under the delta.

Figure 4.5 Hydrologic Region Water Use Met by Imports

Source: California Legislative Analyst's Office (2008).



Note: While the Colorado River region is a net exporter of water, its main source is imported from the Upper Colorado River Basin beyond the California state borders.

Within this broader framework, it is important to note the sources and distribution of water flowing through the delta. The largest sources are the combined inflows from the Sacramento River (74 percent) and the San Joaquin River (16 percent); the smallest (8 percent) arises from in-delta precipitation and eastern tributaries. Of the water in the delta, a relatively small portion (15 percent) is actually transported south through the SWP for urban residential and industrial use in Southern California; 12 percent is transported through the Central Valley Project; and 8 percent is used locally, mostly for agricultural purposes. Fully 65 percent flows out to Suisun and San Francisco Bay (California Legislative Analyst's Office 2008).

These ambitious water transfer projects have resulted in major urbanized regions of the state becoming dependent on imports as a primary water source. Figure 4.5 shows that more than 60 percent of urban and agricultural water use in both the San Francisco Bay and South Coast hydrologic regions is accommodated by imports from other regions. In the Central Valley, for example, from 30 to 60 percent of water in the southern Tulare Lake Hydrologic Region is imported.

Planning in Los Angeles Comes of Age

Among the prominent features of the Los Angeles metropolitan region are the film capital of Hollywood, suburban San Fernando Valley, and Los Angeles International Airport as well as the harbor, which functions in tandem with Long Beach's harbor to form the largest port complex on the West Coast. During its peak growth period, Los Angeles encompassed an area of massive proportions that dwarfed the hundreds of smaller municipalities in the region.

As automobile use expanded rapidly before World War II, serious conflicts arose between the streetcar system and road traffic. Following the war, in conjunction with the early nationwide development of the interstate highway system, major public investments were directed to freeway systems. These transportation changes drew users away from the Red Car system, and the last streetcar line closed in the early 1960s. Although a new rapid transit rail system emerged in the 1980s to connect downtown Los Angeles with some suburban centers, freeways remain the dominant mode of transport throughout the sprawling metropolitan region.

Prior to World War II, Los Angeles had no citywide zoning to regulate development. Basic zoning was established in 1946 to control height, bulk, and setbacks of buildings on property as well as allowable floor area. No comprehensive plan was in place for the city, however. During the 1960s and 1970s, a complex planning system emerged when the city's planning department conducted a citywide goals program. For the first time, a citywide plan was prepared, approved by the mayor, and adopted by the 15-member city council. The new general plan featured a centers concept that sought to steer growth into high-intensity, mixed-use concentrations linked by a proposed rail-transit system. Other citywide general plan elements eventually addressed housing, open space, various infrastructure facilities, and public safety.

Because the general plan was formulated after adoption of basic zoning, in the early 1980s widespread contradictions regarding the greater intensity of development allowed under zoning than under the general plan had become evident. The build-out capacity of the 1946 zoning ordinance would accommodate 10 million people, whereas the general plan restricted the population level at build-out to around 4 million.

A lawsuit was brought by residents who were angered by high-rise office buildings that, while consistent with commercial zoning, were constructed in areas designated as single-family residential zones by the general plan. Following a successful judgment in favor of the homeowners, the entire city was rezoned in the late 1980s using geographic information systems (GIS), which helped bring zoning into conformity with the general plan. Meanwhile, during the boom of the 1980s, building permits were issued for more than 40 million square feet of office space, and the skyline began to change shape again. The city initiated preparation of a new general plan framework in 1990, and it was adopted in 1996. This framework incorporated the earlier



Metro Rail Station Development, Del Mar Station, Pasadena
Photograph courtesy of Metro. ©2011 LACMTA.

centers concept as a series of targeted growth areas that took into account a variety of urban forms beyond high-rise centers. Construction continued and led to the arrival of Walt Disney Concert Hall, the emergence of a viable downtown office-residential core, and expansion of subway, light rail, and bus systems that connected downtown with various suburban communities.

During this same period, cities and counties throughout Southern California were bringing their planning procedures into closer alignment with an environmental awareness that had been growing since the 1970s when California planning laws were updated with new requirements for local general plans and their implementation. By the 1990s interest was intensifying in the concept of smart growth, which emphasized a more balanced, regional pattern featuring revitalization of existing town centers through combined mixed-use and transit development. A closer relationship was emerging between local land use, transportation, and environmental planning.

Regional Growth

The first decades of the twenty-first century continue to see massive growth in the Los Angeles region. Planning for certain designated aspects of growth is coordinated at the regional level by the Southern California Association of Governments (SCAG), a joint metropolitan planning organization (MPO) and a council of governments (COG) under federal and state laws. The region

Blakely Disaster Readings

Table 4.1 Top Five California Growth Counties, 2000–2009

Source: State of California (2009).

County	Population Change	Rank Within State
Los Angeles	832,911	1
Riverside	568,392	2
San Diego	372,182	3
San Bernardino	342,325	4
Orange	291,796	5
Total Top Five Counties	2,407,606	

Table 4.2 Population of SCAG Regional Counties, July 2009

Source: State of California (2009).

County	Population
Los Angeles	10,409,035
Orange	3,115,393
Riverside	2,127,612
San Bernardino	2,064,375
Ventura	841,001
Imperial	179,254
Total Population	18,736,670

Table 4.3 Population of MWD Counties, July 2009

Source: State of California (2009).

County	MWD
Los Angeles	10,409,035
San Diego	3,208,466
Orange	3,115,393
Riverside	2,127,612
San Bernardino	2,064,375
Ventura	841,001
Total Population	21,765,882

included in SCAG encompasses 38,000 square miles, including 6 counties and 189 cities together with many unincorporated communities. It is divided into 14 subregions for coordination purposes.

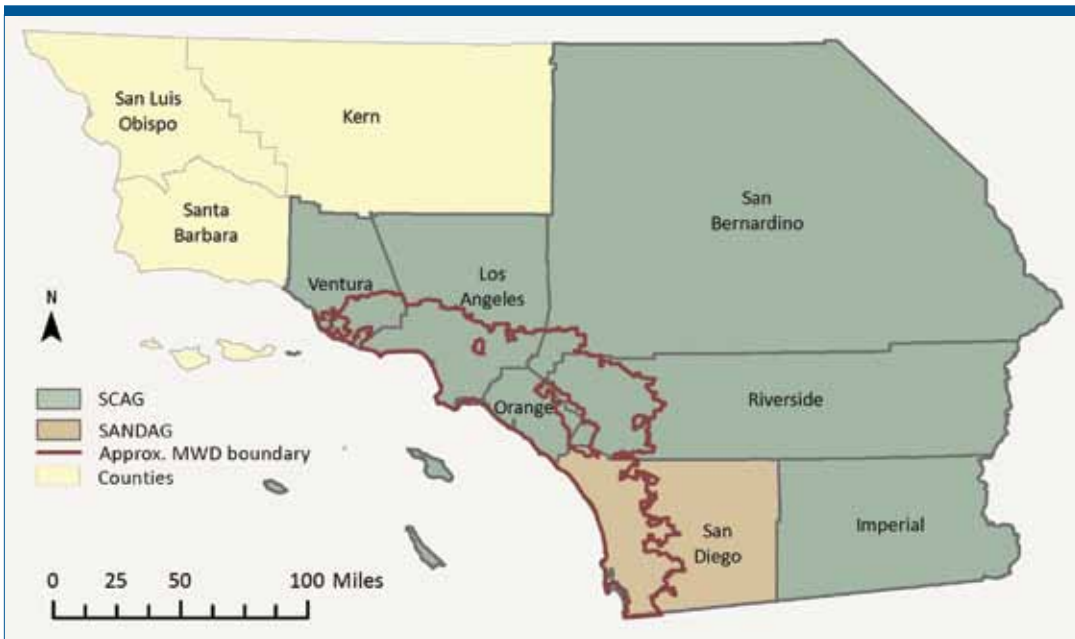
The SCAG region’s population in 2009 was estimated at 18,736,600, or nearly 49 percent of California’s total population of 38,487,900; the city of Los Angeles alone had an estimated population of 4,066,000 (State of California 2008). With a land area of 485 square miles, the city dominates the region’s landscape. Urban geographers have identified it as one of ten “alpha level” world cities, based on the presence of global service centers for major urban economic sectors including accounting, advertising, banking, and legal services (Beaverstock, Smith, and Taylor 1999).

Recent growth has taken two forms. On the one hand, higher-density housing and mixed-use developments are being constructed near subway, light-rail, and express bus stations as well as lines in new urban clusters located near existing town centers. Such siting provides convenient and varied living, working, shopping, and cultural environments. By contrast, leapfrog suburban development continues to intrude into agricultural areas, such as extensive new subdivisions encroaching on the San Bernardino County Dairy Preserve—often called the Chino Ag Preserve—and other areas of the Inland Empire, a subregion of San Bernardino and Riverside Counties.

Between 2000 and 2009, population growth in Southern California, including San Diego County, exceeded 2 million people, and much of this growth took place in inland valleys, away from the Pacific coast. All five of California’s

Figure 4.6 SCAG, MWD, SANDAG Areas

Source: SCAG; SANDAG; MWD; CAL Fire; ESRI. Prepared by Carol Schuldt, California Polytechnic State University.



top-ranked growth counties were in Southern California, four of which fall within the SCAG region (table 4.1). San Diego County has its own county-level regional planning agency, the San Diego Association of Governments (SANDAG), but it largely falls within the MWD service boundary and ranks third in statewide population growth. It experienced an increase of nearly 400,000 residents between 2000 and 2009, which brought its total to more than 3 million.

Tables 4.2 and 4.3 compare the populations of the overlapping SCAG and MWD regions, and figure 4.6 shows the primarily coastal area serviced by MWD, including 14 cities, 12 municipal water districts, and the county water authority. The MWD boundaries are not coterminous with county lines, but most residents of the six SCAG counties served by MWD live within its boundaries. The population in the seven counties that comprise MWD's primary service area now totals more than 21 million, or 55 percent of California's population. While the Antelope Valley and Imperial Valley desert subregions are formally outside MWD service boundaries, they also rely on imported water from the SWP and the Colorado River Aqueduct.

Climate Mitigation, Adaptation, and Action Plans

Nationally, California has taken an active lead in addressing climate change. In June 2005 then-governor Arnold Schwarzenegger led a vigorous and widely publicized policy initiative to mitigate global warming through Executive Order S-03-05, which established the following greenhouse gas (GHG) emis-

sion reduction targets: by 2010, reduce to year-2000 emission levels; by 2020, reduce to 1990 levels; and by 2050, reduce to 80 percent below 1990 levels.

This order was followed by passage of Assembly Bill (AB) 32, the California Global Warming Solutions Act (2006). It charged California's Air Resources Board (ARB) with executing a comprehensive program to achieve quantifiable, cost-effective GHG emissions reductions of 25 percent by 2020 through development of regulations and market mechanisms under California Health and Safety Code Section 38500. In 2008, Senate Bill (SB) 375 identified a regional target-setting process for GHG emissions reductions in California, calling for ARB to release draft targets by 30 June 2010 and for each MPO to develop a sustainable communities strategy (SCS) that identifies how ARB's GHG reduction targets would be met within regions. Although local land use planning is not directly the subject of the bill, regional target-setting processes will impinge on local development decisions, and ultimately will have the effect of strengthening the role of MPOs and other regional planning organizations.

Parallel to these efforts are the outcomes of lawsuits against San Bernardino and Stanislaus Counties that were filed by Jerry Brown, California's attorney general at the time and now its governor. In those suits, the state held the position that the respective county's general plans did not honor the emission reduction strategies of AB 32. Using the California Environmental Quality Act (CEQA) as a base, successful settlements required the two counties to include GHG emissions reduction policies and actions in their new general plans. Subsequent changes in CEQA guidelines have reinforced the settlements' outcomes, leading to a spate of local city and county climate action plans that seek to avoid such lawsuits by integrating climate change mitigation.

The State of California Multi-Hazard Mitigation Plan states the following:

Climate change is already affecting California. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing. Extreme weather events, such as heat waves, wildfires, droughts, and floods, are likely to be some of the earliest climate impacts experienced. In order to address these changes, California has developed a variety of laws, policies, and programs to both mitigate (or reduce) the emission of greenhouse gases into the atmosphere and adapt to the changes that will take place. (Cal EMA 2010, 103)

California's Climate Adaptation Strategy (CAS) released by the California Natural Resources Agency in 2009 also stresses the need for public policy that addresses long-term climate change impacts identified by the Intergovernmental Panel on Climate Change, such as severe storms, flooding, water and food shortages, and desertification of temperate regions.

A question addressed at some length in the CAS is the appropriate relationship between climate mitigation and adaptation actions. To some degree, regional GHG emissions reduction (mitigation) resulting from MPO efforts throughout the state will help moderate the intensity of climate change globally. Yet a concern remains regarding adaptation actions that can be taken regionally to help create societal resilience to climate change impacts that may be inevitable and possibly irreversible, but are beyond the immediate reach of mitigation efforts.

Adaptation Strategies

One major adaptation strategy necessary for Southern California is recognizing the long-term reductions in water resources induced by intermittent droughts and other conditions that create water shortages. The multiple challenges to be addressed include diminished water supply, water conservation, water reclamation, planning and governance, and natural hazard mitigation.

Water Supply

During the past two decades, Southern California has experienced several droughts when SWP flows were diminished by lowered reservoir storage. The State of California Multi-Hazard Mitigation Plan addresses this issue.

Droughts exceeding three years are relatively rare in northern California, the source of much of the state's water supply. California's last major statewide drought was in 2007–2009. At a regional level, parts of southern California experienced a series of consecutive dry years in the late 1990s/early 2000s, with water year 2002 setting records for the single driest precipitation year in cities such as Los Angeles and San Diego. The Colorado River Basin, an important source of water supply for southern California, experienced five consecutive years of drought in water years 2000–2004. (Cal EMA 2010, 313)

In 2007, California was entering a drought formally recognized in 2008 by the governor's Executive Order S-13-08. Dr. Renée Kidson, chief hydrologist for water accounting in the Australian Government Bureau of Meteorology, has chronicled the impacts of drought-based fluctuations on water deliveries from the SWP and Colorado River Aqueduct. In light of climate change, she suggests that alternative sources of water will be needed, stating that although MWD had a maximum contracted supply of 2,011,500 acre feet of SWP water, this volume was met only once, in 2006, during the period from 2001 to 2008 (Kidson 2009). Noting that MWD is the largest supplier of municipal water in the world, its deliveries were less than 40 percent of ordered volumes in two of those eight years—2001 and 2008 (table 4.4).

Blakely Disaster Readings

Table 4.4 Acre Feet (AF) of Water Requested and Granted, 1996–2008

Source: Kidson (2009).

Year	MWD Requested (AF)	SWP Granted (AF)	% of Request Granted
1996	738,800	738,800	100
1997	1,044,100	1,044,100	100
1998	1,203,578	1,203,578	100
1999	1,180,000	1,180,000	100
2000	1,507,136	1,507,136	100
2001	2,011,500	784,485	39
2002	1,800,107	1,408,060	78
2003	2,011,500	1,810,350	90
2004	2,011,500	1,307,475	65
2005	1,911,500	1,720,350	90
2006	1,911,500	1,911,500	100
2007	1,911,500	1,146,900	60
2008	1,911,500	669,025	35

Kidson's analysis highlights the three primary factors affecting the SWP's diminishing ability to ensure water deliveries: drought; pumping constraints arising from provisions of environmental lawsuits that restrict pumping from the delta; and agencies' placements of larger orders (Kidson 2009). Furthermore, the contracted supply of Colorado River Aqueduct water, which includes a fixed base allocation of 550,000 acre feet per year and a variable surplus allocation of up to 662,000 acre feet, is not reliable either. Kidson concludes that to secure a reliable water supply for expected levels of development for the year 2020, the MWD should reduce its reliance on imported water, increase conservation, and develop alternative sources.

In a broader assessment, Stephen Erie (2006) evaluated factors affecting projected water deliveries to the year 2050, concluding that it will be necessary for the MWD to rely more on water conservation and development of local supplies to meet regional growth demands at the same time as it offsets probable reductions in external water supplies. Projections for demand in 2025 suggest that the MWD will need to supply from 2.4 to 2.7 million acre feet of water.

Water Conservation

Throughout its history, land use in Southern California has been characterized by development that requires large amounts of water, including large-lot, single-family homes, golf courses, and irrigated agriculture. The region's Mediterranean and desert climates have made extensive watering of lawns and gardens standard practice. Many cities still enforce landscape requirements that emphasize cosmetic uniformity.

This attitude began to change with the onset of a major drought in the late 1980s. Tom Bradley, then mayor of Los Angeles, appointed a Water Conservation Task Force in 1988. Cochaired by the city's planning and public works directors, the task force's water conservation recommendations, such as installation of low-flow toilets, related principally to new development. Many of the recommendations were implemented, and the effort also led the planning department to prepare and issue guidelines that homeowners could implement themselves. For example, xeriscape techniques, which use less water than those for traditional lawns and gardens, were encouraged for residential landscaping. The city has implemented other measures to encourage water conservation, and together they have substantially reduced per capita water consumption.

Nevertheless, water conservation efforts in Southern California have barely scratched the surface. Among the implemented water-saving practices are:

- expanded and vigorous xeriscape promotion on a community-wide and regional scale;
- sanitary capture of washing machine and shower "grey water" for home landscape use;
- creation of porous driveway and road coverings to facilitate water percolation rather than run-off;
- greater use of basins for water detention (to slow runoff) and retention (for stormwater capture and percolation into the groundwater); and
- for proposed subdivisions, water-use audits that identify practical water-saving conditions for development as part of environmental review and mitigation monitoring processes.

Since these practices can be implemented most easily in new developments, several California laws bring the issue of water supply to the forefront. Under SB 610, passed in 2001, as a condition of approval of new subdivisions of 500 homes or more a reliable water supply is required. SB 221, adopted the same year, requires water supply assessments for developments identified as projects under CEQA guidelines, many of which have fewer than 500 housing units. Additionally, under Water Code Section 10632, urban water suppliers, such as cities and special districts, must prepare urban water management plans that include a contingency analysis for implementation in case of an urban

water shortage. It must identify actions needed to prepare for and respond to a catastrophic interruption of water supplies, such as could occur during a regional power outage, earthquake, or other disaster.

The water conservation challenge for existing communities lies with the application of creative incentives, such as tiered rates, which increase user charges on a logarithmically increasing scale for heightened water use, as well as pursuit of grant-funded water conservation projects.

Water Reclamation

New local forms of water supply also will be needed to offset future reductions of water imports. With diminishing deliveries of SWP and Colorado River water anticipated over time, the MWD and member agencies need to pursue investigations of water reclamation techniques, such as desalination and recycling tertiary treated wastewater. Presently, wastewater recycling is used in Orange County, for example, and it offers promise for other regions where thick sedimentary layers between the surface and groundwater aid in the filtering process.

In the long term, seawater desalination is even more promising for the coastal MWD region. Unit costs currently remain high in comparison to other water supplies due to heavy energy requirements, however. The desalination process also raises the cost to the environment from extensive GHG emissions, although companion solar installations may help with mitigation. Simple gravity also exacerbates the cost issue, since seawater desalination requires pumping the water inland and uphill, as does the need to develop additional reservoir capacity to store water at intermediate distances.

Several California communities, including Marina, Morro Bay, and Port Heuneme, already use desalinated seawater. With the help of the U.S. Army Corps of Engineers, plans are progressing for a desalination facility for the small resort village of Cambria, where the water supply from two local creeks is constrained by competition between agricultural and town uses. Another environmental concern to be overcome during development of desalination systems is the management of intake and outflow to avoid adverse impacts on sea life. One option is to bury intake and outflow systems beneath beach sands in areas with sufficient depth and porosity.

Neither reclamation nor desalination alternatives will be inexpensive or easy. Development of new local supplies through increased reclamation will require major investments, yet it promises to offer substantial benefits over time through wide-scale development and implementation.

Planning and Governance

The overlapping boundaries of SCAG and MWD belie their functional and symbolic differences in governance. Functionally, under federal law SCAG is an MPO, and its primary focus is on transportation planning; the MWD, how-

ever, is a regional special district concerned primarily with water purchases, delivery, and management.

SCAG is responsible for advising state and federal transportation agencies and its member organizations on issues of highway improvements and vehicular movements in Southern California. Traditionally, it has been oriented to advocate for relatively minor adjustments to the vast network of freeway and road improvements, thus facilitating sprawl and reliance on the automobile as the principal mode of personal transportation. Now, under SB 375, SCAG is tasked with setting GHG emissions reduction targets that ultimately will have the force of law through the CEQA and ARB.

As a facilitator of transportation management, SCAG will have to adjust its former focus on the automobile and begin to promote greater investments in rail transit and smart growth land use modifications to lower GHG emissions through reduced per capita vehicle miles traveled. It will need to facilitate and support a more diversified transportation and land use mix to meet these objectives. One aspect of this change in focus is SCAG's recent effort to encourage high-speed rail and expand other forms of mass transit that offer viable alternatives to highway travel.

This need for transport diversity is recognized in a SCAG (2009) publication that examines various climate change topics, including weather impacts, peak oil, land use planning, green building, education, governance and finance, and sustainability. However, the only essay in the report that identifies water as a serious, long-term issue is by Dan Cayan (2009, 7), who observes:

In one form or another, many of Southern California's climate concerns radiate from efforts to secure an adequate fresh water supply.... Of all the areas of North America, Southern California's annual receipt of precipitation is the most volatile—we only occasionally see a “normal” year, and in the last few we have swung from very wet in 2005 to very dry in 2007 and 2008.... Southern California has special challenges because it is the most urban of the California water user regions and, regionwide, we import more than two thirds of the water that we consume.

The MWD has been challenged throughout its history to balance issues of governance (such as its arcane system of voting) with the needs of individual member agencies. Another key governance issue is whether the MWD is to be the sole supplier of supplemental water in the region (O'Connor 1998). While the MWD has exercised leadership in assessing and promoting water conservation and reclamation measures, primarily in relation to drought management, on behalf of its members, it has yet to deal fully with the issue of permanently reducing the external water resources from which it supplies supplemental water to its members. It now seems apparent that, in addition to drought management, the MWD must address the long-term reduction of water supply

touched on in Cayan's essay and elaborated in the California Climate Adaptation Strategy (CNRA 2009).

With regard to climate change, the governance issues facing the MWD and SCAG are quite different. While law mandates SCAG to address climate mitigation through reduction of GHG emissions, the MWD must deal directly with climate adaptation challenges posed by permanently reduced external water sources. In light of shrinking external supplies, overriding the MWD concerns include what direct responsibility it should take for regional water conservation and what actions it should promote among member agencies in order to reduce per capita water use.

Despite the need for coordination, no substantive relationship appears to exist between SCAG and the MWD that assists in executing their separate regional governance functions. Yet some formal linkage must be established to avoid long-term conflicting outcomes from the MWD's traditional water policies, which tend to foster centrifugal regional development, and SCAG's fledgling efforts to promote more compact growth.

Natural Hazard Mitigation

An aspect of climate change that needs closer scrutiny is the intensification of natural hazards, such as flooding, wildfires, heat waves, and coastal inundation associated with sea level rise. This concern was foreshadowed in the 2007 State of California Multi-Hazard Mitigation Plan.

It is now clear that in coming decades natural disasters are broadly expected... to intensify due to climate change. Emergency managers, planning agencies, private companies, and communities especially affected by climate change will be challenged to adapt their planning to take into account an increasing array of related natural hazards. Disasters expected to be more widely experienced in the future include: avalanches, coastal erosion, flooding, and sea level rise; extreme heat and prolonged drought; mudslides and landslides; severe weather and storms; and wildlands fires. (OES California 2007, 134)

Hazard mitigation planning in the United States is legislated under the Disaster Mitigation Act of 2000, which requires the Federal Emergency Management Agency (FEMA) to approve multihazard mitigation plans as a precondition for state and local eligibility to receive federal mitigation project grants. By 2009, FEMA had approved nearly 19,000 local mitigation plans prepared by cities, counties, and special districts across the country. Similar to the general plan safety elements required by California planning law, these plans deal with hazard and risk identification, assessment, and mitigation action proposals to prevent disaster losses before they happen. Mitigation actions may involve modification of development to redirect it away from hazardous areas—such as

any 100-year floodplains shown on federal flood insurance rate maps or state-identified Wildland-Urban Interface (WUI) areas—and toward those most suitable for growth or urban intensification.

Diminished long-term water supply can intensify the risks and impacts of catastrophic fires in WUI areas. According to the 2010 State of California Multi-Hazard Mitigation Plan (Cal EMA 2010), from 1950 to 2008 most wildland fires occurred in hilly and mountainous areas, particularly near populated regions of Southern California, and in the past decade a series of devastating wildfires burned WUI areas. In October 2007, wildfires displaced nearly one million residents, taking 10 lives, and destroying thousands of homes. The 2007 fire siege highlighted the well-recognized fact that fire, an integral component of Southern California's ecosystems, can have cascading consequences. The Station Fire in August and September 2009 occurred in national forest lands near the city of La Canada Flintridge and resulted in loss of substantial watershed ecosystems and mudflows in suburban neighborhoods. These events led to re-examination of wildland fire management practices near urban areas.

Larger and more frequent wildfires will impact California's economy by increasing fire suppression and emergency response costs, damages to homes and structures, interagency post-fire recovery costs, and damage to timber, water supplies, recreation use and tourism. The California Department of Forestry and Fire Protection (CAL FIRE) spent over \$500 million on fire suppression during fiscal year 2007/2008. As climate change continues these costs are expected to increase. (CNRA 2009, 111)

Sea level rise, another climate change-related hazard in Southern California, leads to coastal flooding, permanent inundation, wetland loss, habitat degradation, increased coastal erosion, and saltwater intrusion into freshwater aquifers as well as ocean acidification. By 2100, the replacement value of buildings and contents (not including land value and relocation costs), in areas that are vulnerable to a 100-year coastal flood with 1.4 meters of sea level rise is forecast at approximately \$24.8 billion for four coastal counties (Los Angeles, Orange, San Diego, and Ventura) (CNRA 2009). During the remainder of the twenty-first century, reengineering of coastal infrastructure such as highways, drainage systems, and wastewater plants will be required to avoid substantial losses due to sea level rise.

Seismicity, while not related to climate change, is also of great concern to the region. As highlighted by the March 2011 earthquake and tsunami in Japan, a catastrophic event in Southern California is a major mitigation concern. Earthquake-induced water, oil, and gas pipeline breakages could lead to widespread fires in urban areas, and due to the outdated design and deteriorating condition of existing systems, the impacts on water systems are potentially severe. In the 2008 Great Southern California ShakeOut earthquake scenario

exercise undertaken by the U.S. Geological Survey, the city of Los Angeles and nearby communities documented serious, long-term outages for water delivery systems. A catastrophic earthquake is an event that seismologists anticipate will occur in the region within the next several decades (Cal EMA 2010). Scawthorn, Eidinger, and Schiff (2005) documents the need for greater attention to potential blockages of response and recovery efforts, especially in urban areas where water systems are damaged, destroyed, or disrupted by seismic events.

Hazard mitigation initiatives cannot be managed efficiently on a local government level alone. For greatest effectiveness, they should be addressed at a regional level, but in Southern California, SCAG and the MWD have shown little interest in such efforts, even though both entities share a common goal of mitigating natural hazards as threats to their respective primary transportation and water delivery concerns.

Toward a Regional Resource Management Authority

Climate change will have a profound influence on the Southern California region and will alter trends previously assumed to be constant. Understanding relationships between climate action and adaptation is key to effective planning for future water, growth, transportation, and environmental sustainability. As with most other significant physical and environmental adjustments, interrelated social, economic, and institutional changes are needed to redirect political will. Southern California provides a living laboratory for learning about success and failure in planning, governance, resource management, and natural hazard mitigation on a megaregional scale. A major question is whether important lessons can be learned soon enough to redirect the future toward greater sustainability.

SCAG, the MWD, and SANDAG possess shared interests in coordinating outcomes for meeting future water delivery, growth, transportation, and hazard mitigation needs. Yet no formal or legal mandate exists to coordinate these functions regionally. This governance vacuum remains a barrier to comprehensive regional action on climate change. To fill this vacuum, the California legislature should pursue consolidation of SCAG, MWD, and SANDAG into a single regional resource management authority (RMA) for Southern California. This authority would retain the principal existing powers of the three agencies, and legislative authorization to coordinate regional climate mitigation and adaptation actions would be added.

The consolidated entity would have additional taxing, investment, and regulatory powers beyond those possessed by its three member groups, and be responsible for the following specific sectors.

- **Growth and transportation:** Review and adjust SCAG and SANDAG growth projections, transportation plans, and SB 375 sustainable growth plans to synchronize them with modified water supply, conservation, and reuse projections.

- **Water:** Review and adjust MWD water use projections and allocations to make them consistent with regional growth projections, transportation plans, and SB 375 sustainable growth plans and regional water conservation and reuse goals.
- **Regulation:** Intervene in regional and subregional disputes over water, growth, and transportation plans and offer formal mediation by an administrative law judge for their resolution.
- **Infrastructure taxing and loan authority:** Raise revenues and undertake focused projects to further regional and subregional water conservation and reuse, green energy, and hazard mitigation goals.

No such organization currently exists in California, although there are parallels in the Tahoe Regional Planning Agency (interstate), San Francisco Bay Conservation and Development Commission, Delta Protection Commission, and the California Coastal Commission, all of which can make decisions overriding those by entities established more locally.

A major question in approaching the establishment of an RMA would be how to deal effectively with forces that either support or oppose its possible formation. Given the regional planning mandates represented by SB 375 and sustainable growth planning incentives, interests likely to support its formation would be those presently promoting heightened rail transit extensions, smart growth, and redevelopment of older downtown areas. Opposition would be expected from those members of the three organizations that are reluctant to relinquish current agency prerogatives to a coordinating authority as well as from subregional and local agencies concerned with maximizing local control.

One of the strongest factors leading toward formation of the proposed Southern California RMA will be increasing climate change impacts. The region will no longer be able to sustain its historically wasteful water consumption practices. Instead, long-term water resource limitations will require permanent changes on a massive scale in water supply and consumption patterns and in water conservation practices, such as runoff capture, groundwater retention and cleanup, low-consumption water-using appliances, and xeriscaping. Another goal will be to develop new local water sources such as seawater desalination and groundwater recycling of tertiary treated wastewater within the region.

Similarly, the region cannot sustain its traditional pattern of large-scale growth into far-flung areas. Instead, it will need to contain growth closer to existing urban centers, which can be encouraged by development of a more robust rail transit system. Without changes to the status quo, needed adjustments to these water use and growth patterns will be politically difficult, if not impossible, to implement under the current governance framework.

Conclusion

To maintain the region's viability, strong leadership will be required to reevaluate transportation and land use planning priorities to reduce GHG emissions, and to reorganize water supply, distribution, and conservation practices to help the region adapt to long-term supply limitations. As with most other physical and environmental changes, difficult social, economic, and institutional adjustment also will be necessary in order to develop the political will to move in new directions. According to Cayan (2009, 19):

In the foreseeable future, Southern California expects continued growth in population, demand for energy and water, many more vehicles and miles traveled, and shifts in land use and ecosystems. Even in the best of circumstances, climate change will compound many of the problems associated with these developments. The early signs of climate change have already been recorded and considerably more change is on the way. How much more will be determined, to a large extent, by our collective global decisions and policies with respect to fossil fuel use and environmental protection.

Additionally, attention will need to be paid to minimization of development in hazardous zones, such as 100-year floodplains and WUI areas, and to investment in coastal development and conservation measures that can help counter sea level rise. All of this, in turn, calls for the evolution of existing institutional and political arrangements represented by SCAG, the MWD, and SANDAG into a new regional authority with skillful and far-sighted leadership at both the local and regional levels.

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Blakely Disaster Readings

Figure 5.1 San Francisco

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 5

San Francisco

Laurie A. Johnson and Laura Tam

Northern California and the San Francisco Bay Area are already feeling the effects of climate change. The region has endured gradual increases in temperature and mean sea level as well as changes in precipitation for more than a century. Critical parts of the Bay's shoreline have already subsided well below sea level and are protected by a patchwork of fragile, old levees. The effects of climate change, particularly rising temperatures and sea levels, will seriously threaten the region's economy, infrastructure, environment, and cherished quality of life.

The San Francisco Bay Area

More than 7.1 million people inhabit the 7,000 square mile region comprising 9 counties and 101 cities in Northern California known as the San Francisco Bay Area—or just the Bay Area to local residents (figure 5.1). The region's population is projected to grow to more than 8 million by 2020, and could reach 12 million by 2050 (ABAG 2009). It is the fifth most populous region in the United States and the socioeconomic and cultural center of the northern part of the state. It is world-renowned for its geographic and architectural beauty, economic and cultural diversity, and highly valued standard of living.

The population is concentrated in the Bay Area's three largest cities—San Francisco, Oakland, and San Jose—and a number of smaller cities in the flatlands surrounding the Bay. San Francisco, the region's cultural and financial center, has the second-highest population density, after New York City, of any major city in North America. In terms of population and land area, San Jose is the region's largest urban area as well as one of its fastest-growing cities. It also forms the center of the financial and high-tech Silicon Valley area. Oakland is a major manufacturing and distribution center, rail terminus and hub, and site of the fourth-largest container shipping port in the United States.

The region is home to more than 3 million buildings, with a total value of \$1 trillion (Kircher et al. 2006). Like many growing regions, however, the Bay Area is undergoing rapid changes, and it faces serious challenges, including traffic congestion, long commutes and overburdened transit systems, lack of sufficient housing and skyrocketing housing costs, loss of open space, declining neighborhoods, air and water pollution, and economic inequality.

San Francisco Bay, which covers close to 500 square miles, lies at the heart of the region. Freshwater drains more than 40 percent of the state's land mass via the Sacramento and San Joaquin Rivers and flows into the Bay in an area collectively known as the delta region (BCDC 2010a). The estuary formed at this confluence of rivers and sea is the largest on the U.S. Pacific Coast. Along with its shoreline marshes and wetlands, it provides food and shelter for a vast array of fish and wildlife, including harbor seals, geese, and thousands of other species of fish, plants, mammals, reptiles, and birds. An estimated 50 percent of the millions of birds that use the Pacific migratory flyway between the Arctic and South America rest and feed on the Bay each year (BCDC 2010a). Salt evaporation ponds at the south end of the Bay historically have been a major source of U.S. salt production.

The single narrow opening that joins the Bay to the Pacific Ocean through the Golden Gate also makes San Francisco Bay one of the world's great natural harbors. It is the fifth-largest U.S. port handling crude oil and the fourth-largest container port overall. In addition to the ports, the region's three major airports, oil refineries, and a variety of industries flank the Bay. A massive network of roads, highways, railroads, bridges, tunnels, and infrastructure crisscross the Bay and link together the region's urban, suburban, and industrial centers.

Just to the west, the Sacramento–San Joaquin River delta region contains unique habitat, highly fertile agricultural land, and critical infrastructure including pipelines, state highways, and power and communication lines. The delta is also the hub of the entire state's water supply. Diversions from this resource area provide water for about 25 million Californians, most of whom live in central and southern counties, and about 3 million acres of the state's farmland (CDWR 2009). Much of the delta's 700,000 acres of land is below sea level by as much as 25 feet and is protected by a fragile system of earthen levees stretching 1,330 miles, most of which holds back water every day of the year, not just during floods (CDWR 2009). Much of the levee system was built in the late 1800s and early 1900s, before modern seismic design and geotechnical engineering were put into practice. Since 1900, levees have failed and flooded delta islands 158 times. Over the years, many state and federal agencies and stakeholders have voiced concern about the condition of the delta and Suisun Marsh levees and the potentially catastrophic consequences should they fail.

Bay Area Climate Trends

The region's temperate, Mediterranean climate of mild, wet winters and dry summers greatly contributes to its appeal. It is controlled in large part by the cool temperatures of the Pacific Ocean and the Bay. But the topographic variation of surrounding hills and mountain peaks as high as 3,850 feet create an array of microclimates. Temperature variations in western areas near the Pacific Ocean generally are smaller throughout the year. Summers can be

cool and foggy and winters mild and rainy. The eastern and inland areas have generally warmer summers and colder winter nights. The temperature variation can be quite pronounced, especially during the summer, when on a given day, inland areas can be more than 40°F warmer than foggy coastal towns.

Average annual rainfall also varies considerably across the region. Annually, inland and southern areas around San Jose can receive fewer than 15 inches, while areas to the north exceed 30 inches. San Francisco has an average of 67 rainy days a year, amounting to 20.4 inches. Except in the region's highest elevations, which may have an occasional dusting each year, snowfall in the Bay Area is rare.

The region's mild climate and the Bay itself combine to make this one of North America's greatest nexuses of biodiversity, and places the area among the top-25 global biodiversity hotspots as designated by Conservation International (Stein, Kutner, and Adams 2000). Just by itself the Golden Gate National Recreation Area—a national park spanning 60 miles of coastline and 75,500 acres of land in three Bay Area counties—is host to more than one-half of North America's bird species and nearly one-third of California's plant species.

Climate and Geologic Hazards

While the climate might seem quite benign, residents know all too well the extreme forces that can be unleashed with little or no warning. Californians often joke nervously about the four seasons in the Golden State: earthquake, landslide, flood, and wildfire.

The region's majestic setting is the result of strong tectonic forces, as the Bay Area sits astride the boundary between the North American and Pacific plates. In 1906, a magnitude-8 earthquake ruptured along the San Andreas fault—the major fault that defines this plate boundary—and the seismic shaking and resulting fire famously destroyed much of San Francisco. A portion of the same fault ruptured again in 1989 causing 57 deaths, destroying bridges and buildings across the region, and resulting in more than \$6 billion (1989 US dollars) in reconstruction costs (Stoffer 2005).

More than 3 million of Northern California's residents live and work within 25 miles of the San Andreas fault, and it is just one of several major fault systems capable of generating powerful earthquakes (figure 5.2). The U.S. Geological Survey (USGS) and other scientific organizations have warned that there is a 63 percent probability that at least one earthquake of magnitude-6.7 or greater will strike the San Francisco Bay region before 2036 (USGS 2008). The Hayward fault, which is now overdue to rupture, is of particular concern because it runs through the densely urbanized East Bay corridor, where several key pieces of the region's major infrastructure either cross or lie in close proximity.

While climate conditions are not directly related to earthquake risk, many of the geologically most vulnerable areas of the Bay region are also among the most susceptible to climate impacts. Shorelines and riverside areas are subject

Blakely Disaster Readings

Figure 5.2 Major Faults and Probabilities of Rupture in the San Francisco Bay Area
Source: USGS (2008).



to intense shaking that can cause a phenomenon known as liquefaction, which transforms soil into a fluid mass. These areas are also vulnerable to sea level rise and flooding. The steep, hillside areas are susceptible to earthquake-triggered slope failures as well as landslides, flooding, and wildfires, all of which are triggered by climatic events. Strong winter storms can cause severe flooding as well as mudslides in the Santa Cruz Mountains and the more mountainous areas of the North Bay. These areas receive more than 55 inches of rain annu-

ally, and wet soil conditions struck by an intense winter rainstorm can lead to life-threatening mudslides. This occurred in 1982, when counties across the Bay Area experienced more than \$66 million (1982 US dollars) in property loss (USGS 2010).

In spring and autumn, the strong offshore winds that develop periodically can cause dangerous wildfires, especially when hillside vegetation is dry. In 1991, for example, a catastrophic firestorm destroyed 1,520 acres of the East Bay hills in the cities of Oakland and Berkeley, causing 25 deaths and destroying 3,790 housing units valued at a total of \$1.5 billion (1992 US dollars; Parker 1992).

Climate Change Impacts

In an effort to assess the state’s vulnerability to climate change, a 2009 report on the California climate adaptation strategy (CAS) summarized the best-known science on the subject (CNRA 2009). It attempted to quantify future greenhouse gas (GHG) concentrations and project future potential changes in average temperatures, precipitation patterns, sea level rise, and extreme events. Using two emissions scenarios from a 2007 assessment conducted by the Intergovernmental Panel on Climate Change (IPCC), a set of six global climate models (GCMs) were run to determine anticipated climate changes for the entire state (table 5.1).

The CAS also cautioned that if no action is taken to reduce or minimize the expected impacts, the costs are apt to be severe. A 2008 report by researchers at the University of California, Berkeley, proposed that damages related to climate change could result in “tens of billions of dollars per year in direct costs ... [and] expose trillions of dollars of assets to collateral risk” if California does not take action (Kahrl and Roland-Holst 2008, 4). More specifically, they estimate that climate change damage across the state could cost between \$7.3 and \$46.6 billion per year. Of the state’s estimated \$4 trillion in real estate assets, \$2.5 trillion is at risk from extreme weather events, sea level rise, and wildfires, with a projected annual price tag of \$300 million to \$3.9 billion during the twenty-first century, depending on climate scenarios (table 5.2).

In addition, costs of disaster insurance, healthy food, water, and heating and cooling are all expected to rise. Access to support systems will become more limited for low-income communities. Overall, low-income communities will spend a larger percentage of their income to prepare and respond to climate change than will middle- and high-income communities (Morello-Frosch et al. 2009).

Table 5.1 Anticipated Statewide Climate Changes in California

Source: CNRA (2008).

	2050	2100
Temperature	2–5°F increase	3.6–9°F increase
Precipitation	12–35% decrease	Not available
Sea Level Rise	12–18 inches	21–55 inches

Table 5.2 Estimates of Economic Damage and Asset Risk for California, 2006

Source: Kahl and Roland-Holst (2008, 4).

	Damage Cost/Year (\$ billions)		Assets at Risk (\$ billions)
	Low	High	
Water	N/A	0.6	5
Energy	2.7	6.3	21
Tourism and recreation	0.2	7.5	98
Real estate (water exposed)	0.2	1.4	900
Real estate (fire exposed)	0.1	2.5	1,600
Agriculture, forestry, and fisheries	0.3	4.3	113
Transportation	N/A	N/A	500
Public health	3.8	24.0	N/A
Total	7.3	46.6	3,237

Extreme Heat, Air Quality, and Health Effects

Past and future GHG emission levels are expected to cause the state of California to experience significant temperature increases during the next 30 to 40 years, especially in the summer months (CNRA 2009). Heat waves are expected to increase in frequency, and individual ones may also show a tendency toward becoming longer and extending over a larger area, thus encompassing multiple California population centers concurrently (Moser et al. 2009). Inland areas are likely to experience more pronounced warming than coastal regions. In the San Francisco Bay Area, the eastern and southern portions of the region are likely to see more pronounced warming than the coastal, northern, and central regions.

While the Bay Area may not experience the severity or frequency of extreme heat events—those in which three or more consecutive days surpass 100°F—that other parts of southern and central California are apt to face, increased temperatures could place additional stresses on health systems as well as local and statewide energy grids. Studies by the California Department of Public Health (DPH) show that there will be an increase in the average number of “extreme heat” days that exceed the region’s 90th percentile average temperature (English 2010). From a twentieth-century baseline of about 12 extreme heat days per year, the number may increase to 32—or as many as 45—annually by mid-century; by the end of the century, it may be as high as from 70 to 94 days per year, representing as much as an eight-fold increase overall. While the region’s temperatures generally are mild, and these extremes may still seem to be “mild” when compared to other regions of the state, the DPH warns that Bay Area residents may be especially at risk, because they may have greater difficulty in adapting (English 2010).

Heat-related illnesses and deaths will increase, and these burdens will fall disproportionately on communities of color, the poor, the elderly, and infants (Morello-Frosch et al. 2009).

Increased annual temperatures are also anticipated to lead to shifts in the range, distribution, abundance, and natural community composition of both plant and animal species (Loarie et al. 2008). A loss of species abundance and diversity in some areas and increases in others is likely to result. Competition from nonnative and exotic species is expected to increase, as are diseases and pests, each of which will have a negative impact on the region's native flora and fauna. Many species are expected to shift to the north and to higher elevations as they seek refuge from hotter, drier conditions (Parmesan and Yohe 2003).

Because the dry seasons start earlier and end later, wildland forest fires have become more frequent and intense in recent years. Chronic smoke exposure from wildfire activity has already been observed in California's northernmost counties. Droughts are expected to increase in frequency, which suggests that wildfires will increase in both frequency and duration as well (CNRA 2009). The number of people and the value of the property at risk will also grow.

Precipitation, Water Quality, and Stormwater Management

The Bay Area is likely to experience abnormal types of water in unusual quantities, in odd places, and at atypical times. Most Bay Area communities today obtain their water from snowmelt in the Sierra Nevada Mountains in the eastern half of the state. Toward the end of the century, however, as little as 20 percent of the Sierra snowpack may exist when hotter, drier conditions caused by climate change are the norm. More precipitation will fall as rain rather than snow, which will have important implications for statewide water management (CNRA 2009). If rainfall and the runoff of meltwater begin earlier in the year, the state will face the significant challenges of storing sufficient water for the dry season while it manages floodwaters during the wet season. California's water supply, already stressed under current demands and expected population growth, will shrink under even the most conservative climate change scenario (CNRA 2009).

Independent of precipitation changes, higher air temperatures will increase evapo-transpiration and decrease soil moisture, leading to less runoff into reservoirs. Decreasing rainfall may also diminish local water supplies, even while higher temperatures are increasing water demand across all sectors. Longer, more intense droughts are predicted by 2100, leading to increased frequency and magnitude of water shortages, and potentially exacerbating conflicts between ecological protection and human consumption needs (SPUR 2011).

Reduced precipitation and increased evaporation will threaten the groundwater basins used for water supplies with lowered recharge (SPUR 2011). The basins are also at risk of increasing extraction to meet growing

supply needs. For coastal freshwater aquifers, this may increase susceptibility to the saltwater intrusion that may result from sea level rise. Saltwater intrusion into coastal aquifers would make some of the freshwater unusable without desalination. When increased snowmelt combines with saltwater intrusion into the Sacramento–San Joaquin River Delta, the risk for flood-caused levee failures will also intensify, and such failures could potentially both destroy low-lying areas and contaminate freshwater supplies stored and conveyed in the delta (CDWR 2009).

Locally and regionally, both water excesses or floods that cannot be stored easily will occur. Given the regional drainage function of San Francisco Bay, storm floods can last longer in the Bay Area than in higher-elevation regions. Even today, the combination of high tides, storm surges, and river flooding can raise water levels in the delta by 4.25 feet for as long as a day (SPUR 2009). Low-lying areas protected by already fragile levees will be at even greater risk. Heavier downpours and increased runoff will also exacerbate overflows in San Francisco’s combined stormwater and sewer systems as well as combined sewer systems elsewhere in the region.

Sea Level Rise

Sea level rise has been underway since the last ice age. The oldest tidal gauge still in operation in the United States, installed near San Francisco’s Golden Gate in 1854, has measured a rise of about 8 inches over the last 100 years (SPUR 2009). Since the late 1990s, the rate of global sea level rise has increased by about 50 percent, and now it averages approximately 0.12 inches per year (SPUR 2009). In our view, sea level rise is probably the biggest climate change–related threat to the Bay Area (figure 5.3).

Climate Change Mitigation

Statewide Responses

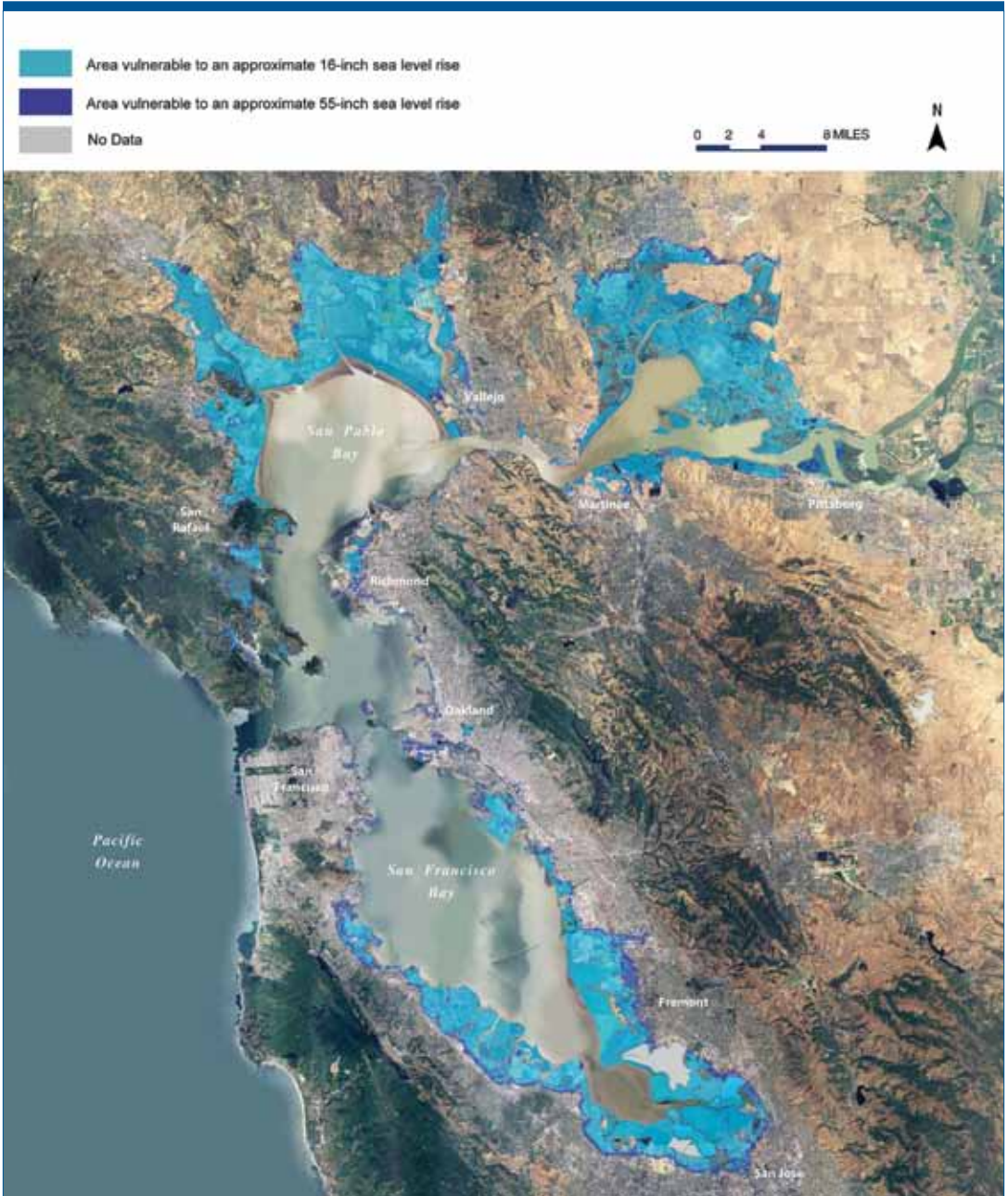
The State of California has been a nationwide leader in both mitigation of GHG emissions and development of adaptation strategies to combat the effects of climate change. Its efforts began more than a decade ago, when the initial focus targeted inventorying GHG emissions levels. It has since evolved, and more recently an emphasis has been placed on understanding anticipated climate change effects and developing adaptation strategies. Box 5.1 presents a synopsis of some key legislative milestones.

Local Responses

Many local governments also have created their own climate change action plans. In a popular model developed by the International Council for Local Environmental Initiatives (ICLEI) and widely adopted all over the world, cities use a standard methodology to inventory their GHG emissions. Many

Figure 5.3 San Francisco Bay Area Shoreline Vulnerable to Sea Level Rise

Source: BCDC (2008).



climate change action plans also establish an emissions reduction target by predetermined dates. Fewer of these contain implementation plans, identify funding for their efforts, or contain action plans for preparing and responding to the effects of climate change. Along with city and county governments, many local agencies have responsibilities for climate change risk manage-

Box 5.1 Government-Mandated Milestones in California's Climate Change Adaptation Strategy

2002: *Senate Bill 1078* established a Renewable Portfolio Standard that requires electricity providers to increase purchases of renewable energy resources by 1 percent per year until they have attained a renewable portfolio equal to 20 percent of resources used (Marin County 2006).

2006:

- Launch of the *California Solar Initiative Program*, a comprehensive \$2.8 billion program intended to provide incentives for residential and commercial solar development over 11 years (Marin County 2006).
- *Assembly Bill 32—Global Warming Solutions Act*—mandates a first-in-the-nation statewide limit to reduce GHG emissions to 1990 levels by the year 2020, or 25 percent below forecast levels. By 2008, the state also must have established an implementation plan and a mandatory reporting

system to track and monitor emission levels, and it also must have developed various compliance options and enforcement mechanisms (Marin County 2006).

2008:

- *Senate Bill 375* establishes a new framework for reducing GHG emissions; it requires regions to develop growth strategies that align transportation funding with housing needs (Greenbelt Alliance 2009).
- *Executive Order S-13-08* calls upon state agencies to develop California's first strategy to identify and prepare for expected climate impacts. The 2009 CAS report summarizes the best-known science on climate change impacts for the state and becomes the first step in an ongoing, evolving process to fulfill this executive order (CNRA 2009).

ment. Among them are agencies that deal with water supply and wastewater, airports and port management, transit and transportation, parks, planning, and redevelopment.

The climate planning efforts of two early leaders in the Bay Area are highlighted below. Both are focused on reducing GHG emissions in their respective local government's area, not the entire region or beyond.

Marin County Greenhouse Gas Reduction Plan. In April 2002, the Marin County Board of Supervisors adopted a resolution committing the county to analyze emission levels, set a target, develop a local action plan, and then implement it. The resultant Marin County Greenhouse Gas Reduction Plan, adopted in 2006, contained policies that both reduce emissions and adapt to climate change (table 5.3).

City and County of San Francisco. Relatively early on, San Francisco—both as city and county—adopted GHG emission reduction targets and developed a strategy to achieve them. The city's climate action plan, adopted in 2004, contained a baseline inventory of emissions in the city in 1990, and its numeric target for 2012 was 20 percent emissions reduction below 1990 levels (SPUR 2011). Besides containing an inventory and overall goals, the plan recom-

Table 5.3 Policies from Marin County’s Greenhouse Gas Reduction Plan

Source: Marin County Community Development Agency (2006).

Policies for Reducing GHG Emissions	Adaptive Climate Change Policies
<ul style="list-style-type: none"> • Increase renewable energy • Conserve electricity • Change commuting and driving patterns • Divert solid waste • Increase bio-capacity of open space and agriculture • Increase local food availability and sustainable agriculture 	<ul style="list-style-type: none"> • Plan for sea level rise • Seek levee assistance • Consider future threat of sea level rise • Establish a climate change planning process • Revise and implement floodplain ordinance • Limit development to accommodate migration of coastal wetlands inland (in response to sea level rise) • Promote restoration of wetlands and riparian areas to provide capacity for high water and flood flows

mended actions and named specific targets for each category. In transportation, for example, certain actions included increasing transit use, bicycling, and walking; through these actions the use of clean-air vehicles was encouraged, while driving in general was discouraged. Energy-based actions included increasing efficiency by means of offering incentives and direct installation, expanding education and outreach, developing renewable energy projects, and increasing green power purchasing.

The city has also developed aggressive green building rules that govern new construction, and it offered residents and businesses financial incentives for purchasing solar arrays and making energy efficiency improvements. Recycling and composting are mandatory, boosting the city’s waste diversion rate, which is already the highest in the nation.

San Francisco has also improved the municipal-vehicle fleet and requires city agencies to write their own individual climate action plans. Its citywide climate action plan, however, had no action items to address climate change preparation and adaptation.

Impacts of Sea Level Rise on the San Francisco Bay and Coastline

The State of California’s Scenarios Project estimated in 2009 that up to 18 inches of sea level rise will occur by 2050, 55 inches by 2100, and much more after that (CNRA 2009, 15). Localized effects and rates of sea level rise can vary widely, however. Areas that have been experiencing land subsidence due to groundwater extraction or loss of marshes could experience the impacts of sea level rise sooner and perhaps with greater intensity. For example, some communities in the South Bay mined groundwater through the 1960s and their lands have subsided by as much as 13 feet (SPUR 2011). Also, heavily channelized and diked parts of the delta are now as much as 25 feet below sea level (CDWR 2009). In the near term, most of the expected damage from sea level

rise on developed areas will result from surges occurring during storms that coincide with high tides (SPUR 2009).

A recent study conducted by the USGS and Deltares, a Dutch research institute, modeled hydrodynamic changes that could result from sea level rises ranging from 1.6 to 16.4 feet in the South Bay (SPUR 2009). It found that sea level rise there will be linear with the ocean; that is, the bay will neither amplify nor change tidal characteristics. The study also found that flow speeds will be higher, particularly south of the Dumbarton Bridge, which could increase erosion and affect shipping for the Bay Area's ports. Finally, the findings suggest that, in general, wave heights will increase as a result of deeper water and higher winds, exacerbate erosion, and pose a potential hazard for recreational areas.

Along the Pacific coast, storms increase winds, especially those directed onshore, which will cause bigger, more erosive waves and accelerate coastal erosion, particularly from vulnerable dunes and cliffs. A 4.6 foot rise in sea levels could cause loss of more than 10 square miles of land along the region's four coastal counties (Heberger et al. 2009). This effect also places thousands of individuals as well as significant transportation-related infrastructure and property along the region's coastline at risk.

According to a 2009 study by the Pacific Institute, approximately \$30.8 billion (in 2000 US dollars) worth of buildings and contents on the Bay Area's coastal and bay shores are currently vulnerable to a 100-year flood, which is defined as a 1 percent annual probability of being flooded (Heberger et al. 2009). With a 55-inch rise in sea levels, that figure increases to \$64.3 billion (2000 US dollars) if no adaptation actions are taken. Most of that property is residential and concentrated on San Francisco Bay. Using population growth projections from 2008, a 55-inch rise in sea level will put 276,500 of the Bay Area's residents at risk of a 100-year flood event (Heberger et al. 2009). These impacts will be experienced disproportionately by communities of color as well as low-income households, which tend to be in low-lying areas. A disproportionate percentage of Bay Area households vulnerable to flooding are linguistically isolated—that is, no one older than 14 speaks English (Heberger et al. 2009)—which presents special challenges for emergency response and public health and education campaigns.

Increases in sea level rise directly threaten the region's infrastructure, including its major highways and bridges, two of its three principal airports, its ports, power plants, emergency facilities, and wastewater treatment facilities. The 22 wastewater treatment plants on the Bay Area's shoreline are vulnerable to a rise of 55 inches in sea level (Heberger et al. 2009). Many of them lack the capacity to handle current storm flows, and that could lead to more frequent sewage spills. During high tides, saltwater intrusion into combined wastewater-sewer systems is likely to increase, leading to saline water reaching the treatment plants, which has the potential to compromise treatment processes. The number of regulated hazardous waste facilities or sites vulnerable to a 100-

year flood event will more than double—to 235 sites—with a rise of 55 inches (Heberger et al. 2009).

Vast areas of wetlands and other natural ecosystems along the coast, bay, rivers, and streams are also vulnerable to sea level rise. If available sediment in the bay is insufficient, tidal wetlands will not be able to maintain vertical elevation as sea level rises (SPUR 2011). Lacking room for wetlands to migrate landward as sea level rises, existing wetlands will become submerged, and losses could be as great as 50 to 70 percent in the South Bay, depending on other contributing anthropogenic factors, such as subsidence (Galbraith et al. 2002).

Finally, rising sea level, in combination with changes in timing and quantities of fresh water flows from the delta, is likely to increase salinity levels further up into the delta (CDWR 2009). A reduction in freshwater inputs to the bay resulting from longer, drier summer periods is projected to shift the salinity gradient eastward during spring and summer (Knowles and Cayan 2002). This shift may be exacerbated by potential changes in the management of delta water resources for human uses, including water supply and agriculture. The salinity increase may reduce plant diversity and threaten several locally uncommon and rare plants in the delta (BCDC 2009).

Policy Responses to Adaptation and Sea Level Rise

Statewide Responses

Late in 2009, the California Natural Resources Agency released its Climate Adaptation Strategy (CAS), as required by the governor's executive order. To develop this strategy, CNRA established seven sector-specific working groups led by twelve state agencies, boards and commissions, and numerous stakeholders. The groups focused on public health, ocean and coastal resources, water supply and flood protection, agriculture, forestry, biodiversity and habitat, and transportation and energy infrastructure (CNRA 2009).

The report summarizes the best-known science on climate change impacts in the state and recommends a set of 12 strategies organized into near-term and long-term and specifying participating agencies already committed to completing the near-term strategies (Malchow 2009). Long-term strategies may change as further research becomes available.

The strategy contains three broad directions regarding sea level rise that represent a clear approach in the state's guidance and policies about this threat. First, the strategy directs state agencies generally to avoid permitting or siting new development in areas that cannot be adequately protected and are at high risk of flooding, wildfire, or erosion due to climate change. For sea level rise, this is a form of managed retreat: recommending that things not be built where they will require expensive flood protection during their design life. However, the strategy acknowledges that certain shoreline areas that already have significant economic-development, cultural, or social value will need protection in

the future, and infill development in these locations could be accommodated. How state agencies, particularly those with shoreline responsibilities, such as the Coastal Commission and the Bay Conservation and Development Commission (BCDC), will interpret this guidance is not yet clear, although a case-by-case basis seems likely, especially in Bay Area cities. The strategy suggests that local governments and regional agencies follow these guidelines within their jurisdictions as well.

The second new direction pertains to future interpretation of the California Environmental Quality Act (CEQA), a detailed environmental impact review process that affects nearly every large planning and development project in the state. Adopted in 1970, CEQA requires all public agencies statewide to identify environmental impacts associated with a proposed project and to provide feasible measures to mitigate any significant adverse impacts it may entail. CEQA applies to all large-scale discretionary projects at all levels of government, including approval of general or specific plans and public or private projects for development and redevelopment by state, regional, and local agencies. The CAS recommends that, in their CEQA reviews, all state agencies consider the potential ramifications of locating new projects, including those involved with infrastructure, in areas susceptible to hazards resulting from climate change. It also directs CNRA to revise the section of CEQA that directs how agencies should evaluate the impacts of locating development in areas susceptible to hazardous conditions.

The third new direction aims at local governments, which are responsible for almost all of the planning activities in the state. The CAS urges local governments to update general plans—as well as local coastal plans, which are certified by the California Coastal Commission (CCC)—to assess climate change impacts and identify vulnerable areas. These plans, then, should use the best available information, some of which could be provided by the state, to identify prudent risk reduction strategies for those areas. Although cities update their general plans every five years, there is no funding either for this process or attached to the CAS and no requirement for local governments to update certified local coastal plans. Without better guidance, examples, and funding, this strategy is likely to be implemented very slowly. To provide technical assistance, the state is developing a Web-based mapping tool called Cal-Adapt to help local governments identify their vulnerabilities based on the latest climate research.

Regional Responses: The Bay and Delta

The BCDC, a state agency whose establishment in 1969 preceded most federal and state environmental laws, is the lead government agency advancing sea level rise planning in the San Francisco Bay region. BCDC's climate change program focuses on advancing research and developing strategies to reduce the region's vulnerability to the impacts of climate change. BCDC regulates bay

fills, protects public access, and prevents degradation of the San Francisco Bay and the Suisun Marsh. It also convenes stakeholders and represents state and regional interests in advancing policies to protect the bay. Along with the CCC, it is empowered to implement the federal Coastal Zone Management Act in California, which gives both agencies regulatory control over federal activities in the coastal zone. The CCC also certifies and regularly reviews coastal plans filed by local governments.

In 2009, BCDC issued a report on the bay's vulnerability to sea level rise that featured the latest research on the subject, recommendations of planning strategies for local governments, and detailed maps (BCDC 2009). BCDC is planning to update the San Francisco Bay Plan, its guidance document, to add findings and policies on sea level rise. However, the ability of BCDC to regulate use of land threatened by sea level rise or to permit development that accommodates it is severely restricted. The agency's jurisdiction is limited to designating priority uses within 100 feet of the high-tide mark, and the only condition that it is mandated to protect is public access to the shoreline. Yet the idea of providing more authority to BCDC to regulate land use by taking those powers away from local jurisdictions has not yet achieved public consensus.

On its Web site BCDC has created a virtual climate change adaptation resource that offers data and information related to planning for impacts in the San Francisco Bay Area. In 2009, it also sponsored Rising Tides, an open international design competition seeking ideas that respond to sea level rise in San Francisco Bay. Six winners were selected from 140 entries (BCDC 2010a) including two plans for barrier construction outside the narrow Golden Gate, a plan to retreat from the Bay using topography as a guide, and construction of a series of laser beams around the Bay to show the potential location of levee barriers as a form of public education (see figure 5.4).

In the San Francisco Bay Delta, adjacent to the bay's northeastern boundary, sea level rise and storm surge pose a high probability of devastating whole islands. The Delta Risk Management Strategy (DRMS, pronounced *dreams*)—mandated by a governor's executive order—is developing a menu of risk reduction measures, packaging the measures into different combinations or scenarios, and using a model to evaluate their effectiveness, benefits, and costs.

The DRMS risk analysis combines the various types of hazards (e.g., earthquakes, flooding, high wind waves and erosion, undetected problems, and the effects of climate change and continuing subsidence), the frequency of each at different magnitudes, and the consequences of failures under each condition for 50, 100, and 200 years into the future. For example, sea level rise is expected to put more pressure on delta levees in the future, climate change is expected to increase high flood flows into the delta during winter, and population growth within the delta will increase the consequences of levee failures and flooding.

Figure 5.4 Proposed Barrier to Control Sea Level Rise Inside the Golden Gate, BCDC Rising Tides Competitor Winner

Source: SOM Skidmore, Owings & Merrill LLP; BCDC (2010b).



Phase 1 of the DRMS analysis, released in 2009, concluded that under business-as-usual practices, the delta region as it exists today is unsustainable. Seismic risk, high-water conditions, sea level rise, and land subsidence threaten levee integrity. An earthquake is the single greatest risk to levee integrity in the delta region because it could cause multiple levee failures allowing simultaneous flooding of as many as 20 islands. This would result in fatalities, extensive property damage, and the interruption of water supplies from the delta for periods from several months to years in length. If such an event occurs during a time of low to moderate freshwater inflow from rivers and streams into the delta, saline water from Suisun Bay would move upstream into the delta. Irrigation, distribution of local urban supplies, and state and federal water project exports all could be affected. Impacts on the delta's ecosystem would also occur, and the economic costs and repercussions would likely exceed \$15 billion.

The analysis also concludes that the risk of flooding and levee failure in the delta region will increase only if current management practices are not changed. The combined risk of an individual island being flooded due to earthquake, high water, and dry weather events were also estimated. Considering the

probability of levee failures from all hazards under business-as-usual practices, the expected mean annual probability of island flooding is as high as 7 percent for some delta islands, and those in Suisun Marsh and the western and central delta are the most vulnerable (figure 5.5).

Currently, three multiperil risk reduction scenarios are being evaluated, and they take different approaches to adapting the delta to the effects of climate change (CDWR 2007). The first would improve levees and construct an armored infrastructure corridor across the central delta that would include rail lines, a major aqueduct, and a state highway. It would also change land use from farming to wetlands and carbon sequestration

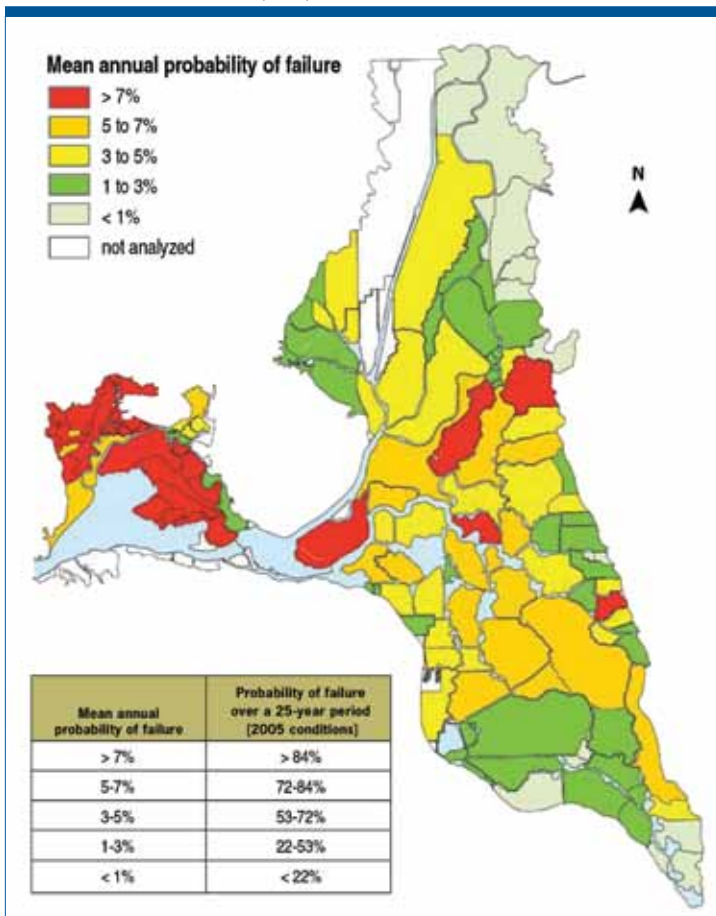
for all islands projected to have more than 3 feet of additional subsidence by 2100. The second scenario envisions all these changes plus a central pathway of levees providing a 300-year level of earthquake protection. The last scenario incorporates all of the changes included in the first scenario, but adds a peripheral canal that would divert freshwater flowing into the delta and into the state’s water project distribution system to the Central Valley and Southern California. The results from DRMS will provide levee risk information for other initiatives and planning efforts that cover all or portions of the region, such as the Bay Delta Conservation Plan.

Local Responses

Local agencies and utilities already engage in climate change adaptation planning. For example, water supply agencies in California are required to file five-year urban water management plans that detail how they will ensure that supply meets projected demand. Recent state legislation requires even greater water

Figure 5.5 Combined Risks of Levee Failure in the Delta Region

Source: CDWR (2009).



conservation—a 20 percent reduction in water use by 2020. In part, this helps the state deal with the existing challenge of water scarcity, but it also builds resilience for water cycle changes, such as loss in snowpack, long-term drought, and other impacts that will be exacerbated by climate change. Other institutions relatively well positioned to adapt to climate change include local public health departments, which already monitor disease outbreaks and respond to projected health emergencies, and fire departments, which have been responding to larger and more frequent wildfires in California for some time.

Sea level rise, however, is a confounding problem for local governments, and none in the Bay Area has adopted a comprehensive approach or plan to handle projected increases of either the bay or the Pacific Ocean. Generally, local government planning efforts are underfunded, and sea level rise has yet to be given priority in local budgeting because it is perceived as a new threat that will not cause significant harm or require emergency response for years, if not decades. No public consensus exists concerning ways to plan for sea level rise or the most appropriate strategies for local governments to adopt in terms of managing risk, finances, and land use. Hope that federal, state, or even regional organizations will step up with resources and planning tools that local governments will need also causes delay in addressing these issues.

The problem of sea level rise is gaining recognition nonetheless, and two types of local endeavors are deepening public engagement in this area of planning. First, efforts of Bay Area nonprofit organizations, research universities, and think tanks that conduct research and publish findings on the subject are often disseminated through the local media. In just the past five years a great deal of work on climate change adaptation has been published. The Pacific Institute, a prominent research organization in Oakland, published a seminal study in 2009 on the effects of sea level rise on the California coast (Heberger et al. 2009). Funded by three state agencies, that study included detailed risk assessments, maps, cost estimates for shoreline protection (table 5.4), and recommendations. It suggests that, to protect against future sea level rise, approximately 642 miles of new or modified coastal-protection structures are needed on the Pacific Coast and San Francisco Bay, with a total cost for building or upgrading estimated at \$5.27 billion. The Pacific Institute's study significantly informed the California Climate Adaptation Strategy.

In 2008 the Public Policy Institute of California (PPIC), a statewide think tank based in San Francisco, published *Preparing California for a Changing Climate*, a major report accompanied by six supporting papers that evaluate preparedness and adaptation strategies for various sectors of the state. PPIC's evaluation of coastal planning efforts for sea level rise revealed that few agencies or utilities with jurisdiction, property, or permitting authority within the expected inundation area were planning explicitly for that risk.

In 2011, the San Francisco Planning and Urban Research Association (SPUR), an urban planning think tank, published a white paper describing the

Table 5.4 Estimates of Capital Costs for Levees to Prevent Flooding from Sea Level Rise in Northern California Counties

Source: Heberger et al. (2009).

County	Raise Levee (miles)	New Levee (miles)	New Seawall (miles)	Total (miles, approx.)	Capital Cost (\$M year 2000 US dollars)
Alameda	45	49	16	110	950
Contra Costa	26	29	8	63	520
Marin	43	77	8	130	930
Napa	3	62	—	64	490
San Francisco	—	10	21	31	680
San Mateo	35	29	9	73	580
Santa Clara	47	4	—	51	160
Solano	3	63	8	73	720
Sonoma	30	15	1	47	240
Total	232	338	71	642	5,270

Note: Estimates in miles and capital cost of defenses required to protect against flooding are based on a 55-inch rise in sea level.

expected impacts on the Bay Area of climate change and making recommendations for how cities, regional agencies, and utilities should prepare (SPUR 2011). It reviewed vulnerabilities and offered strategies in six key planning areas: public health and safety, water management, energy, transportation, ecosystems and biodiversity, and sea level rise. SPUR’s analysis also weighed the theoretical advantages and disadvantages of the following seven physical planning strategies for management of sea level rise in the bay:

- *Barriers or tidal barrages* situated at the Golden Gate or in smaller, strategic parts of San Francisco bay to manage tidal flows;
- *Coastal armoring* with linear protection (e.g., levees and seawalls) to fix the shoreline in its current place;
- *Elevated development* in which the height of land or existing development is raised and protected with coastal armoring;
- *Floating development* anchored in place, or which may be floated occasionally during a flood, making it largely invulnerable to changing tides;
- *Floodable development* designed to withstand flooding or to retain storm-water;
- *Living shorelines* with wetlands that absorb floods, slow erosion, and provide habitat; and

- *Managed retreat* that safely removes settlement from encroaching shorelines, allowing the water to advance unimpeded, and bans new development in areas likely to be inundated.

Regional awareness is also growing around the issue of sea level rise through the public review process for two proposed shoreline development projects in the Bay Area. Treasure Island and the Redwood City Saltworks, both on San Francisco Bay, have incorporated sea level rise projections and adaptations into their proposed redevelopment plans and as of early 2011 were seeking approval.

Treasure Island is a former U.S. Navy base occupying a low-lying, man-made island in the middle of San Francisco Bay. The redevelopment plan proposed by Treasure Island Community Development LLC (TICD) is a model of smart growth, transit-oriented, and green development (figure 5.6). Sea level rise protection plans include raising and seismically retrofitting the 25 percent of the island that will constitute the new building pad, then setting it back 300 feet from the high tide mark and building levees at the water side of the setback (Seifel Consulting 2010). This plan is adaptable to uncertain future sea levels because the levees are designed to be raised when needed in the future, but the cost does not need to be absorbed by the project initially. TICD also proposes to use an infrastructure financing district, a tool unique to California that creates a designated assessment district to finance districtwide improvements to public amenities.

Redwood City Saltworks proposes to redevelop 2.2 square-miles of active salt farming ponds on the western shore of San Francisco Bay (figure 5.7). The project would restore 436 acres of wetlands on its bay side and build a levee topped with a recreational path adjacent to the 12,000 new housing units and commercial, office, and other facilities that will occupy the other 50 percent of the site (City of Redwood City 2011). The Saltworks plan helps the region address its housing shortage, protects housing with a levee in the case of future sea level rise, and provides one million square feet of protected commercial space. Although it is near downtown Redwood City, to be truly transit-oriented it will require new transit extensions. The proposed project is controversial because the salt ponds have been identified as an opportunity site for restoration of wetlands. Today, tidal marshes occupy only about 8 percent of their original extent in San Francisco Bay, due to filling, armoring, and reclamation activities. Currently, however, no identified financing is in place to buy or restore this site for wetlands or to protect any housing in Redwood City that may be vulnerable to future flooding.

Both projects are in areas that are vulnerable to earthquakes and floods, and both propose to protect themselves from anticipated future sea level rise. Tens of thousands of new homes will add much-needed housing in viable locations and, by increasing supply, help support affordability in the region. The

Figure 5.6 Proposed Treasure Island Development in San Francisco Bay

Source: Treasure Island Community Development, LLC.



proposed urban designs of both sites align with new urbanism principles: They are walkable, compact, transit-oriented, and mixed use. Although neither project is on an infill site, both propose to redevelop underutilized parcels near major transit nodes and employment centers. As they undergo the entitlement and environmental review processes in 2011, each one becomes a litmus test for how the Bay Area will plan for future sea level rise.

Climate Change Lessons, Issues, and Next Steps

In a recent poll, a commanding majority of Californians expressed concerns that climate change has already begun and that it poses a serious threat to the state's economy and quality of life. PPIC reported that "the key policy question is whether California's institutions have the information, tools, and resources to craft responses that encourage individuals and society as a whole to adjust and adapt to these changes" (Bedsworth and Hanak 2008, 3).

A statewide policy framework to address both climate change mitigation and adaptation has been developed, and mitigation strategies have already begun to be implemented. Studies have helped characterize the potential impacts of climate change for both the state and region. Even though most local governments lack sufficient resources to address adaptation planning broadly, many already are considering, case-by-case, projects proposed to manage sea level rise in various ways. Yet even with all these developments, five critical gaps still must be addressed in order to achieve definitive success.



*Aerial view of the existing salt ponds that encompass the proposed Redwood City Saltworks Redevelopment Project in South San Francisco Bay
Photograph © Cargill Incorporated*

First, the San Francisco Bay Area's key regulatory institutions need a toolkit of legal and regulatory powers that will help manage anticipated effects of climate change. For example, the authority to implement strategic decisions on adapting to sea level rise held by both the BCDC and the CCC—the two agencies that presently have jurisdiction in the shore zone—is severely limited. In the face of this new risk, state law may need to be amended to broaden the scope of authority for both commissions.

These agencies, along with local governments, which do most of the land use planning in California, also must reassess strategies for permitting and authorizing changes or expansions for the bay's and coast's major facilities, such as airports, ports, and wastewater treatment facilities. Today, for permitting purposes, BCDC and the CCC assume that new development will have a 50- to 90-year lifespan. Starting now, climate change should be factored into the design of all new shoreline structures, especially those that are part of critical infrastructure. These agencies must also help determine how to prioritize funding to protect the significant social and economic resources that are at risk.

To fill the second gap, a new entity may be needed to govern the Sacramento–San Joaquin River Delta, because here, two major climate adaptation issues now added to earthquake risk have come to a head: water supply and sea level rise. The delta's problems are well known, yet thus far millions of dollars

and numerous planning processes have failed to achieve the twin goals of water provision and ecosystem restoration that long have been the state's priorities for the region.

To wrestle with the third potential deficiency, new land use or regulatory authority for state-level organizations should be paired with tools and financing for local governments so that they can mitigate flood hazards by amending zoning or designating special districts. Local governments also need a sustained source of funding along with potential technical assistance to complete vulnerability assessments, develop climate change strategies, and execute effective implementation programs. Although not required currently, cities and counties should consider updating their coastal plans, many of which were developed in the 1980s, before sea level rise became a recognized concern. Findings and policies on climate change hazards should also be considered as local governments update their general plans. Local planning processes need to involve vulnerable populations in the development of appropriate preparation and adaptation strategies.

Fourth, ecological migratory paths need to be delineated and protected to safeguard the health of the bay, which itself is an iconic environmental and economic resource. This habitat includes wetlands that have been destroyed in more than 90 percent of their original extent in San Francisco Bay and, in some places, whose restoration could help buffer developed areas from flooding. Bay management agencies should take a lead in identifying opportunity sites for restoration. Conservation organizations and local governments can also help identify migratory paths and conservation opportunity areas for other key plant and animal species that are threatened by climate change.

Finally, California has long supported research to identify specific climate changes and threats making today's knowledge about future climate effects much greater than it was even a few years ago. Financial and technical support is needed to improve the basic science and modeling concerning climate impacts, particularly with respect to downscaling global models to regional and local levels. For example, climate in the Bay Area is varied, which is especially noticeable in the summer when the marine fog makes the considerable temperature differentials between inland and coastal areas particularly evident. This will mean that, even with a coherent regional strategy for sea level rise in place, the region must plan for temperature and air quality differences throughout. A better understanding of the effects of climate change in each microenvironment—especially as global climate models continually improve—would help ensure predictability for planning.

That California leads all other U.S. states in planning for climate change is acknowledged widely, but now is the time to continue this progress by improving science and governance to keep the state's citizens safe in a future of warmer days and higher seas.

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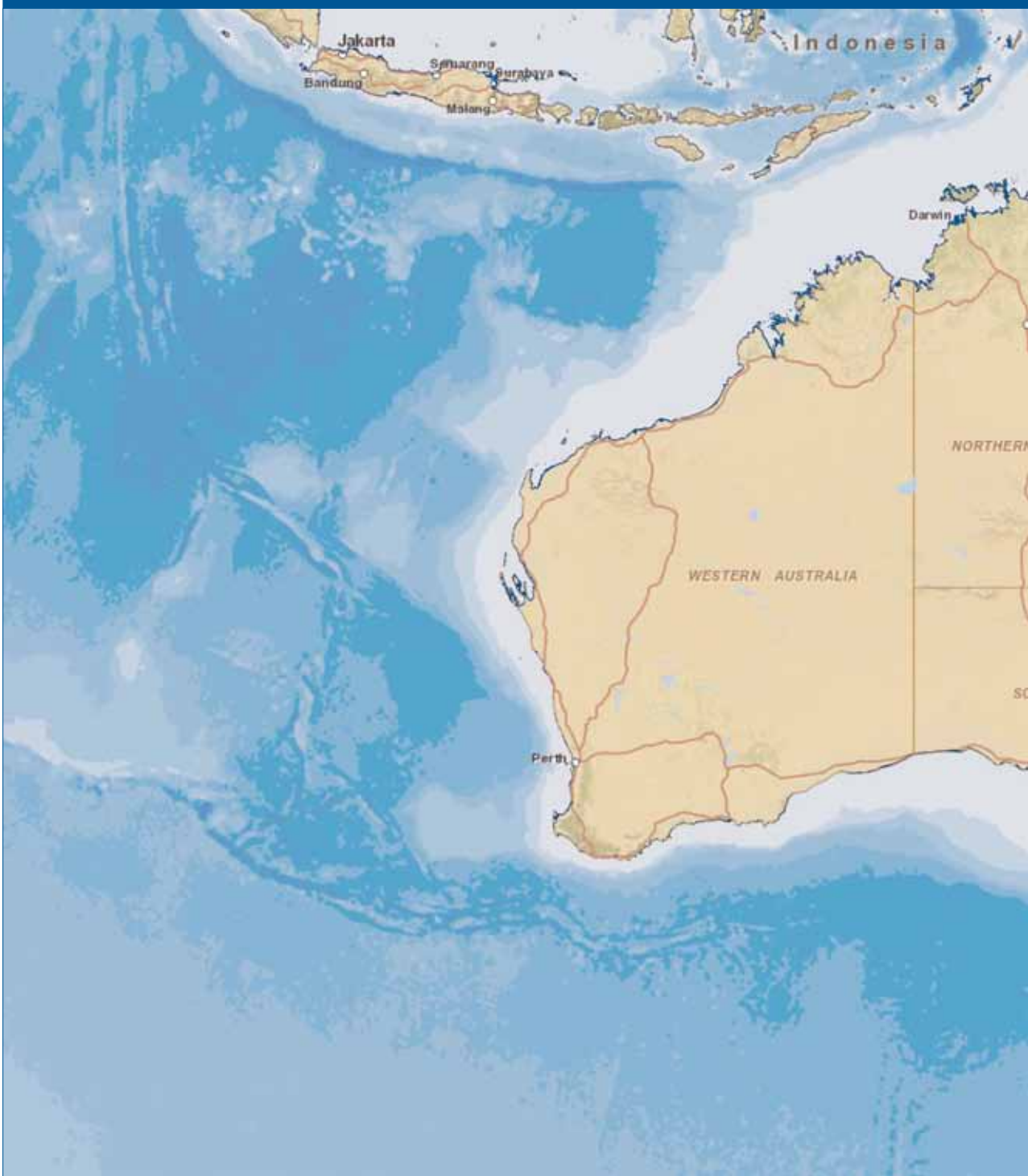
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Blakely Disaster Readings

Australia

Source: Weiss and Overpeck, University of Arizona.



■ dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Blakely Disaster Readings



Blakely Disaster Readings

Figure 6.1 Melbourne

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 6

Melbourne

Peter M. J. Fisher

Melbourne, the state capital of Victoria in southeastern Australia, is a large sea-board city (figure 6.1). Prior to the rise of global warming concerns, decadal climate variation across the region has been viewed as a gradual, creeping process—not entirely human-friendly, but unlikely to make the state a difficult place to live. If considered at all, anthropogenic climate change was not regarded as likely to occur. By the mid-2000s, however, some people became concerned about a 12-year drought arising from a prolonged El Niño event and punctuated from time to time by a weak La Niña event that resulted in diminished dam levels, severe water restrictions, and dustbowl conditions. Then on 7 February 2009, later named Black Saturday, killer firestorms to the east and north of Melbourne incinerated 173 people and a million animals. The fires burned 450,000 hectares (ha), destroyed more than 3,500 buildings, injured 414 people, and displaced 7,562 others. Once temperatures and winds reached extreme proportions, the dryness already in effect was an invitation to cataclysmic fire.

Shaken by the failure of fire plans to prevent this tragedy, the Labor government then in power established the Victorian Bushfires Royal Commission (2009a) and declared “unconditional support for residents wishing to rebuild their homes and towns” (*Weekly Times* 2009, 1), regardless of whether those sites were safe—the very matter the commission was charged to investigate. The government seemed neither to recognize nor address the distinct possibility that climate change is altering the vegetation as a result of frequent devastating fires in settings where there has been a considerable influx of “tree change” residents. James Hansen and his colleagues predict that there will be even more extreme summer heat events, which indicates that very hot fires are also likely and will only hasten that vegetative transformation.

The “climate dice” describing the chance of an unusually warm or cool season, relative to the climatology of 1951–1980, have progressively become more “loaded” during the past 30 years, coincident with increased global warming. The most dramatic and important change of the climate dice is the appearance of a new category of extreme climate outliers. The most important change of the climate dice is probably the appearance of extreme hot summer anomalies, with mean temperature

at least three standard deviations greater than climatology, over about 10 percent of land area in recent years. These extreme temperatures were practically absent in the period of climatology, covering only a few tenths of one percent of the land area. Therefore we can say with a high degree of confidence that events such as the extreme summer heat in the Moscow region in 2010 and Texas in 2011 were a consequence of global warming. (Hansen, Sato, and Reudy 2011,1)

Meanwhile, the government's response several years earlier to a metropolitan water deficit was to build a desalination plant and interbasin pipelines to deal with the decline in rainfall that began in 1998. Despite an enhanced dependency on electricity to carry out these measures, policies built on the efficiencies of integrating water making and power generation were not pursued.

Beginning in 2010, the El Niño event was replaced by a strengthening La Niña that resulted in high rainfall, flash flooding, and steadily rising metropolitan dam levels. Later that year the state Labor government was defeated by the coalition opposition (the Liberal and National Parties), which had promised to abandon the desalination plant, but eventually claimed they were unable to do so because of contractual obligations (Davidson 2011).

Consequently, this chapter focuses on these two climatic eras—the 12-year drought followed by a period of record-breaking rainfall—that reflect a wild swing in weather conditions considered characteristic of advancing climate change. Victoria's experience at the front lines of that change may offer lessons of value to other places with similar weather patterns, such as Southern California.

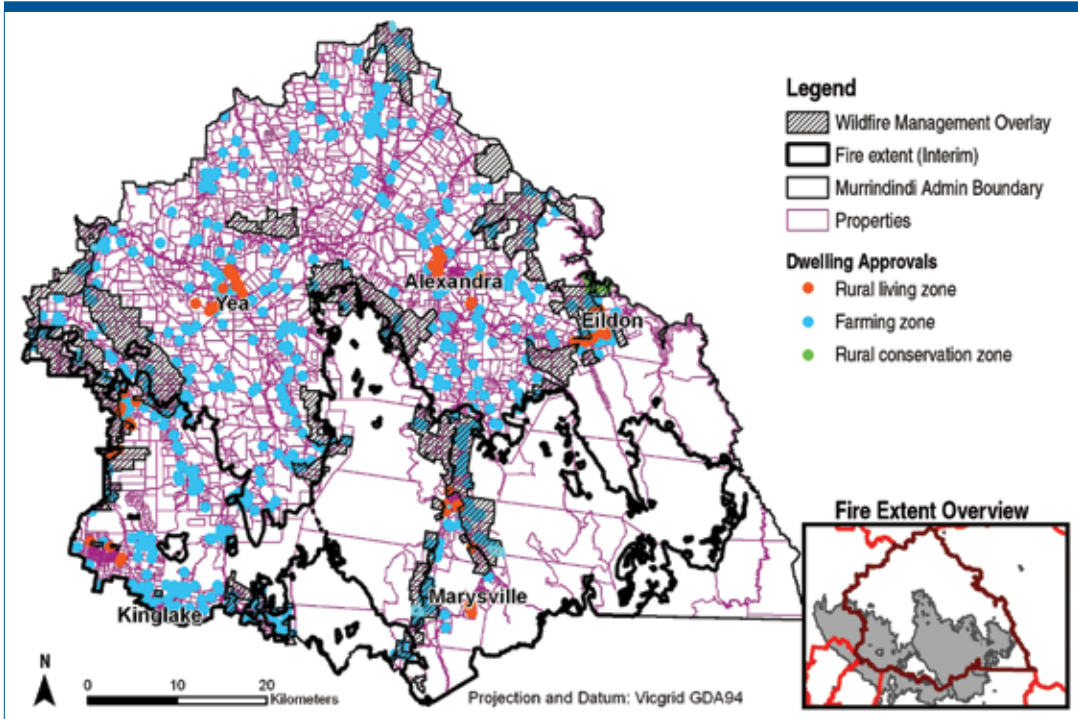
The Geopolitical Dimension

Despite being home to fewer than half the inhabitants of London, the Melbourne metropolis covers a larger land area. Its population stands at 4.1 million and is increasing at an annual rate of 2 percent—adding more than 200 people a day or almost 1,500 a week. In 2010, for the ninth consecutive year, Melbourne experienced the highest growth among the capital cities in Australia. Current projections by the Australian Bureau of Statistics estimate the population will swell to between 6.5 and 7.5 million by 2051 (Colebatch 2011).

The metropolis dates from 1835, when an area 10 kilometers (km) upstream from Port Phillip Bay on the Yarra River adjoining a cascade of fresh water of drinking quality above and navigable brackish water below, was chosen by pastoralists from the Launceston-based Port Phillip Association as a good place to found a village. Development was rapid, and in 1851 a gold rush centered on Bendigo 150 km north and Ballarat 100 km northwest led to a large influx of diggers, including many who came from the earlier gold rush in California. By 1860, 22 main roads radiated out of Melbourne, establishing much of today's arterial road network. This gold-driven boom continued until a depression occurred in 1890. By then, however, "Marvelous

Figure 6.3 New Dwelling Approvals in Murrindindi Shire, 1997–2007

Source: Buxton et al. (2011).



a pattern that largely persists, but has come under pressure from successive governments to rezone incremental sections of green acres to accommodate Melbourne’s population growth.. Over the years, administration of statutory planning schemes to implement the green-wedge-and-corridor provisions has been shared among local councils and state agencies, depending on which issues the Victorian government considered to be of state significance. In a new twist the coalition government has requested green wedge councils to nominate land for potential inclusion within a revised boundary to overcome “anomalies.” Of the 11 councils, 8 have rejected any changes to Melbourne’s longstanding green wedges or failed to make submissions by the deadline (Whitelaw 2011).

In 2010, almost half of the city’s population lived in suburbs lying more than 20 km from the central business district (figure 6.2). An estimated 600,000 people now reside in the high-risk, fire-prone, peri-urban areas, and many of them commute to jobs within the built-out area (Buxton et al. 2011).

The royal commission established to inquire into the Black Saturday fires was told by six different planning and environment experts that rebuilding homes in places such as the burnt-out town of Marysville would be inadvisable. They added that the risk was so great in some parts of Victoria that residential development there should be prohibited, and this ban should also cover new development and new subdivisions in existing areas (Buxton et al. 2011; Gray



The ruins of a house amid choking smoke in Marysville 24 hours after the Black Saturday conflagration, during which 38 people perished in the town while others huddled on a sports oval until forced to flee eastward to Alexandra in a police-escorted convoy of cars, the blaze right on their heels.

Photograph © Keith Pakenham.

2010a). The experts also called on the government to consider buying back some privately owned land in areas at risk for fires. Nevertheless, numerous new building approvals have been and continue to be granted in the heart of the zone ravaged by the Murrindindi firestorm (figure 6.3).

Regional Climate Change Issues

In the years prior to 2006, the policy focus of climate change in Victoria and elsewhere in Australia was limited to mitigation—in other words, reducing greenhouse gas (GHG) emissions. Recognizing, however, that change in the earth's geophysical system is inevitable, as witnessed by an increasing number of extreme weather events in Europe and other global regions, this response gradually expanded to include adaptation.

A report prepared for the Port Phillip City Council (City of Port Phillip 2007) was one of the first attempts to inform Australian local governments of the role they could play in limiting climate change and natural hazard impacts on private and public assets. Another study of Melbourne's Western Port region undertook a similar assessment (Kinrade et al. 2008). Other specialist studies, including those prepared by the Commonwealth Scientific and Industrial Research Organisation, Australia's national science agency (CSIRO 2005),



*Hard surfaces cover the alley of a new development in the Melbourne suburb of Brunswick.
Photograph © Peter M. J. Fisher.*

examined the water, sewerage, and drainage systems of Melbourne, and a report by Victoria's Department of Sustainability and Environment (DSE 2006) investigated the vulnerability of infrastructure.

During three consecutive days of 43–44°C temperatures in January 2009, overuse of domestic air conditioners produced power outages with repercussions including disabling the rail network. Rails also buckled on lines not equipped with concrete sleeper ties (NCCARF 2010). The lessons were clear: emergency response systems needed to be improved, design changes made, and some equipment re-engineered to cope with temperature extremes. Rail authorities subsequently undertook some engineering adjustments (Fisher 2009). Extreme heat further affected electricity supplies when a transmission line transformer failed, and the Black Saturday fires a few weeks later threatened the main transmission line to Melbourne and advanced perilously close to the Loy Yang power station and an adjoining coal mine.

Strong population growth in the region's coastal areas has exposed increasing numbers of residents to the threats of storm surge and sea level rise. CSIRO has estimated that between 27,600 and 44,600 homes in the state could be at risk of inundation from a 1.1-meter sea level rise and tidal surge associated

with a 1-in-100-year storm. In fact, their research shows that Victoria has the third-highest number of residential buildings at risk of inundation in Australia at a replacement value of \$6.5–\$10.3 billion* (Department of Climate Change 2009). Of these homes, 70 percent are situated in the Melbourne area, notably the municipalities of Kingston, Hobsons Bay, Greater Geelong, Wellington, and Port Phillip, and by 2016 the coastal population is projected to increase by 92,000. The Climate Commission (2011) has noted that in Melbourne (as well as Sydney), a sea level rise of 0.5 meter leads to very large increases in the incidence of extreme events by factors of 1,000—or 10,000 for some locations.

Some developments or redevelopments close to the sea still had slipped through the planning net, in spite of a sea level rise identified by the Western Port Alliance study (Kinrade et al. 2008) and a new strategy of the Victorian Coastal Council (2008). At least one arm of state government, the Victorian Civil and Administrative Tribunal (VCAT), seemed prepared to grapple with some of the tough implications of climate change in 2008, when it overturned South Gippsland Shire's approval of a six-dwelling planning permit application on the Toora coast. VCAT (2008) conceded that planning for climate change was still in an evolutionary phase and the risk from storm severity would make the proposed developments unacceptable. However, the new coalition government's decision to relieve a council in the state's far west of its controls over development within a zone vulnerable to a 0.8 meter sea level rise suggests a loosening of this approach (Dowling 2011a; 2011b).

Built environments with little space devoted to cooling and the wind-modulating effect of trees continue to emerge in Melbourne although the central city recently has developed a strategy to maintain and enhance trees on its streets and public lands (City of Melbourne 2011). A profusion of heat-absorbing masonry and other hard surfaces that threaten to overload drainage systems when downpours occur has been the norm.

Following a climate change summit in May 2008, a Premier's Climate Change Reference Group was established "to provide expert, independent advice on a range of climate change issues" (Victorian Government Department of Premier and Cabinet 2009, 15). The group focused on mitigation and strongly advocated early action by Victoria in a series of detailed recommendations. Its chairman, Intergovernmental Panel on Climate Change climatologist Professor David Karoly (2009b, 1), made this observation after the group had finished its work.

The Victorian Government's ambitious green paper on climate change includes discussion of many important actions to respond to climate change through both adaptation and emissions reduction. But the Government appears unwilling or unable to accept that an urgent whole-

* Unless otherwise noted, dollar amounts cited in this chapter refer to Australian currency.

of-government approach is needed, with limits on population growth, a strategy to phase out brown coal power stations, huge investment in low-carbon energy sources and public transport, and regulations requiring dramatic improvement in energy efficiency.

In 2009 Victoria's government established a partnership with Melbourne, Monash, La Trobe, and RMIT Universities for the Victorian Centre for Climate Change Adaptation Research (VCCCAR). Another development that year was the creation of the royal commission following the Black Saturday fires, which were attributed at least in part to anthropocentric climate change, as was the decline in water storage levels (Karoly 2009a). The new coalition government has since adopted its predecessor's policy of reducing emissions by 20 percent by 2020, but it has abandoned plans to shut down the high-emission Hazelwood power station and permits commercial exploration for brown coal to proceed in the nearby region.

Natural and Man-Made Conditions

A Unique Intersection of Climate and Vegetation

Australia separated from Antarctica 45 million years ago, but the new oceanic circulation opened by the rift affected world climates (White 1994). Although it was no longer contiguous, Antarctica cast a long climatic shadow from the deepest latitudes over its receding neighbor. Even today, research has demonstrated a strong correlation between increased snowfall at Law Dome in East Antarctica and decreased rainfall in the southwestern parts of Australia, and vice versa (AAP 2010; Ommen and Morgan 2010). This derives from two atmospheric moisture corridors: one that blows dry air from the Southern Ocean over southwestern Australia while the other shifts moist air southward to Antarctica. A pressure system that lies between the two continents may be the lynchpin for this atmospheric seesaw.

The resultant drying led to a contraction of the wet Gondwanan forests and their eventual replacement by arid-adapted vegetation, including the progenitor of the gum tree or eucalyptus. Frequent fire was inevitable in this new landscape, and the gum evolved to eliminate competitors in the Gondwanan rainforest by secreting highly flammable oils that encourage ignition, orienting its leaves to reflect sunlight downwards to dry out the understory, and using a shedding bark to start fire ahead of a main blaze. To survive such maelstroms, the trees are able to regenerate from epidermal buds or seed rains, as in the cases of {*Eucalyptus regnans*} (mountain ash) and {*Eucalyptus delegatensis*} (alpine ash), both of which are killed by fire.

This is the problematic landscape into which increasing numbers of people have cast themselves since European settlement of Australia started in 1788. The peril to lives and livelihoods was forever present, as demonstrated by the blazes

of Black Thursday in 1851, when 25 percent of Victoria is believed to have gone up in flames. However, fewer people lived in the state at that time.

Anthropocentric Climate Change

Victoria's climate has changed radically over the last century, with a pronounced warming since the decade of the 1950s. Research shows one indicator of this trend: indigenous butterflies are emerging from their cocoons 10 days earlier than they did 65 years ago, which correlates with a 1°C warming (Phillips 2010).

Higher levels of carbon dioxide (CO₂) as well as rain-bearing low pressure systems tracking further south are viewed as playing a key role in the warming over recent decades. This contemporary climate change is increasing fire risk for a growing population, future fires could penetrate Melbourne's generously treed outer suburbs to the east and northeast, causing a death

toll that could be counted in the tens of thousands rather than the hundreds lost on Black Saturday. The ferocity and heat of the crescent of fire on that day summons a parallel with the virtually uncontrollable blazes of Southern California in the path of the Santa Ana winds or Mediterranean countries affected by the siroccos from North Africa.

A combination of a marked decline in rainfall resulting in tinder-dry conditions, a location at the end of a 2,000 km northwesterly wind trajectory over the hot, baking deserts of Central Australia, and an abundant tree species that deliberately promotes fire, thrusts Victoria into the front line of climate change. Flame-gas heights during the Murrindindi fire on Black Saturday, for example, exceeded 100 meters and burned at temperatures of 1000°C or greater. This fire triggered a thunderstorm with lightning over the Mt. Riddell blaze near Healesville, which suggests it created its own microclimate on a day of record low humidity. By contrast, the impact of the drought and rising aridity had been creeping and was far less traumatic. Yet the two phenomena were closely related: the greater the desiccation, the higher the risk of fire and its heat and ferocity.

Grasping the Intricacies of Melbourne's Climate

South Eastern Australia's weather derives from a complex interplay of four main climate drivers: El Niño–Southern Oscillation (EN–SO), the Indian Ocean



*In February 2010, just one year after Black Saturday, epidermal buds of eucalyptus have regenerated in Toolangi Forest.
Photograph © Janet M. Bridgart.*



At Lake Mountain, the aftermath of the Murrindindi fire revealed pyrolyzed and gasified leaves, a result of extreme radiant heat.
Photograph © Janet M. Bridgart.

Dipole (IOD), the Southern Annular Mode (SAM), and the Subtropical Ridge. El Niño events arise from sea surface temperatures in the central and eastern tropical Pacific Ocean that are warmer than normal and linked with an anomalous atmospheric circulation called the Southern Oscillation (Mullen et al. 2010).

Both El Niño and La Niña events normally last for about a year, but they can be shorter or much longer. There have been four recent La Niña events: 1998–2001 (moderate), 2007–2008 (weak to moderate), 2008–2009 (weak to moderate), and 2010–2011 (very strong; figure 6.4). In Victoria, El Niño events typically result in reduced rainfall from March to November.

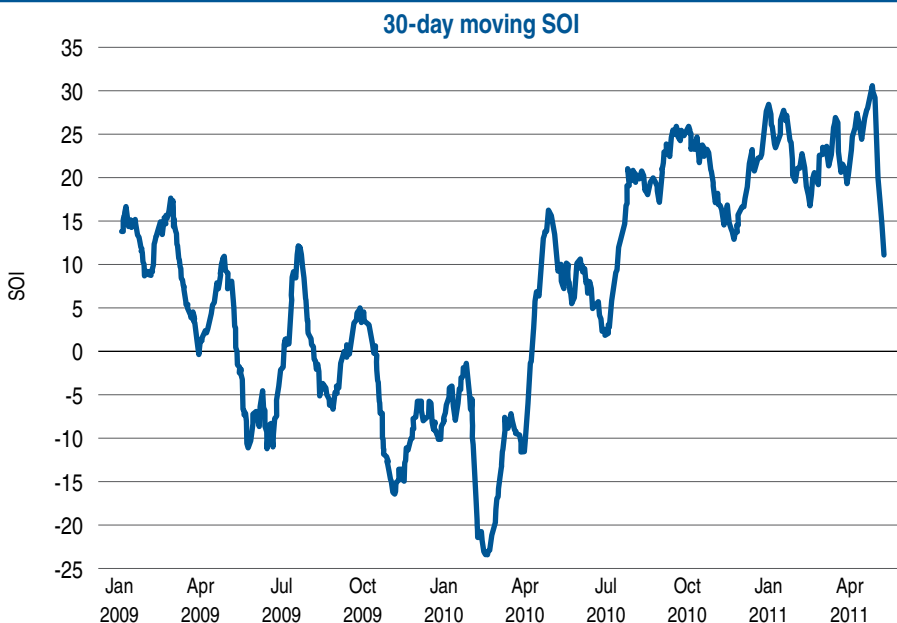
The IOD, a relatively recent discovery, arises from a difference in sea surface temperatures near Africa compared to those near Sumatra and Northern Australia. A positive phase of the IOD is associated with decreased rainfall over southeastern Australia from June to November.

Roger Jones (2009) believes that climate change is implicated in blocking highs and SAM intensification, and perhaps the IOD as well. Natural climate variability also may be interacting with these changes. He records that from the period between 1996 and 1998 until 2010 a statistically significant shift occurred in mean annual rainfall, mean annual stream flow, and mean daily maximum temperature. The annual rainfall decreased by 21 percent, with the largest decreases in spring (23) and autumn (29), next in winter (18), and least in summer (13). For stream flow, the annual decrease was 39 percent and the largest seasonal decrease has been in autumn (46), with the least in spring (35). Maximum daily temperature rose annually by 1°C, increasing 1.2°C in spring and summer, 0.7°C in autumn, and 0.8°C in winter.

Interestingly, in southeastern Australia returns to earlier La Niña events from 2000 to 2009 had not resulted in a resumption of plentiful levels of winter and spring rain, partly because the IOD generally has been in a positive phase during the events. As a result, there was no let up in dryness from late 1996 until the start of 2010. In its negative phase, the IOD brings warm water to the north coast of Australia, which results in increased evaporation into the atmosphere and rain-bearing air sweeping over the continent. It remained gener-

Figure 6.4 The Southern Oscillation Index (SOI) Demonstrates the Strength and Duration of La Niña Events

Source: National Climate Centre; © Commonwealth of Australia, 2011.



ally positive for three years, from 2006 to 2009, even though such a three-year sequence is rare. The major decrease was in autumn rainfall, thought to be due to the more intense central air pressure of the subtropical ridge (Timbal 2010).

With a La Niña event well established in the Pacific Ocean, however, 2010 saw a wetter weather pattern emerge, and it grew to major proportions by early 2011. Among the ramifications was a “tropical link,” with one particular cyclone moving inland from the Coral Sea then tracking south as an intense low pressure system. This produced subtropical conditions and culminated in vast flash flooding in Melbourne and extensive flooding elsewhere in the state’s northwestern areas during January and February. Despite these developments, the long-term conditions that led to decreased rainfall since 1996 are still believed to be operative (Roger Jones, personal communication, 2010).

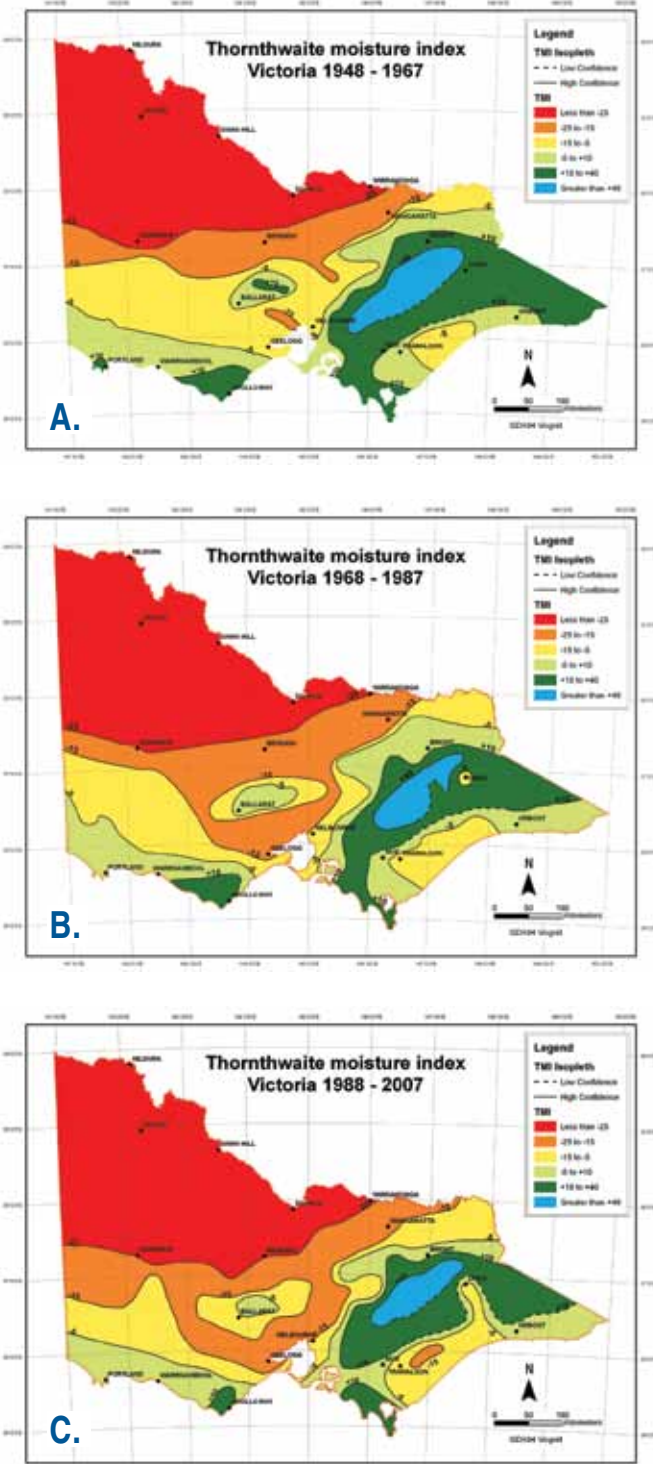
Increasing Aridity and Bushfires: Desiccation, Heat, and Destruction

The extended period of drought in Victoria ended with the “big wet” of 2010–2011, but the drought had exacerbated what was already a steady decline in soil moisture from as early as 1968, as determined by the Thornthwaite Moisture Index (figure 6.5). Apart from the soils in its eastern suburbs, the moisture content of Melbourne’s soils equaled that of the drier Bendigo region (just over the Great Dividing Range to the north) earlier in the study period from 1948 to

Blakely Disaster Readings

Figure 6.5 Soil Moisture in Victoria, 1948–2007 (Thornthwaite Moisture Index)

Source: Lopes and Osman (2010).



2007. In other words, for years the metropolis and its peri-urban areas had been succumbing to desiccation and the consequent elevation of fire risk.

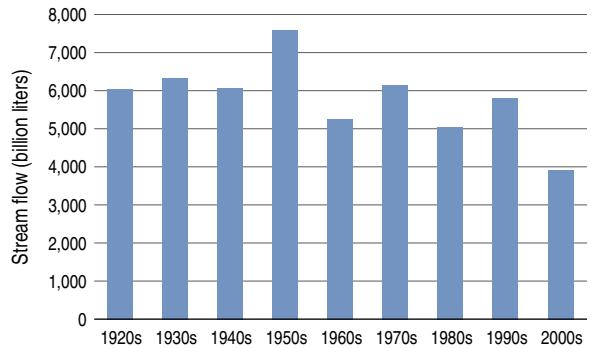
In general, until there is enough rain to dampen the whole system, rainfall refills the soil profile and trickles into groundwater with less run-off. In turn, stream flows are reduced significantly. Thus, a 10 percent decline in rainfall on Melbourne’s drinking water catchments over the period of the drought resulted in a 30 percent reduction in inward stream flow (figure 6.6). Dam levels dropped from nearly full in 1996 to barely one-quarter full in 2009, with a steep reduction in the amount of water that flowed into the city’s major reservoirs. Increased rainfall in 2010–2011 caused the overall dam levels to rise to two-thirds capacity, while the major Thomson Dam reached 50 percent capacity.

These variables of soil moisture and rainfall also have bearing on low levels of relative humidity. The dry heat typical of summers in Victoria brings about humidity levels that hover around 10 to 20 percent. The low humidity is exacerbated by wind changes accompanying the passage of cold fronts, which increase the dehydrating effects of high winds in the form of hot northerlies that follow. These have become more intense in recent years.

In the 1960s the interplay of weather conditions was integrated into the McArthur Forest Fire Danger Index (FFDI or simply FDI), an empirical indicator of high and extreme fire danger and the relative difficulty of putting out blazes (Karoly 2009a). The FFDI is used for rating fire danger culminating in public warnings for high (FFDI 12–25); very high (25–50); and extreme (>50). An extreme rating is accompanied by a total ban on fires. A report prepared for the Bushfire Cooperative Research Centre indicated that values may substantially exceed 50 (Lucas et al. 2007, 2).

Figure 6.6 Changes in Stream Flow in Melbourne’s Water Catchments

Source: Melbourne Water.



The annual cumulative FFDI values mask much larger changes in the number of days with significant fire risk. The daily fire danger rating is “very high” for FFDI greater than 25 and “extreme” when FFDI exceeds 50. Two new ratings have been defined for this report: “very extreme” when FFDI exceeds 75 and “catastrophic” when FFDI exceeds 100. The number of “very high” fire danger days generally increases 2–13 percent by 2020 for the low scenarios and 10–30 percent for the high scenarios. By 2050, the range is much broader, generally 5–23 percent for the low scenarios and 20–100 percent for the high scenarios. The number of “extreme” fire danger days generally increases 5–25 percent by 2020 for the low scenarios and 15–65 percent for the high scenarios. By 2050, the increases are generally 10–50 percent for the low scenarios and 100–300 percent for the high scenarios.

In the wake of the Black Saturday fires, two additional warnings, extreme (FFDI 75) and catastrophic code red (>100), have been adopted across the continent. The official advice for code red is, “if you live in a bushfire prone area the safest option is to leave the night before, or early in the morning” (Gray 2010b, 7).

Heat, Fire, and Water: Challenges and Experiences Under El Niño Conditions

Soaring Temperatures and Firestorms

Recent incidents. On Saturday, 7 February 2009, temperature records were rewritten across the state of Victoria. The hottest place was Hopetoun in the northwest, with a new statewide benchmark of 48.8°C. In Melbourne, the

Blakely Disaster Readings



Roadside fire alert signs such as this one at Trafalgar, Victoria, show the six risk categories. As a result of Black Saturday, these signs now dot rural Australia.

Photograph © Peter M. J. Fisher.

maximum was 46.4°C, more than three degrees hotter than on Ash Wednesday in 1983, the day holding the previous February record. The FFDI reached unprecedented levels, ranging from 120 to more than 200, and relative humidity plunged down to 6 percent following a week of record temperatures in late January, during which 374 infirm and elderly citizens died from heat exposure.

But the scene had been set well before 7 February dawned. A day earlier, V-Line, the regional passenger train provider, warned of a possible cessation of service on the Gippsland line due to the prospect that the Bunyip State Park fire could flare up and cut off the tracks, which subsequently occurred. Services were also cut on the Seymour and Warrnambool lines. As many as 400 fires were recorded around the region.

A blustery, cool change later in the day swung the wind direction 90 degrees, converting initially long, narrow fire fronts into wide ones that moved in a northeasterly direction, with spot fires flaming up as far as 20 km ahead.

The main blazes were the Kinglake-Murrindindi, Bunyip, Churchill, Bendigo-Redesdale, and Beechworth complexes. The first two were in the greater metropolitan area while the third threatened the state power supply. The fourth penetrated the western suburbs of Bendigo, a provincial city of 100,000 people, and burned to within two km of the central business district.

This ominous occurrence brought the Kinglake-Murrindindi blaze precariously close to the heavily populated, leafy suburbs of outer Melbourne—Eltham, Greensborough, St. Helena, and Warrandyte (Bachelard 2009). The



These ruins of a house and car in the aftermath of Black Saturday's Beechworth blaze were typical of the devastation. One can recognize the random selectivity of the fire's damage, however, by contrasting the relatively untouched oak tree to the left with the scorched, leafless one on the right.

Photograph © David Bethell.

Kinglake-Murrindindi fire complex, which resulted from the merging of separate blazes after a wind change in the late afternoon, killed 159 people and destroyed 1,800 homes and 330,000 ha of land.

After the wind change, the fire turned toward the town of Marysville in the evening, where 38 lives were lost. Temperatures were so high (up to 1,200°C) that burned vehicles' engine blocks were melted, and forensic teams had great difficulty identifying many victims. It was later determined that 173 people had perished across the state. The destruction of convention facilities, bed and breakfast inns, and other visitor attractions has severely limited the economic recovery of Marysville since the fires.

Black Saturday also showed that Melbourne's surface water supply was in jeopardy, not only from growing aridity but also from serious contamination of its catchments due to burnt vegetation. The Kinglake-Murrindindi Complex South fire broke into the O'Shannassy River and Armstrong Creek water catchments on Tuesday, 10 February. Heavy rainfall in its wake would have caused mud, ash, soil, and rocks to be washed into the dams, something that occurred after the January 2003 fires in Canberra.

Policy responses. Victoria's premier, John Brumby, visited the ravaged towns on 9 February 2009, when he announced that a royal commission would exam-

ine “all aspects of the government’s bushfire strategy including whether climate change contributed to the severity of the fires” (Australian Broadcasting Corporation 2009). Touring Marysville, Buxton, and Kinglake with Brumby on 17 February 2009, Kevin Rudd, then Australia’s prime minister, declared that communities wiped out by Victoria’s bushfires would be rebuilt “brick by brick” (Nicholson and Rood 2009). Edward Blakely (2009, 11) publicly cautioned against such assertions, observing:

It makes little sense to build back into trouble. But in too many instances the desire to build back soon overwhelms the need to build new safer and smarter systems that can withstand foreseeable hazards like climate change. In New Orleans we are learning from the Dutch how to build a city less dependent on levees to secure a better and more sustainable city. Victorians can and should learn from Canberra’s disaster as well as identify best practices globally as it rebuilds its communities.

On 10 February, the national and state governments together established the Victorian Bushfire Reconstruction and Recovery Authority to oversee and coordinate a recovery and rebuilding program. Its priority was to “help regions, towns and individuals to rebuild and recover in a way that is safe, timely, efficient, cost effective and respectful of those different needs” (FRU 2011). This authority was also charged with distributing a large amount of money, food, and household items collected for bushfire victims.

Meanwhile, weather predictions, including very strong northerly winds followed by a blustery change, caused the people of Victoria to brace for another maelstrom on 3 March. The police department sent text messages to nearly 3 million cell phones, reportedly as a test for a new telephone-warning system. Fortunately, it was a false alarm, although some adverse comments arose, charging the department of “crying wolf.”

The royal commission began its hearings in April 2009. Jack Rush, the counsel assisting the commissioners, took early aim at the alert the public had received before the Black Saturday fire, stating: “The only warning on the day was for an extreme fire danger. Such general warnings [are] not a trigger to go early.... Australian states allow people to make a choice about whether to stay or go rather than requiring them to evacuate. In other countries with a high wildfire risk, evacuation is still seen as the safest emergency approach” (*The Age* 2009, 1).

Under prior government-endorsed fire plans, the *stay-and-defend-or-go* (abbreviated to *stay or go*) policy assumed it was possible for a well-prepared resident to defend a property. The Australian design standard AS 3959-2009 (Construction of Buildings in Bushfire Prone Areas), in particular, holds that properties can be constructed “that will give a measure of protection to the building occupants [until the fires passes] and to the building itself.” Clearly, many of the buildings destroyed on Black Saturday did not meet this standard,

Table 6.1 Comparison of Actual Conditions with Design Assumptions of the Australian Standard (AS) 3959-2009

Source: Grundy (2009).

Parameter/Case	AS3959-2009	Australian Capital Territory 18 January 2003	Victoria 7 February 2009
Air temperature	35°C	37.4°C (12:42 pm)	46.4°C Melbourne
Wind	34 km per hour ¹	78 km per hour (gust) ²	>100 km per hour
Relative humidity	25 percent	4 percent (4:30 pm)	6 percent
Rate of fire spread	3 km per hour	unknown	8 km per hour

Notes:

1. Only used for calculating rate of fire spread in scrub or scrubland, not in forest or woodland.
2. A 14 km high cumuloform plume of dry, unstable air above the ACT fire caused gusts exceeding 100 km per hour and storm damage before and during the firestorm. Gusts in the Kinglake and Marysville firestorms are believed to have been even stronger.

which was developed for conditions prevailing during the Black Friday fires of 1939. The contrast with actual conditions in Victoria is stark (table 6.1).

It appears that AS 3959-2009 assumed an FFDI of 100, but in Victoria on Black Saturday it ranged from 120 to above 200. Whereas it is not uncommon for impact variables to exceed design standards with earthquakes, for example, this analysis indicates that the design standard may need to be reviewed. The royal commission recommended that people should be encouraged to use shelters, the government should cease telling people that houses are safe, and evacuation should be the primary option (Victorian Bushfires Royal Commission 2009a). Even if the former prevails, as Grundy (2009, 3) points out that:

the areas not burnt this time will be more at risk from bushfires next summer than the areas which were burnt. Although the burnt areas will be rebuilt to a more robust standard of fire resistant structures they will remain vulnerable with even the most fire resistant structure being at risk of destruction, as was demonstrated on Black Saturday. Within the burnt area there are many surviving houses, including timber clad houses, which also remain vulnerable. Accordingly, a risk reduction plan needs to be developed for the unburnt areas where it is likely that only minor modifications to buildings at risk will prove economically and socially acceptable. The same plan should apply to areas recently burnt.

The places not affected on Black Saturday should be given as much concern as the devastated areas. Whereas only 38,000 people permanently reside in those towns that escaped the fire, hundreds of thousands visit or vacation there in the summer months. Melbourne University bushfire researcher Kevin Tolhurst has articulated the perils they could face.

Fourteen towns not burned out on Black Saturday—from Lorne and Aireys Inlet to the west of Melbourne, through Macedon, Warrandyte and Hepburn Springs, to the Dandenongs and Arthurs Seat in the east—could be disasters waiting to happen. These were examples of how dangerous some places in Victoria could be. Those on top of ridges were in danger of blowtorch-style fires which moved quickly up forested hillsides. Kinglake was devastated by a *blowtorch* fire. Other towns at risk were in hollows or open valleys and in danger of firestorms caused by a blizzard of embers falling from surrounding hills, such as happened in Marysville. The nature of the fuels and terrain in many of these places is what makes them so attractive [to live in] but also potentially disastrous as well. Other dangers were lack of access roads, transient populations, and houses built to capture tree-top views rather than to withstand bushfire. (Bachelard 2010a, 7)

It also is not beyond the bounds of possibility that fires will reshape the vegetation of these areas.

Eucalypt woodlands would hold on in large areas of their current range, but even these fire-tolerant systems would be vulnerable to big, frequent fires, especially when El Niño droughts compound the effect of global warming. Fragmentation of ecosystems would limit the ability of plant communities to colonise more hospitable areas. Plants have to occupy intermediate zones. Migration isn't likely. (C. Jones 2010)

Heavily forested “tree change” communities at the periphery of the metropolitan area, such as those in the Dandenong Ranges and North Warrandyte, are set in a maze of winding roads and dirt access tracks that quickly would become jammed with escapees. Similarly, in the coastal towns of Lorne, Aireys Inlet, Fairhaven, and Anglesea, an area destroyed by fires on Ash Wednesday in 1983, the forest has grown back and residents and summer numbers have ballooned, but the overcrowded Great Ocean Road remains the only way out.

Bushfire behavior is so complex it thwarts the type of fine-grained risk assessments needed to distinguish between what is probable and inevitable. The VCAT recently refused to grant permission for a family to build a house on its Yarra Valley land, in part because the tribunal thought the risk of bushfire was too great and the site fraught with danger (Cooke 2010). However, contemporary historical research on brushfires in Southern California could help Australia with an application of a computer model that predicts risk in narrow bands across a terrain according to spatial variation in extreme winds (Moritz et al. 2010).

As noted above, the royal commission examined the provision of safe refuges, but the government has yet to identify fully where these places may be situated in towns throughout the state (Lacey 2009; Victorian Bushfires Royal

Commission 2009). The commission recommended that the term *neighborhood safer place-place of last resort (NSP)* be abandoned in favor of *shelters*. This has not occurred, and NSP signs are already beginning to appear with the release of maps designating 85 percent of the state as bushfire prone (Dowling 2011b).

Fire Services Commissioner Craig Lapsley has signaled that in future Victorians will be warned at the commencement of the fire season “that they face a high risk of trauma, injury or death” if they seek shelter in a place of “last resort,” such as a local sports ground or a farm dam. He also urged parents on “extreme” or “code red” days to take children from schools before the first hint of fire (Gray 2011c).

The very intense fires that were experienced on Black Saturday would have produced a witch’s brew of chemicals—aldehydes, volatile organic compounds, and fine particulates—as well as the deadly carbon monoxide that resulted through the reaction of water with elemental carbon. Clearly that level of toxics exposure, which could lead to long-term health consequences, would be better avoided by abandoning the affected areas altogether.

Fuel-reduction burns (FRBs) to eliminate or reduce the severity of fires have always been a point of contention between those wanting asset protection and those who favor habitat conservation. The evidence for the effectiveness of such burns has been very mixed, with the type of vegetation, terrain (ridge lines, etc.), and fire temperature all appearing to be critical variables. Geoff Lacey (2009, 10–11), for example, uncovers evidence from French Island forests near Melbourne “that an open under storey is not necessarily the result of frequent burning . . . [and] that frequent hot burning by settlers in some locations gave rise to a dense growth of trees and shrubs.” He further cautions that frequent control burning in forests and other ecosystems “could result in changing the species composition and perhaps a change of the ecosystem from one type to another, for example, from a shrubby to a grassy under storey and vice versa.”

A different viewpoint has been offered by a former forests chief, who told the royal commission that, over 30 years, successive state governments failed the people of Victoria by allowing forest fuels to build up to unnaturally high levels, creating fuel loads that significantly contributed to the high death toll on Black Saturday. He also called for tripling the annual FRBs’ target to 385,000 ha, which should be mandated in law (Gray 2010b). According to Robyn Grant (personal communication 2011) of the Gippsland Environment Group, however, FRBs as presently constituted suffer from systemic problems that, if not remedied, could lead to wholesale destruction of species and possibly “the bush” as we know it. For example, the monitoring budget provides only 1 to 2 percent of the fuel-reduction budget and includes no fauna, fungi, invertebrate, or aquatic species monitoring. Nor does it accommodate water-quality monitoring. Moreover, the frequency of FRBs allows no time for seeding and regeneration, and the burns are not performed on a trickle-mosaic basis, which tend to be hot rather than cold burns and allow wildlife to take refuge in adjoining patches.

Blakely Disaster Readings



Before and after aerial views demonstrate how few trees would remain untouched (in green on second image) if residents of a 6.4 ha area at Upwey in Melbourne's Dandenong Ranges strictly followed new clearing rules legislated by the government of Victoria in the wake of Black Saturday. Photographs © Michael Buxton.

No less controversial is the issue of clearing around houses. In September 2009, under the concept of “defendable spaces,” the state government issued new rules, which stated that properties can be cleared of trees within ten meters of a house and four meters of a fence line. Given the size of many subdivisions in peri-urban areas, this rule could result in a virtual stripping of the landscape. Michael Buxton’s aerial photographs show that, for a 4.6 ha area at Upwey in the Dandenong Ranges, only 12 of the existing 262 trees are safe from being felled. Apparently the only thing preventing this from happening is the expense to the property owner.

Ken Edmunds, a firefighter, has suggested that this kind of tree clearing could lead to fierce winds funneling through the denuded landscapes, spreading fires even farther and faster, and in any event fireballs that result from wind-borne debris could drop on any property (personal communication 2009). Concerns about how to respond to fire danger show up in the Country Fire Authority’s (CFA 2009, 4) pre-existing information brochure about leaving early or defending your property: “If you chose to stay to defend, you must have adequate defendable spaces, be well prepared and understand the complexities and the risks of your decision, including *the very real chance you may be injured or killed*” (emphasis added).

A further response to the Black Saturday fires has been to develop a bushfire attack level (BAL) rating system in which homes are categorized in one of six bushfire levels, ranging from low to extreme, based on risk factors including the fire danger index, FFDI, slope of land, and vegetation. For example, the highest rating—BAL-FZ (flame zone)—would apply to the ridge along which Coombes Road runs in Kinglake West, where all homes were destroyed with a large loss of life. Outbreaks can occur wherein temperatures in excess of 1000°C make it unlikely that even houses conforming to the BAL scheme would be able to survive, however. A key royal commission recommendation that would have instituted a buy-back of properties at high risk (e.g., BAL-FZ) was rejected by the then-Labor government, although the new coalition government has announced a limited, voluntary scheme (Gray 2011a). This has received a mixed reception from Kinglake property owners (Gray 2011b).

Although the burnt areas are to be rebuilt with more robust standards for fire resistance, they remain vulnerable. Even the most fire-resistant structures, especially those that are timber clad, would be at risk of destruction under weather conditions similar to those on Black Saturday. Thus a risk-reduction plan needs to be developed for the areas that escaped burning, where minor modifications to buildings at risk will prove both economically and socially acceptable. The same plan should apply to areas recently burned.

Finally, the royal commission has been told that, even though the government was warned as early as 2000 that cutting costs on power line maintenance could cause bushfires and pose a serious risk to workers and the public, nothing was done (Bachelard 2010b). A class action against the distribution com-

pany SP AusNet, SPI Electricity, headed by a former St. Andrews resident who lost her son on Black Saturday, is expected to go before the Victorian Supreme Court in 2012. The company is alleged to have failed to inspect and maintain its single wire earth return (SWER) power lines, which led to a break in a 43-year-old line that started a fire near Saunders Road in Kilmore East (Campbell 2011).

Meanwhile, at the close of 2011 the government announced a \$500 million plan over 10 years to implement a recommendation from the royal commission to replace Victoria's 100,000 km of dangerous SWER lines. The government's plan calls for installation of a mix of aerial-bundled lines and underground lines, whereas the royal commission directed running all lines underground at an estimated cost of \$40 billion. The government claims that this will reduce by 64 percent the risk of power lines starting a bushfire while achieving a 91 percent reduction from the cost for full undergrounding (Lucas 2011).

Nonetheless, the Powerline Bushfire Safety Taskforce (2011, 3) noted that "the majority of powerline-initiated fires in Powercor's and SP AusNet's areas in 2009 were started by multi-wire powerlines (typically 22kV): approximately 1.6 fires started for each 1000 km of multi-wire powerlines compared with 0.3 fires started for each 1000 km of SWER powerlines." In that respect, the government has adopted the taskforce's recommendations to mandate installation of rapid earth fault current limiters (REFCLs) that operate on 22kV power lines and new-generation automatic circuit reclosers (ACRs) for use on SWER power lines. Regarding priorities, the taskforce noted that "a large proportion of the state's fire loss consequence [the likely extent of damage from a bushfire] can be mitigated by targeting actions to a relatively small proportion of powerlines supplying a small proportion of Victoria's rural customers. These powerlines are mainly located in the Dandenong Ranges extending north through to the foothills of the Great Dividing Range, the Otway Ranges and the Macedon Ranges" (Powerline Bushfire Safety Taskforce 2011, 4).

Drought and the Decline in Water Storage Levels

Recent incidents. In contrast to the rapid onslaught of the fires, the drought was a protracted occurrence. A decline in rainfall began in 1998, and a sharp drop in drinking water levels reduced Melbourne's reservoirs to 25.6 percent by mid-2009—the lowest level ever recorded (figure 6.7). Above-average rain from 2009 into 2010 caused a turnaround, with dammed reservoirs refilling after 14 years of drought. Between 23 June 2009 and 21 November 2011, total system storage (TSS) rose 724 gegaliters (gL) representing a rise from 26 to 65 percent. The string of record-low levels set earlier took a corresponding toll on agricultural production. More records were broken when the water levels rose.

Drought implies that the particular state of affairs will come to an end at some point, which will be followed by a return to past rainfall and evaporative

regimes. Modeling undertaken by CSIRO indicates that this is unlikely over the long run, however, since water supply is projected to decline by 3 to 11 percent by 2020 (depending upon the warming scenario) and 7 to 34 percent by 2070 (R. Jones 2009).

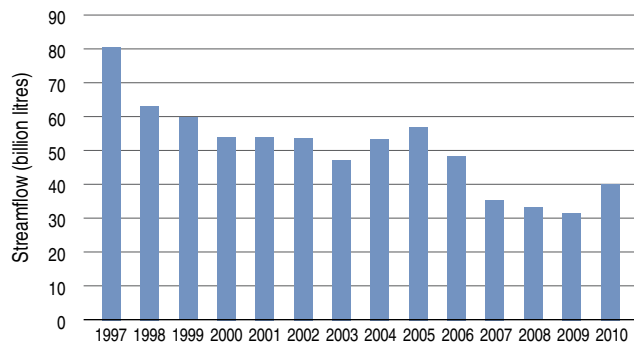
David Dunkerley (2009) examined the intricacies of Melbourne's rainfall for 24-hour periods spanning a 68-year timeframe and found a shift to prolonged precipitation events characterized by lower rain rates and smaller event depths, all of which could potentially exacerbate the effects of declining annual rainfall. He further notes that a larger fraction of the incident rain is lost to wet-canopy evaporation during lower rain-rate events. In other words, smaller rain events are less able to penetrate leaf canopies and ground litter to replenish the soil's moisture store, while changes in subdaily rainfall may be of considerable significance to ecohydrology and to the production of water supply from forested catchments. Clearly this phenomenon had been instrumental in the decline in soil moisture observed earlier (Lopes and Osman 2010).

Lower rain rates and smaller event depths have provided conditions for the outbreak of fires within forested water reserves. Fire invaded the Maroondah, O'Shannassy, and Tarago reservoirs on and after Black Saturday, damaging 30 percent of Melbourne's catchments during a period when water consumption trebled. These events showed that surface water supply is not only in jeopardy from growing aridity, but subsequent heavy rainfall can wash mud, ash, soil, and rocks into the dammed bodies of water (the Tarago, Thomson, Upper Yarra, O'Shannassy, Maroondah, Greenvale, Yan Yean, Sugarloaf, Silvan, and Cardinia Reservoirs). This occurred after the Canberra fires and required filtration plant upgrades (White et al. 2006). Additionally, the water demands for recolonizing eucalyptus saplings can deplete runoff for 20 or more years. It was fortunate that only limited rain fell over Melbourne's catchments in the wake of 7 February 2009.

Policy responses. In the weeks following Black Saturday, water held in the storage areas at Maroondah and O'Shannassy, both of which had fire-damaged reserves, was sent to areas where there had been no fire, specifically the Silvan and Cardinia Reservoirs, to guard against heavy rainfall washing contaminants into them (White et al. 2003). Some 500 km of firebreaks 40 meters wide subsequently were cut around the Thomson and Upper Yarra catchments, which

Figure 6.7 Melbourne's Water Storage Levels, 1997–2010

Source: Melbourne Water.



supply most of the city's drinking water, to protect 160,000 ha of vulnerable forest, based on the assumption that these efforts would make the catchments closer to 100 percent safe. Airborne burning bark and twigs, however, can ignite areas as far as 20 km ahead of an advancing fire and thus breach these buffers, especially with the kind of temperatures, humidity, and winds experienced on Black Saturday.

The announcement in 2005 that the smaller Tarago reservoir was to be recommissioned was cast as a response to climate change, with the state government remaining opposed to building desalination plants or pipelines to tap into other water basins. The State Government of Victoria's *Our Water Our Future* initiative (DES 2007) adopted the conclusion of the Melbourne Water Climate Change Study.

Demand management measures and water supply augmentations identified in the Water Resources Strategy for the Melbourne Area were found to provide sufficient buffer for climate change to be adequate in 2020 across the full range of climate change and alternative demand forecasts considered in this case study.... After 2020 the magnitude of supply side changes may require additional action to be taken including desalination or other system augmentation. Melbourne Water's ability to cope with climate change will be dependent on the rate at which climate change, population growth and water use reductions occur. (Melbourne Water 2005, 18)

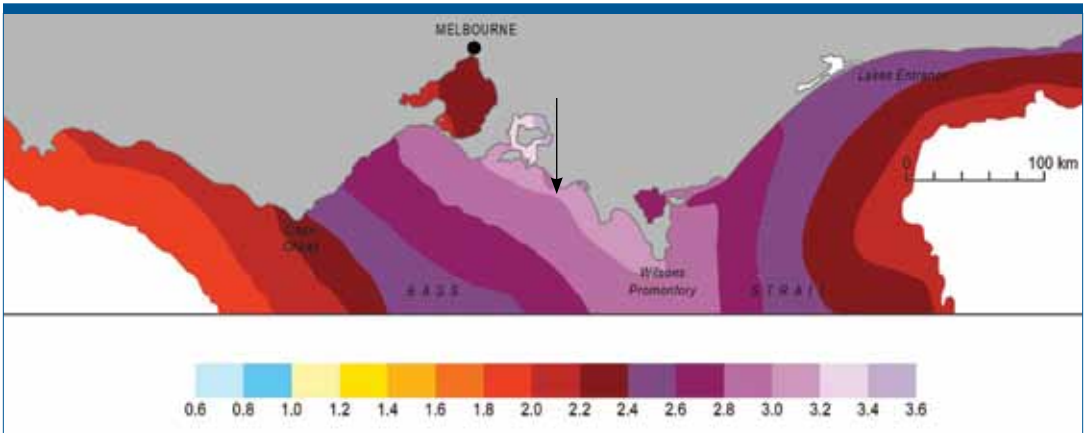
At the time, it was assumed that the drying was a phase and that wetter conditions would return (which, in fact, they did from 2010). Two years after *Our Water Our Future* got its start, the State Government of Victoria (DES 2007) determined this perspective to be tenable no longer, and it released a water plan, again marketed as *Our Water Our Future*, settling for big engineering solutions rather than focusing on domestic water tanks and recycling, as many had urged (Parliament of Victoria 2009). Australia's largest reverse osmosis (RO) desalination plant, which is designed to produce 150 gL per annum—or one-third of Melbourne's water needs—remains under construction at Wonthaggi, southeast of Melbourne, a few hundred meters away from a high wave-energy coastline.

Multiple-effect desalination (MED) combined with gas-fired, combined-cycle electricity generation, an alternative method common in the Middle East, was overlooked. Such technologies use the heat exhausted from the turbines making electricity in gas-fired power stations to generate steam that feeds a turbine to make yet more electricity. The steam then can be condensed or sent to a distillation plant to produce freshwater. Combined-cycle installations have impressive fuel efficiencies, both in desalination and in pure power generation modes.

A public-private partnership is building the RO plant near the mouth of the Little Powlett River at a site that is vulnerable to inundation. Flooding that

Figure 6.8 1-in-100-year Storm Tide Height in 2100¹ Relative to Present-Day Mean Sea Level

Source: McInnes et al. (2009; 2011).



In harm's way? CSIRO modeling suggests that the Wonthaggi desalination plant (indicated by arrow) is especially vulnerable to storm surge under conditions of rising sea levels.

1. Assumes a 19 percent increase in winds forcing the storm surge and 82 cm of sea level rise.

took place in 2007 was called a 1-in-100-year event by the state government, for example, yet it disrupted construction work when it occurred again in February 2011 (figure 6.8). Opponents have numerous concerns: the brine load; disruption of rustic values; the need to put the rejected iron chloride used in the process in a landfill; and the plant's dependency, at least in part, on power generated from brown coal. Another problem is its close proximity to the ocean on a part of the southern coast that CSIRO has identified as the most vulnerable to storm surge and sea level rise (Department of Climate Change 2009; McInnes et al. 2009; 2011).

Once the plant comes online, water prices are expected to rise 64 percent, and it is planned to continue producing water until Melbourne's reservoirs reach 65 percent capacity—a TSS level attained on 21 November 2011. When originally announced in 2007, the cost was \$3.1 billion, which rose to \$3.5 billion after farmers demanded that feeder power lines from the Latrobe Valley that cross their properties be put under ground. Then the winning consortium said that the full cost, including operating expenses, would be \$4.8 billion with financing. In late 2009 the government tabled a document showing the cost would be \$5.7 billion. Kenneth Davidson (2010, 11) observed, "even if the plant produces nothing, the government will be forced to pay under its contract \$570 million a year for 30 years. This is equal to \$3.80 a kilolitre without the supply of any water."

The government's 2007 water strategy had another key element: public-private partnerships building pipelines to move water within or between basins, known in current water parlance as a *water grid*. The key pipeline, the North-South or Sugarloaf, was conceived as an insurance policy for providing a sup-

plemental water supply until the Wonthaggi desalination plant came online. It was intended to transport water from a then-depleted Goulburn River (a tributary of the Murray-Darling) to a holding reservoir at Sugarloaf. The pipeline was predicated on a 225 gl per annum water savings further downstream in the Goulburn Valley, primarily because it was expected to eliminate evaporation and seepage losses in irrigation channels as part of a broader “food bowl” plan. The Victorian Auditor-General’s Office (2010) has since found that the government failed to demonstrate the need for this expenditure and to properly explore alternatives.

The new Minister for Water has stated that moving water through a water grid from one community to another deprives a farming industry reliant on the water in the former community, however (Walsh 2011). The government has since mothballed the North-South pipeline in favor of emphasizing water security by increasing recycling initiatives for both water and stormwater (Arup 2011). The minister also expressed concern about the water-saving estimates in Northern Victoria and asked the state ombudsman to look at the oversight and governance of the irrigation modernization project there. The ombudsman subsequently reported that the project has “an ongoing battle” with technical problems, poor contractor work, and faulty equipment (Fyfe 2011, 2).

Both the desalination plant and interbasin pipelines represent a shift to carbon-intensive solutions. Forcing seawater through ultrafine membranes or pumping raw water over mountain ranges consumes large amounts of electricity, which translates into even greater emissions and requirements for yet more water for cooling at the power stations. These energy-greedy projects are being superimposed onto existing and planned carbon-intensive wastewater treatments that are struggling to be offset by methane capture, pumping efficiencies, and other measures.

In 2007 the government at the time had maintained that the increased energy demands could be countered by renewables. In Perth, Western Australia, for example, 48 wind turbines were built to compensate for the coal- and gas-fired turbines that powered the Kwinana desalination plant. Fully operational, Australia’s fledgling RO water desalination plants could release up to 6,000 metric tons of carbon dioxide emissions from the nation’s coal-fired power stations. At this rate, wind farms hardly dent the growth in national GHG emissions.

The change from predominantly gravity-fed potable water supply via mountain dams to volt-driven processes can potentially push the water industry toward an even greater dependency on the electricity sector. That deepening connection requires new organizational approaches to keep abreast of the technological changes. But the lack of technical direction within the state government that resulted from outsourcing appears to have clouded recognition of the opportunities this presents.



The Yarra River discharges its plume of sediment and pollutants into Port Phillip Bay in the wake of massive rainfall during February 2011. Photograph © Mike Abicare.

Victoria urgently needs to retire its less efficient, dirty, brown-coal-fired stations, and the state's former Labor government had sought federal funding to decommission the Hazelwood plant. Early in 2011, however, the new coalition government abandoned that plan. Nonetheless, the introduction of a national carbon price in Australia, which will begin in July 2012, includes a request for expressions of interest by high emission power stations to offer to close down. While Hazelwood has shown interest, it has made no final decision whether to accept a closure offer. Price will play a large part, but inevitably gas base load progressively will replace existing capacity or meet additional demand through a combination of carbon price and banks' reluctance to lend to coal-fired projects.

Given that Victoria earlier faced a water deficit of considerable proportions, which was compounded with the need to move from dirty, low-efficiency, coal-fired power stations toward natural gas, it is difficult to comprehend how the Gulf states' successful model for integrating electricity generation with water making—that is, gas-fired, combined-cycle plants linked to multiple-effect distillation—could have been overlooked had it not been poorly understood. This appears to reflect the fact that energy and water policy development operate in separate silos. Upon such lines, in 2010 Australia's then-Chief Scientist Penny Sackett, referring to her report *Challenges at Energy-Water-Carbon Intersection* (PMSEIC 2010), expressed doubts as to whether budgets around the nation

for energy, water, and carbon were being dealt with holistically. She added that treating one independently could harm the others (Fisher 2011).

In the short term, at least, the existence of the Wonthaggi RO plant appears to have ruled out any consideration of an integrated installation at, say, Hastings on Western Port Bay, which has Longford gas and where brine concentrate could be sent to the Eastern Treatment Plant effluent outfall.

Nevertheless, opportunities remain for smaller water energy projects that scavenge waste heat and/or combustible gases from industrial sites, especially refineries, power stations, and gas plants, to run small MED systems—which are commonplace in ships and sugar refineries—to turn seawater or brackish bore water into process water. These alternatives could, at the same time, circumvent transmission line losses by as much as 20 percent due to the distance between the user and the base-load generator. Wind farms or wave farms, then, could be turned to other uses, thus further lowering transmission line losses. The possibilities are many and varied, and they suggest the scope of effort needed to both ensure water security and limit emissions growth.

Washed Out: Challenges and Experiences Under La Niña Conditions

Recent incidents. Record rainfall during February 2011 resulted in flash flooding in Melbourne. As much as 100 mm of rain fell within 75 minutes in some parts of the city. The impact on the Yarra River—sometimes known as “Melbourne’s No. 1 Drain,” as it threads through the metropolis and into Port Phillip Bay (Otto 2005)—was especially dramatic, with plumes of fine clay sediments as well as cigarette butts, topsoil, dog droppings, and other rubbish carried off city streets, testimony to the spread of paved surfaces. In addition, beaches experienced elevated levels of *E. coli* resulting from a pulse of sewage released from overloaded mains. The drainage authority, Melbourne Water, admitted that raw sewage was pumped into the city’s rivers during this period. The storm was subsequently recorded as a 1-in-500-year event, but drainage systems in newer areas were designed to cope with only a 1-in-100-year event—a national standard clearly in need of review. Testimony to the inadequacy of basing return intervals on past weather records when dealing with climate change was the virtual repetition on Christmas Day 2011 of the 1-in-500-year event of the previous February. Once again, less than one year later, the city was lashed by violent storms, flash flooding, and even a tornado (The Age} 2011).

Rebuilding older parts of the metropolis at a higher density is leading to vast expanses of paved and other hard surfaces that create urban heat island effects, lowered infiltration levels, and greater runoff. Drainage systems are being challenged by this creep of concrete, masonry, and asphalt—a situation not unlike that in the United States, where paved surfaces now account for an area the size of Ohio (Frazer 2005).

Policy responses. In 2005, the Victorian Auditor-General's Office (2005, 5) concluded that "there was little evidence that effective strategies had been applied to address [the] flooding risks. Because of this lack of progress, metropolitan Melbourne will continue to face significant flood-related damage." The situation has only worsened since that report, with infill housing increasing run-off volumes where hard tarmacs and roofs are displacing garden beds, turf, and trees. An architect who designed a block of three-story apartments in a middle suburb among those earmarked "to maximize development along new and future road based trunk public transport corridors" was ordered to install a large water pump in the basement car park, which would also flood, but he noted that no adequate main drain to absorb high-velocity stormwater was in place (Victorian Department of Transport and City of Melbourne 2009, 6).

A Melbourne Water report has warned that by 2030 the city's drainage infrastructure will be overwhelmed almost twice as often, and the area affected by flooding may be 25 percent larger across most parts of metropolitan area (Ker 2011). This means more of the city will be vulnerable to inundation by 2030, as the same aging drainage system struggles to evacuate water from storms that are expected to produce 30 percent more rain by 2030. Philip Pedruco and Rod Watkinson (2011, 12) conclude, "This change in rainfall intensities may have significant implications on future planning, management and infrastructure. . . . We may need to revise our infrastructure design standards, and some areas currently considered appropriate for development may be vulnerable in the future."

Policy Directions: Aspirations for the Decade Ahead

Reconfiguring large parts of Melbourne to cope with a future punctuated by severe deluges obviously is required. In particular, introducing vegetated areas would help attenuate flows, since trees and shrubs adsorb raindrops on their leaves, their roots soak up further amounts, and grass surfaces allow infiltration. More immediate responses are needed, however, which could include restricting construction of underground shops and facilities, such as car parks, and shifting auxiliary generators from basements to higher levels to lessen risks to communities, businesses, and critical infrastructure in order to aid recovery in the event of flooding. Developing a risk map of the metropolis that covers bushfire and storm surge as well as inundation, could aid in data collection.

Areas developed before the late 1970s are especially vulnerable. Their space limitations make it difficult to retrofit them with features such as retarding basins to store water and guide it into waterways and the sea—although an occasional park or sports oval might be used for the purpose. In more favorable circumstances, much of the discharged water could be harvested after the first flush and thence cleansed.

Billions of dollars will be needed to secure these older areas from the worst impacts of climate change. Unfortunately, in the contest for capital, drainage systems receive low priority compared to infrastructure that is viewed as directly boosting economic growth, such as the federal government's National Broadband Network, despite the fact that its systems can be seriously disrupted by inundation.

A public-private partnership between the government and the insurance industry that funds mitigation of riverine flooding might be adapted to address the cause of city flash flooding. Another possibility is levying an impervious-service charge, such as the one in Richmond, Virginia, and many other municipalities in the United States, "to areas that have been paved or otherwise covered with material that is resistant to infiltration by water" (Richmond Department of Public Utilities 2011).

It also has been suggested that the existing built-out city can yield large areas for renewal, and the Victorian Auditor-General's report (2005) can serve as a forewarning that substantial hidden costs associated with building out may occur in some locations. Developers who see planners as roadblocks should be made to wait while careful assessments of flood risk and storm surge under new weather conditions are studied further and become better understood. For example, Melbourne Water intends "to review the performance of the total drainage system in order to ensure its optimum capacity into the future" (City of Casey 2011).

There is no ready-made solution to protecting lives, assets, and wildlife from firestorms. A relentless urban expansion driven by strong population growth is causing the destruction of valuable habitat, the potential extinction of native birds and mammals, and the loss of food-producing land. Significant levels of densification proposed as a solution are now leading to vast expanses of hard surfaces that create urban heat island effects, lower percolation, and intensify runoff as noted earlier. Far more sympathetic treatments are possible (Fisher 2007).

In many parts of the city fringe the fire risk is so great that residential development there should be prohibited—especially in the absence of provisions for compulsory evacuation ahead of code-red conditions—and this ban ought to extend to new development and the subdivision of existing areas (Buxton et al. 2011; Gray 2010a). Moreover, the possibility of a fundamental shift in vegetation type due to more frequent, hotter blazes and global warming should oblige a more extensive government buyback of privately owned land in all high-risk areas. This should also prompt serious thinking about population growth in such places. The previous state Labor government rejected a voluntary buyback scheme proposed in the final report of the Victorian Bushfires Royal Commission (2010), while the opposition at the time, which since has become the coalition government, said it would implement that recommendation. It has now done so, but on a very limited basis by applying the scheme

only to properties affected by the 2009 bushfires, which have yet to be rebuilt, and not to other areas at unacceptably high risk for bushfires (Gray 2011a; Urban analyst 2011).

The combination of dryness and intensive population growth still besets Melbourne's water security. The Labor government had addressed this situation by building a north-south pipeline and a huge RO plant. Apart from an enormous public debt burden, however, these large-scale engineering projects move the water industry toward an even higher dependency on the generation of electricity, thus increasing its vulnerability to the kinds of power shortfalls predicted for the decade ahead. Even if renewable sources are brought into play, the reliance on electricity seems likely to increase Victoria's GHG emissions. It also highlights the need for a greater degree of integration between water making and electricity generation, which is possible with combined-cycle, gas-fired power stations through MED technologies accompanied by greater organizational integration.

A recent report by the U.K. Environment Agency (2009) suggests that water companies merge with energy producers to create more effective partnerships for tackling emissions. The conundrum for Victoria is that the generators are privately owned whereas the water utilities are public. One way or the other, the local water industry and the government clearly have some work to do if they are to lower the industry's carbon footprint in a significant way. The efficiencies arising from integration of the two sectors should not be underestimated.

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Blakely Disaster Readings

Figure 7.1 Sydney

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 7

Sydney

Alan Cadogan

Sydney's world famous harbor is at the midpoint of a metropolis that spreads for 100 kilometers (km) north and south along the Australian coast (figure 7.1). It faces a rising South Pacific Ocean to the east and a hotter, drier landscape, far from cooling sea breezes, on the sprawling inland side, which is expected to become even more sweltering as summer temperatures climb. Like all Australian cities, Sydney faces increased temperatures, variable rainfall, more frequent severe weather, and sea level rise. These climate-related changes will affect urban heat levels, coastal storm surges, bushfires, flooding, drought, water quality, biodiversity, and public health.

The Development of Sydney

Although Aboriginal people have lived in the region for an estimated 50,000 years, by world standards Sydney is a young city. In 1909 when its first metropolitan plan was formulated, virtually all of the city's population lived within a 20-km radius of the harbor downtown, and most residents lived within walking distance of jobs on the wharves and in the small downtown. New electric trams were beginning to open up the suburbs, where comparatively low land values allowed residents to acquire larger plots, but Sydney was still a small, relatively dense city (City Exhibition Space 2001).

In 1945 the New South Wales (NSW) state government established the Cumberland County Council, the city's first and only metropolitan planning authority, to address key issues including centralized employment, overcrowding in inner areas, uncoordinated subdivision, distribution of population, and lack of coordination among government agencies. Its county plan assumed a population of 2.25 million by 1980 and was inspired by British models with a greenbelt at a 20-km radius from the city center, and concentration into outer areas with no provision for satellite growth or decentralization. Following the massive postwar migration over the 1950s, the plan essentially was abandoned. By 1967, Sydney's population was 2.5 million, and growth rates suggested it would reach 5.5 million by 2000 (City Exhibition Space 2001).

Major shifts in the Sydney economy during the late twentieth century saw it move away from blue collar toward white collar jobs, which tended to

be less centrally located, while road-based private transportation began to be preferred over public transportation. Despite numerous planning schemes aimed at reducing sprawl and linking housing to employment centers and public transport during this period, successive governments have abandoned each plan. They have preferred to release new land on the city's outskirts for development and to prioritize infrastructure funding toward road projects. The result is a sprawling city with a geographic area equivalent to that of Greater London, but with only half as many people.

Recent decades have seen a significant turnaround in attitudes about the increasing desirability of inner-city living, but Sydney remains predominantly suburban. Like most Australian cities, its self-image is based on low density and an ingrained opposition to urban consolidation and higher-density living, both of which present major challenges to the city's long-term sustainability.

The current *City of Cities* metropolitan plan predicts that Sydney's population will increase to 5.3 million by 2031, thus requiring an extra 640,000 new homes and 500,000 new jobs (Department of Planning NSW 2005). The plan concentrates growth in existing centers to meet the target of ensuring that Sydney's residents do not have to travel more than one hour a day for jobs and other services. More than half of the new dwellings are to be accommodated in existing developed areas. In 2010 the plan was reviewed in the context of increasing federal government interest in planning Australia's major cities. Early indications suggest that Sydney's densification, while gradual, is progressing at a higher rate than the plan anticipated. It is unclear, however, whether this is an emerging trend or merely a result of other factors. The absence of effective metropolitan planning, infrastructure coordination, and governance in Sydney and, indeed, in most Australian cities, is actively debated across all states' capital-city communities and governments as well as nationwide (box 7.1). Despite this plan, the new state government, which received an overwhelming mandate for change in the March 2011 election, has already signaled a lower density target for the existing developed areas of the city and a greater proportion of growth at its fringe.

Recent Climate Change Trends and Predictions

Since 1950, Sydney has experienced warming of around 0.8°C overall and a drop in annual rainfall at a rate of approximately 55 millimeters (mm) per decade. The Commonwealth Scientific and Industrial Research Organisation (CSIRO 2007b, 5) noted that "although changes in average temperature, rainfall, and evaporation will have long-term consequences for [Sydney], the impacts of climate change are more likely to be felt through extreme weather events. Projections suggest that there will be more hot days, bushfires, droughts, and intense storms." By 2050 Sydney is projected to be hotter during every season, with the greatest warming in winter and spring. Maximum daytime and minimum overnight temperatures are expected to rise 2°C to 3°C (DECC 2008).

Box 7.1 Sydney's Urban Structure and Governance

Area	
Location	Eastern coast of Australia, 35°S latitude
Built-up urban area	1,687 km ² (ABS 2010)
Total area (includes national parks and undeveloped land)	12,145 km ² (ABS 2010)
Demography	
Population (2008)	4.4 million (approximately 20% of Australia) (ABS 2010).
Density (built-up area)	2,058 people per km ² (ABS 2008)
Economy	
Estimated GDP	\$172 billion* (Infrastructure Australia 2010)
Governance	
Provincial government	Authority: State of New South Wales Key responsibilities: public transport, health, education, roads, police, water and energy utilities, major infrastructure, metropolitan planning
Local government	Authority: 38 local councils Key responsibilities (delegated by NSW government): land use planning, local place management, local traffic management, waste management, delivery of local services
Metropolitan government	Authority: None The NSW government administers most citywide activities. Metropolitan representation is by the premier of NSW and the lord mayor of Sydney (leader of the City of Sydney Council representing 26.15 km ² centering on Sydney downtown), depending on the context.
Physical	
Geography	Sydney occupies a coastal basin that measures approximately 60 km east-west and 100 km north-south; it is contained by low mountains to the south, north, and west. It has two main geographical regions: the Cumberland Plain, a relatively flat region to the south and west of the harbor; and the Hornsby Plateau north of the harbor, which rises as much as 200 meters (m) in elevation, and is dissected by forested valleys.
Structure	Sydney's downtown extends about 2 km south from Sydney Harbor, the point of the first European settlement in 1788 and the city's dominant economic and cultural center. Other centers developed in a radial pattern during the twentieth century, and a multicentered urban form is emerging. Sydney has 300 suburbs. Demographically and geographically, the city center is situated around 15 km west of downtown.

* Dollar amounts are in Australian currency, unless indicated otherwise.

Interactions with complex regional climate systems make the effects of future warming on Sydney's rainfall patterns difficult to predict (Garnaut 2008). El Niño remains the greatest wildcard when projecting the future climate of eastern Australia. CSIRO (2007b) notes that it is difficult to distinguish between natural variability and any contribution of human activities in understanding Sydney's declining rainfall. Within an overarching trend toward drier conditions, rainfall projections are variable, with increases in extreme rainfall likely. Generally, rainfall events are expected to become slightly larger and separated by longer dry spells. Rainfall across metropolitan Sydney is projected to increase by 20 to 50 percent in summer, with a smaller increase in spring, and a projected decrease in winter (DECC 2008). Even if future rainfall is at the higher end of the predicted range, higher temperatures will exacerbate evaporation, which will result in overall drying and loss of soil moisture.

Sea level rise on the NSW coast is expected to increase by 0.91 m by 2100. This includes global sea level rise (0.18 m to 0.59 m), ice flow melt (0.2 m), and effects of the East Australian Current (0.12 m) (CSIRO 2007a). The debate continues, however, regarding the likely extent of sea level rise. While predictions indicate a moderate rise, a disproportionately large corresponding increase is expected for inundation and flooding from high tides and storm surges.

Climate models for Sydney's rainfall indicate the potential for both increases and decreases, so despite these trends and predictions, considerable uncertainty exists. Temperature forecasts generally engender greater confidence than projections for sea level rise and rainfall. Confounding the overall warming trend, for example, 2008 was notably cool in Sydney (BOM 2008). For other climate impacts there is simply a lack of reliable information (table 7.1). On a regional level, there is little or no detailed information about the frequency and severity of storm surges, rainfall extremes, drought, hail, or links to local extremes such as air pollution and flood. It should be noted that whatever climate change scenarios are adopted many IPCC climate change projections to date appear to have underestimated the speed and extent of change.

Community Attitudes Toward Climate Change

Australia's largest-ever community protest for action on climate change was held on 12 November 2009, when an estimated 90,000 people took part in a Walk Against Warming in every major city, including 15,000 marchers in Sydney. But apart from large public gatherings, direct evidence of support for action on climate change is lacking. The recent long drought in Sydney highlighted community concerns about the environment, particularly water issues; however, it is unclear if the community perceives any link between the drought and human-induced climate change.

Table 7.1 Current and Projected Climate Change for Sydney

Source: CSIRO (2007a and 2007b); DECC (2008); Greening Australia (2008); and Preston et al. (2008).

	Present (1990)	2030	2070
Average maximum temperature (July–January)	17–26°C	+0.2–1.6°C	+0.7–4.8°C
Days above 35oC per year	3	4–6	4–18
Days above 40oC per year	0	0–1	1–4
Days below 0oC per year	0	0	0
Sea level rise (cm)		+3–16	+7–50
Average rainfall	1,094 mm	–13% to +7%	–40% to +20%
Extreme rainfall	—	–3% to +12%	–7% to +10%
Summer rainfall (2050)	—	+20–50%	
Winter rainfall (2050)	—	+5% to –50%	
Extreme Winds	—	–5% to +8%	–16% to +24%
Evaporation	—	+1–8%	+2–24%
Droughts per decade	3	–1 to +2	–2 to +6
No of Fire Days			
(high or extreme)	9	9–11	10–15
Solar radiation (Sydney Coastal Councils)	—	–1% to +2%	–3% to +6%

In the lead-up to the December 2009 United Nations Climate Change Conference in Copenhagen, the Danish government initiated a global citizen’s consultation across 38 countries. The Australian consultation, held in Sydney, involved 105 citizens, all randomly selected based on their representative demographic characteristics; 13 of them were from Sydney (Atherton and Herriman 2009). The results from Australia indicated that 75 percent of its citizens are very concerned about climate change and a further 20 percent are fairly concerned. In addition, 89 percent supported emission reduction targets by 2020 that were within or above the IPCC recommended range of 25 to 40 percent.

For its Sustainable Sydney 2030 vision, in 2008 the city council conducted its own survey, focusing on Sydney’s downtown area and surrounding suburbs. This survey considered community attitudes on a range of issues that included climate change and sustainability (City of Sydney and SGS Economics and Planning 2008). Broadly agreeing with the UN-sponsored consultation, the survey’s findings showed that:

- 97 percent of all participants, and 97 percent of the residents surveyed in the city council local area, believe that reducing greenhouse gas (GHG) emissions is an important target for the next 20 years; and

- 62 percent of city council local area residents believe that climate change is a threat to the city, and a further 28 percent feel that, while it is not currently a threat, it will present one for future generations if nothing is done.

Although it appears that Sydney's citizens are concerned about climate change, there is no consensus about what should be done on an individual, metropolitan, or national level. It is also unclear how much Australians are prepared to pay for climate change mitigation and adaptation measures.

Climate Change Issues for Sydney

The majority of the Sydney metropolitan area faces some impact—and in many cases multiple repercussions—from climate change. While coastal communities are particularly vulnerable to sea level rise and storm surge events, urban-fringe communities are particularly vulnerable to the effects of bushfire and heat-related health effects. Vulnerability varies not only from suburb to suburb but from household to household as well (Preston et al. 2008).

CSIRO (2007b) identified climate change impacts for metropolitan Sydney under four broad headings: water, farms, biodiversity, and forests and communities. A study for the region under the jurisdiction of the Sydney Coastal Councils Group (SCCG) examined five impact areas: extreme heat and health effects, sea level rise and coastal management, extreme rainfall and stormwater management, bushfire, and effects on ecosystems and natural resources (Preston et al. 2008). While to varying degrees Sydney is exposed to each of these climate adaptation issues, this chapter focuses on the challenges of heat waves and sea level rise.

Extreme Heat

Among climate-related hazards, extreme heat events arguably are the leading cause of mortality in the developed world. Largely due to their diminished thermo-regulatory capacity, older people, infants, and small children are considered high-risk groups for heat-related morbidity and mortality. Benjamin Preston and his colleagues estimated that due to heat-related causes approximately 176 individuals aged 65 or older were likely to die each year in Sydney, or roughly 40 people per 100,000 (Preston et al. 2008). Significantly, despite widespread findings that elderly individuals are more sensitive to heat events, the team found that “mortality does not simply occur in individuals where death was otherwise imminent, but in generally healthy individuals that would have been expected to continue living for years in the absence of the heat event” (Preston et al. 2008, 21).

Climate change is projected to cause significant increases in both the frequency and duration of periods of high temperature in Sydney. As a result, the region may be one of the more sensitive of Australia's cities to increases in heat-related mortality. It has been estimated that, by 2030, the number of days

during which Sydney will experience temperatures above 35°C will double, and it will increase six-fold by 2070. Rosalie Woodruff and her associates projected that this would increase the annual heat-related death rate among people 65 and older from 70 to 239 per 100,000 individuals. When combined with Sydney’s population growth, this data suggests the potential for 432 to 1,042 premature deaths due to heat waves by 2100 (Woodruff et al. 2005).

Western Sydney is particularly exposed, because it does not receive the cooling sea breezes that moderate the city’s eastern coastal suburbs. When Greening Australia (2008) analyzed climate records from Prospect Reservoir (Western Sydney) and Observatory Hill (Coastal Sydney), it found that temperatures for Western Sydney have increased at more than twice the rate experienced by coastal suburbs or expected from global warming (figures 7.2 and 7.3).

Figure 7.2 Mean Maximum Temperatures in January for Sydney and Western Sydney, 1965–2007

Source: Greening Australia (2008).

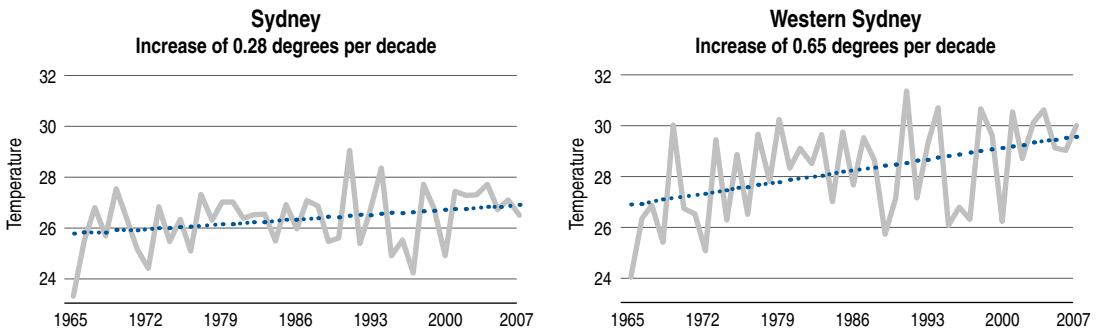
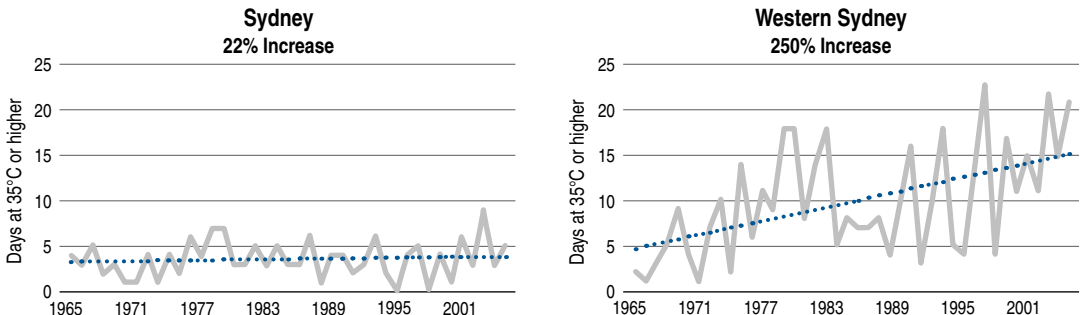


Figure 7.3 Number of Days per Year with Temperatures Greater Than 35°C in Sydney and Western Sydney, 1965–2002

Source: Greening Australia (2008).



Blakely Disaster Readings

Late in the summer of 2011 Sydney experienced its longest, hottest heat wave since records began to be kept in 1858. For more than six nights, the minimum temperature did not fall below 25°C, while daytime maximums for seven days remained above 30°C, peaking at 42.2°C. Richmond, in Sydney's northwest, broke its own record with eight days straight of temperatures at 35°C and above. Nocturnal discomfort peaked on the early morning of Sunday, 6 February, when a new overnight record for the warmest night in Sydney's history was set—the temperature fell to just 27.6°C. This heat wave was two days longer than the previous record-setting one. The Ambulance Service of NSW told news media including the Nine MSN news service it had responded to 190 heat-related calls over the course of the heat wave (McGrane and Godfrey 2011; The Age. 2011).

An urban area's thermal environment is highly complex due to the various types of land use, building materials, and infrastructure associated with its landscape. *Urban heat island effect* is a term used to describe localized warming due to urban development and the increase in large amounts of paved and dark-colored surfaces, such as roads, roofs, and car parks. Rather than reflecting the sun's heat, these surfaces absorb it, which causes surface and ambient temperatures to rise. Anthropogenic heat production, such as that from engines, electrical appliances, and air conditioners, also contributes to the urban heat island effect.

A thermal image made between 1:00 and 5:00 a.m. (figure 7.4) encompasses Sydney's downtown area and its surrounding inner suburbs. It clearly compares heat effects brought about by significant areas of dark-colored tarmac, such as major roads and the large port on the western edge of the city center, with those that characterize vegetated areas and white-roofed buildings. Even after several hours of darkness, these darker areas remain up to 7°C hotter than other areas. John Clarke (1972) found that this effect leads to a nighttime impact of urban heat islands that may actually be greater than maximum temperatures during daytime because higher overnight temperatures do not allow exposed individuals respite from heat. The tendency for higher temperatures, particularly during nighttime, in the more densely developed areas is also found in other cities, such as in Melbourne (Coutts, Beringer, and Tapper 2007). During the 2011 Sydney heat wave, Australia's Bureau of Meteorology figures confirmed the effect, with temperatures in downtown Sydney registering between 1°C and 2°C higher than those at suburban weather stations.

A study of housing health and safety in the United Kingdom found that heat-related mortality was restricted largely to individuals housed in multiple-occupancy structures, with those living on the top floor particularly at risk (Office of the Prime Minister 2003). These findings suggest that as Sydney's density increases in response to the significant sustainability issues arising from sprawl, a considerable risk of exacerbating extreme heat effects of climate change will increase.

Sea Level Rise

Projections of future sea level rise vary considerably depending on which method is utilized to generate estimates (e.g., global climate modeling simulations, empirical assessment of observations and trends, or paleoclimatic analogy). The various components of sea level rise incorporated (e.g., thermal expansion, ice sheet mass balance, and ice sheet dynamics) are also important considerations. Regionally, sea level rise also may vary significantly from global averages. For example, recent sea level trends around the Australian continent have been significantly higher than the global average (Parliament of the Commonwealth of Australia 2009).

Rising sea levels will increase rates of erosion along susceptible stretches of coastline and progressively inundate low-lying areas. The most significant effect of rising mean sea levels will arise during extreme storm conditions, when strong winds and falling pressure bring about temporary, localized increases in sea level known as storm surges. Those that occur when mean sea levels are higher will enable inundation and damaging waves that penetrate farther inland, causing increased flooding and erosion and subsequent detrimental impacts on built infrastructure and natural ecosystems (Garnaut 2008).

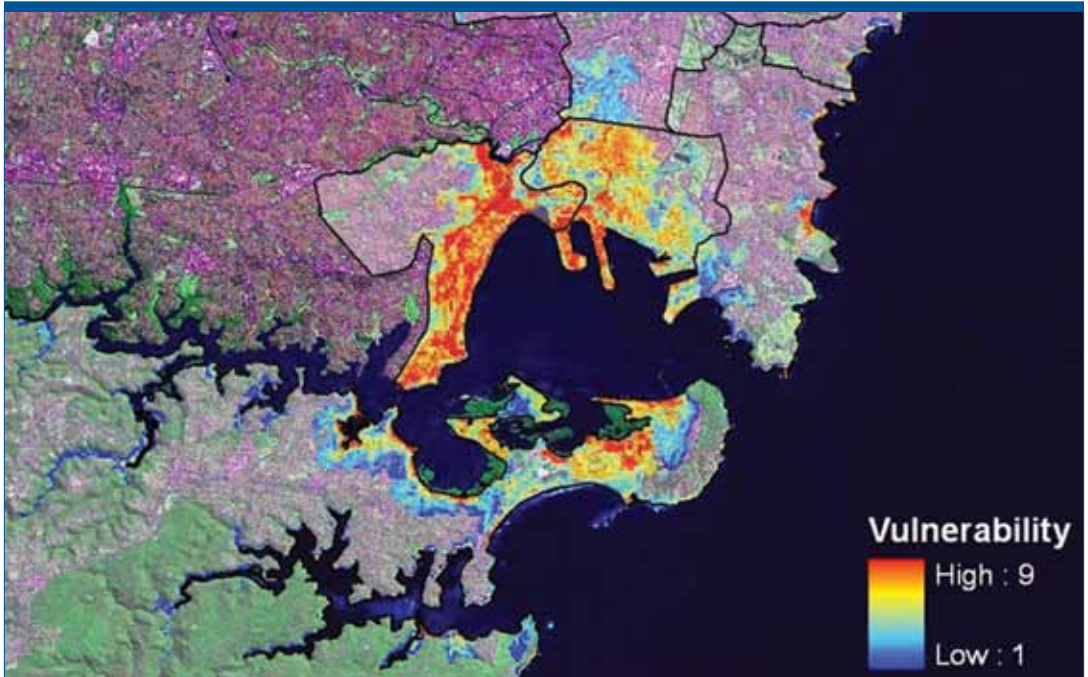
Coastlines' sensitivity to sea level rise and other coastal hazards are highly variable, but their landscape and topography are important factors. The proximity of infrastructure and assets to affected areas is also key. The Department of Environment and Climate Change (DECC 2008, 3) for NSW has recognized that Sydney "has a heavy density of residential and commercial beachfront developments that may be threatened by either ocean inundation or sea level rise induced recession. Settlements adjacent to estuaries and beaches are the most vulnerable." Within the Sydney metropolitan area (Newcastle to Wollongong), 46,000 addresses are identified as being within 1 km of the shoreline and at elevations lower than 3 m (Parliament of the Commonwealth of Australia 2009).

Many of Sydney's critically important cultural, economic, or tourism assets, including the Sydney Opera House, its major oil refinery, and 70 harbor and ocean beaches, such as the world famous Bondi Beach, are potentially threatened by sea level rise and storm surge events. The entire airport, Australia's most significant tourism infrastructure asset, is vulnerable, but its third runway, which was built on reclaimed land only 3 m above sea level and exposed to severe weather on Botany Bay, is at particularly high risk.

In 2009 the Department of Environment and Climate Change estimated that coastal flooding, erosion, and other hazards could cost the NSW government \$200 million annually (Parliament of the Commonwealth of Australia 2009). Sea level rise is likely to exacerbate these costs significantly.

Figure 7.5 Coastal Vulnerability for Selected Areas Within the Sydney Coastal Councils Group Region

Source: Preston et al. (2008, 48).



In Sydney's northeastern suburbs, at Collaroy and Narrabeen beaches, coastal erosion is estimated to be as much as 22 meters as a result of a sea level rise of only 20 centimeters. That rises to 110 m in the event of a 1-in-50 year storm surge, with associated economic losses of \$230 million (Parliament of the Commonwealth of Australia 2009).

Preston et al. (2008) analyzed the Sydney coastal region in order to determine its net vulnerability to sea level rise (figure 7.5). They found high vulnerability to be a function of multiple challenges, including topography, levels of development, and adaptive capacity.

As a consequence, assets, infrastructure and coastal amenities (e.g., beaches) in vulnerable areas must be carefully managed in the future to protect both development and amenity. To this end, local governments' adaptive capacities and their ability to partner with each other and state government to achieve management goals may be particularly important. (Preston et al. 2008, 46)

Current Policy Responses

Public Sector Approaches to Climate Change

Even though all levels of government in Australia are coming to recognize climate change as a critical issue, relatively few of their actions in Sydney can be characterized specifically as adaptation to climate change. A 2008 study by the Australian Network of Environmental Defender's Offices identified only seven pieces of legislation at the national and NSW levels that mention climate change (Parliament of the Commonwealth of Australia 2009).

Despite this lack of direct regulation, many existing programs and policies contribute to addressing climate change by means of the broader themes entailed under the heading of sustainability. For example, even though it is not a primary aim of the policy, the NSW government's building code for residential design will help to address extreme heat from climate change through more efficient building design. Similarly, coastal dune protections undertaken since the 1980s to effect sand-erosion mitigation and biodiversity protection at NSW beaches also will help protect against storm surges. Responses to flood management, bushfire, and storm surges already occur, but few of them have been characterized as adaptations to climate change. For Sydney, however, most adaptation responses are likely to involve changes in degree of actions already underway rather than the institution of new actions.

The NSW government's approach to reducing the impacts of climate change is outlined in its greenhouse plan and state plan, and in the climate change action plan it is developing currently. In general, policies are geared toward mitigation rather than adaptation. This reflects recognition of the need to respond to the causes of climate change as well as uncertainty concerning the degree of adaptation measures that might be required. NSW is also working through the Council of Australian Governments, which includes the eight Australian state and territory governments and the national government, to define the scope of national reform required to meet the challenge of adaptation to climate change and identify actions within priority areas.

While cooperation between jurisdictions in Australia is laudable, lack of clear direction at a national level is still considered a problem. A jurisdiction-wide focus on activities, often politically driven and lacking a regional specificity, tends to take hold at the state level, and it often ignores the economic, population, and environmental significance of metropolitan Sydney. As a result, coordination of both mitigation and adaptation policies for metropolitan Sydney is often fragmented or absent.

Sydney's local government is charged with responsibility for preparing a range of legally binding statutory planning and land management schemes, including land use plans, codes, and regulations within the state-governed frameworks that can be primary areas in which climate change policy is delivered. Most of the city's local government councils have incorporated some

form of sustainability into their land use plans and regulations. They address both mitigation and adaptation actions and are triggered when the councils grant planning consent for development.

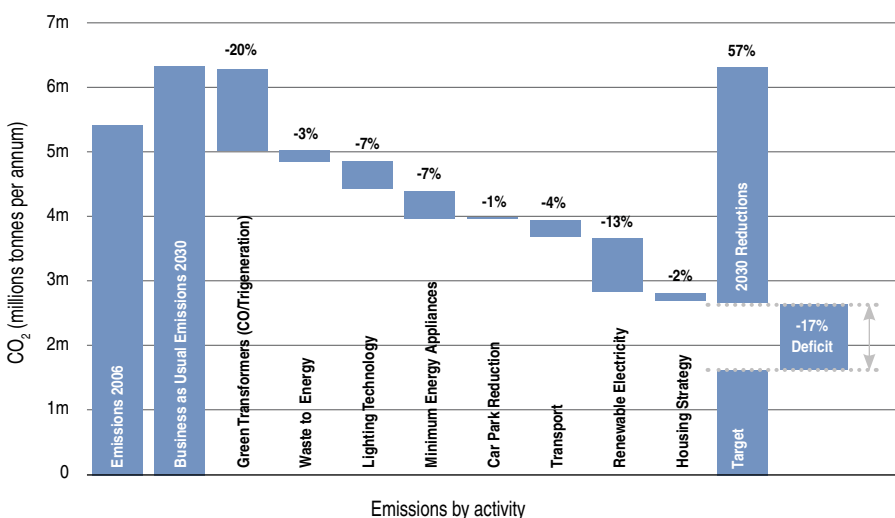
Many existing actions by local government, such as planning and management of flooding, bushfire, and drought, are adaptation actions, even though they are not characterized as such. Many Sydney councils have focused other projects or policies toward climate change mitigation. The total number would be too numerous to list, but one key example is Randwick City Council, which initiated a carbon-trading scheme with other councils. In another case, the councils of North Sydney, Parramatta City, and the City of Sydney began CitySwitch, an energy efficiency scheme for office tenants that since has been adopted nationally.

Taking a leadership position in the city’s climate change debate, the City of Sydney Council (2008) completed its Sustainable Sydney 2030 vision for the metropolitan region to be green, global, and connected by 2030. Following the largest public consultation ever undertaken there, the work included a broad spectrum of initiatives and objectives that address all aspects of city life and maintain a focus on sustainability. Significantly, the council took an ambitious position in climate change abatement by committing to a 70 percent reduction in GHG emissions from 2006 levels by 2030 (figure 7.6).

Nevertheless, this work by the city council, though significant in terms of its leadership role and empirical contribution, affects just a small part of metropolitan Sydney, whether measured by area or population. It appears that many local governments within Sydney have felt obliged to act locally despite the absence of consistent guidance from national and state governments. Given

Figure 7.6 Sydney’s 2030 Emissions Reductions Goals

Source: City of Sydney Council (2008).



the comparatively low level of resourcing available to most Sydney local governments and their small areas, this is problematic. The better-resourced councils have tended to fill the policy gap and do the best they can for their communities. While this can lead to innovation and healthy competitive policy, there is often little or no consistency between councils' efforts and an ineffective, inefficient utilization of public resources from a metropolitan viewpoint.

Private Approaches to Climate Change

Private sector approaches to climate change in Sydney lack documentation. As Ross Garnaut (2008, 364) suggests, "some may expect that government can, and should, protect the community from climate change by implementing the right strategy, program or initiative to allow Australians to maintain established lifestyles. This is not a realistic expectation." It is clear, at least anecdotally, that the climate policy leaders are those multinational corporations or prominent local businesses with self-imposed environmental policies and targets they have derived due to a sense of corporate citizenship and individual responsibility.

Even so, when it comes to climate change the majority of the private sector, as it wrestles with shorter-term investment return horizons, appears to be reactive rather than proactive. The Property Council of Australia and Insurance Council of Australia are among the organizations that represent businesses involved in the development of climate change policy nationally and locally. While other businesses, particularly those responsible for significant emissions, typically oppose policy reform, private sector responses are highly variable. In 2010, for example, as the new national government came to power with a platform including emissions reductions, Australia's largest mining company came out in favor of establishing a carbon price. Perhaps the only unifying element to the debate is that businesses apparently want certainty about the price of carbon. How they may adapt to climate change, other than through mitigation, however, does not feature in current public dialogue.

It appears in many cases that individuals acting alone or as part of small groups are most involved in climate change adaptation. They may choose to invest in energy-efficient housing with environmental features, such as passive solar design; locate farther from shorelines in response to potential inundation threats from storm surges; or introduce land management practices, such as back burning or clearing around property assets to reduce fire risk. There is very little evidence, however, on which to draw any firm conclusions about these activities collectively. Anecdotally it appears that, while many people are personally concerned about climate change, few have any clear idea about how it will affect them and what they might do to adapt.

Adaptation Responses to Extreme Heat

Sydney's two major climate change issues of extreme heat and sea level rise require very different responses. Extreme heat, though more pronounced in Western Sydney, is not primarily location specific. It affects individual health rather than infrastructure and varies according to local issues, such as tree canopy extent, dwelling design and construction, access to resources, and adaptive technologies (e.g., air conditioning). The current adaptation responses for extreme heat in Sydney include urban heat island mitigation, adaptive design, adaptive technology, and community education and communication.

Urban heat island mitigation. Several simple policies and programs can address the causes of the urban heat island and have measurable impacts on lowering temperatures at a local level.

- Increased tree cover. Vegetation is a low-cost natural cooling mechanism that works through both shading and evaporative cooling and offers ancillary benefits to biodiversity, water quality, and recreation. Improved tree cover can be achieved by increasing vegetation in open spaces, streets, and new developments, and by installing green roofs. Tree placement should maximize shade on building walls and roads.
- Subdivision street design. Orientation of streets within a subdivision affects how much they are exposed to sunlight as well as the amount of heat they absorb. In summer streets running east to west essentially receive sun exposure all day, whereas angled alignments maximize shading.
- Light-colored roofs and paving. Surfaces with high albedo and thermal emittance (white and other light colors at the simplest level) reflect, rather than absorb, a greater proportion of energy from sunlight and can reduce temperatures significantly, especially in mid- to high-density developments.
- Minimal energy use. Heat is the end result of all energy used in cities, whether electrical, mechanical, or for lighting or transportation. Directly reducing the use of energy decreases urban heating.

The absence of broad-scale recognition of the urban heat island effect as an issue is the greatest impediment to implementation of mitigation policies. While some planning policies and guidelines in Sydney include urban heat mitigation measures, despite their comparatively low cost, no overall coordination of these efforts has been attempted.

Adaptive design. Building designs that include higher-quality passive solar design and energy efficiency play a significant role in improving both sustainability and interior environmental quality.

In 2000 the NSW government released the Residential Flat Design Code, a set of guidelines that provides benchmarks for better practice in apartment planning and design. Applying this code is intended to help achieve (1) environmental sustainability benefits, including improved energy efficiency and narrow building dimensions to enhance natural ventilation and daylight; (2) improved residential amenities, such as higher ceilings, better layouts, and quality outdoor living spaces; and (3) higher design quality to improve the presentation of the building to the street. While not specifically a climate change initiative, the guidelines and their enforcement through planning codes are part of a significant mechanism for adapting to extreme heat as well as mitigating GHG emissions.

Adaptive technology. While improved building design will assist in lowering indoor temperatures, sometimes significantly, during extreme heat, this benefit will diminish as heat wave duration increases. In many cases air conditioning will be the primary adaptation to reduce indoor temperatures significantly, but the use of energy-hungry air conditioning systems comes at a high financial cost and will have additional impacts as a significant component of increasing total electricity consumption at times of peak loading. While peak electricity demand does not directly impact GHG emissions, it drives investment in new network and power station capacity. Once this investment in additional capacity is made, powerful commercial pressures to maximize returns on this investment take hold and often are accompanied by aggressive selling of energy outside the peak. As a result, in a context of coal-fired electricity generation such as Sydney's, this adaptive response will increase GHG emissions both directly and indirectly, which initiates a climate change feedback loop.

Community education and communication. Community awareness of the risks associated with extreme heat appears to be lacking, even though such events have become increasingly common. Even experienced disaster managers express surprise at the fatality rate attributed to heat waves compared with those for cyclones and floods (Granger and Hayne 2000). Currently, Australia's Bureau of Meteorology does not issue specific heat wave warnings, though at times of extended hot weather advice concerning the dangers of heat stress will be included in normal weather forecasts. The use of more formal heat wave community messaging in Sydney and elsewhere is likely to become more common.

For example, the Central Coast Heatwave Pilot Project, which includes an early warning system and staged media releases, was developed to prepare the area north of Sydney for heat wave conditions that continue for three days or longer. The project ran from September 2007 to the end of March 2008, but that period happened to be a cool and wet summer despite the occurrence of

heat waves in other regions of Australia. Thus the heat wave plan was never activated (LGSA 2010).

An alert system to combat heat extremes for Melbourne has been proposed by Neville Nicholls, a professor at Monash University, and the Victorian Department of Human Services. If the average of the predicted maximum temperature on one day and the predicted minimum temperature for the following morning exceeds 30°C, a heat alert would be issued to the public, local authorities, ambulance services, and other health and welfare organizations. The alert would warn of serious health risks and advise simple responses to circumvent heat stress, such as drinking plenty of water, using a fan, wearing light and loose-fitting clothing, and avoiding unnecessary exertion. The alert system could also include responses that would assign increased ambulance and hospital resources during hot conditions and advise citizens to check on elderly relatives or neighbors.

Adaptation Responses to Sea Level Rise

Unlike extreme heat, which affects an individual's health, sea level rise is location specific and has direct consequences for infrastructure. Even though its greatest impact is likely to be on coastal Sydney, with such major economic assets as the financial center, port, and airport located close to sea level, repercussions will be spread over the entire city. Management of disaster responses and emergency recovery has a clear role to play in sea level rise, as do long-term land use policies that include contentious issues, such as planned retreat, where the most susceptible land is abandoned over time in response to increasing risk. The current adaptation responses for sea level rise in Sydney include risk-appropriate land use and emergency and recovery management.

Risk-appropriate land use. Gradually, coastal adaptation practices are being developed and implemented across Australia. They follow a general methodology of protect, redesign, rebuild, elevate, relocate, and retreat (Parliament of the Commonwealth of Australia 2009). If applied consistently over time, these practices will deliver a coordinated response to sea level rise. Byron Shire, in the far northern region of NSW, for example, has a long-established policy of planned retreat for certain beach compartments within its area, but its council has noted difficulties in implementing aspects of it due to a lack of statutory support (Parliament of the Commonwealth of Australia 2009). Work on implementing adaptation for coastal Sydney is not well advanced.

The frequency and severity of storm surge events may have significant influence on how orderly any rebuilding, relocation, or retreat can be. Garnaut (2008, 379) states: "By 2100 under a best-estimate no-mitigation case, measures for coastal protection may not be adequate to withstand the damaging impacts of climate change on buildings. The relocation of industries, activities

and households away from certain coastal areas may be the only available adaptation response.”

Governments in Australia currently do not provide compensation to the owners or potential developers of land affected by bushfires, coastal hazards, or flood risks, except for some reimbursement and other payments that may be made in relation to an emergency or disaster. Recompense is not provided for any impact on property titles due to erosion or sea level rise. So far, impacts have been gradual, affecting individual landowners rather than entire communities. As more land is affected by rising sea level, however, pressure will mount to see this become a community issue rather than one solely resting with individuals.

Emergency and recovery management. This should be an infrequent and last-stage adaptation. Consistently implemented, risk-appropriate land use policies should manage exposure to storm surges and sea level impacts. In their absence, however, emergency recovery increasingly will become a front line response.

Through various national agencies, the Australian government has comprehensive arrangements in place for disaster and emergency management. The Department of Environment and Climate Change, for example, currently is updating policies to take into account severe weather and storms due to climate change. The NSW government also provides emergency management support during and following major environmental and weather related events, such as bushfires, floods, and major storms. Both state and national governments may provide limited assistance and other payments in response to an emergency or disaster. As the frequency of coastal inundation and damage from storm surges increases, however, and presently rare events become common, it is unclear how the governments may respond in terms of disaster recovery.

Policy Directions for Sydney

Garnaut (2008, 363) warns that “mitigation will come too late to avoid substantial damage from climate change.” Despite significant uncertainties, the consensus appears to be that climate change will increase the severity and frequency of existing impacts. Extreme events that earlier might have been expected to happen once in 100 years will occur more frequently. In some cases, such as coastal flooding with a half-meter sea level rise, such events may begin to come about several times during one year (Parliament of the Commonwealth of Australia 2009). Accordingly, management practices and plans will need to be adapted for the changing climate. The framework under which these adaptations occur will need to move toward a probability-based risk management approach rather than remaining rooted in traditional planning approaches based on certainty and presently relevant benchmarks.

Uncertainty about the magnitude of extreme events will result in the management of emergency and recovery services moving into the front line of adaptation. Sydney's emergency response and recovery agencies will require ongoing best practice review and capability development as the nature of extreme weather events due to climate change continues to emerge. A key action is assessment of whether provisions for responding to extreme heat events, storms, and coastal flooding are adequate, given current climate change scenarios. These appraisals require the continual updating of data upon which the risk is assessed and the disclosure of that risk to communities.

Financial and technical resources may enable communities in and around Sydney to assess risk and develop hazard-management plans, such as construction of sea walls, beach nourishment, conservation easements, stormwater retention, and water-sensitive urban design. In general, as the value of the affected land area rises, the likelihood that protective measures will be taken also increases. But significant future costs potentially are associated with protecting assets and ultimately moving entire settlements. An enormous range of approaches to the issue of how such risk-appropriate land use mechanisms should be implemented exists. In particular, it is unclear under what circumstances hard engineering solutions should be preferred to changed land uses and other approaches, and when planned retreat should be required.

An overarching question is, Who will pay for mitigating climate change impacts? Such improvements often involve significant expense for the construction and maintenance of protective infrastructure. Should the benefit flow to individuals and individual property owners rather than to the public? It is unclear at what scale climate change becomes a public rather than a private issue.

Unintended policy consequences will come about as the climate changes. Urban density in Sydney should be increased to reduce the GHG emissions and ecological footprint of the city, but urban heat island effects worsen as density increases. Policies must be integrated across the entire range of mitigation and adaptation issues. In the case of extreme heat, for example, increased density must be accompanied by policies that provide greater tree canopy in dense areas and also incorporate light-colored roofing. This will challenge current systems, particularly where the mitigating action occurs in a separate location from a development, or where incentives are split, such as when tenants' investments lead to landowners' savings, or vice versa.

Often responsibilities for different decision-making events are divided among a number of levels of government and agencies. For planning and design of near-term hazard mitigation activities to be robust, they must consider long-term implications of climate change, which political considerations, budgetary constraints, or simply lack of awareness among decision makers may complicate. The fragmentation of government across metropolitan Sydney is a barrier to coherent and consistent approaches to climate change adaptation.

Blakely Disaster Readings

Australian governments do not have good records for working cooperatively on urban issues. Increasing congestion, decreasing affordability, aging infrastructure, environmental degradation, and a vulnerability to external forces are some of the results. The situation is improving, however, as the following tentative signals indicate.

- The federal government has set up a major cities unit that is more directly engaged with cities and infrastructure and is intended to work toward a national urban policy.
- The NSW government is refocusing on municipal planning and delivery of metropolitan-scale infrastructure in Sydney.
- Through plans such as the City of Sydney Council's Sustainable Sydney 2030, local government is strengthening its links to the community. The residents' vision, voice, and support are fundamental to ensure that change in the form of policies, programs, and projects are appropriate and shared.

Even in instances where governments are motivated to intervene, Garnaut (2008, 363) questions their capacity.

In many instances, centralised government will lack the agility to orchestrate a differentiated response with the necessary precision to address local needs. The informational requirements of government would be extreme and costly. It is unlikely that an intrusive or directive approach to adaptation would be as effective as one motivated by local interests. . . . The appropriate adaptation response will always depend on a range of local circumstances. Therefore, unlike the mitigation effort, adaptation is best seen as a local, bottom-up response. Households, communities and businesses are best placed to make the decisions that will preserve their livelihoods and help to maintain the things they value.

New Orleans had to undergo the traumatic catastrophe of Hurricane Katrina for these imperatives of cooperation to be recognized. Sydney is not immune from such a calamity. Our challenge is to integrate and cooperate now and avoid the need for a disaster as the catalyzing precursor for change. Whether governments will stand in the way of better governance of our city is yet to be seen.

The following seven conclusions can help Sydney as it moves forward in adapting to climate change.

1. **Continue mitigation.** Sydney should continue with GHG mitigation actions, even as the city is forced to adapt to climate change impacts. While it appears likely that mitigation activities will not prevent the Sydney region

from being exposed to the repercussions of climate change, the city has a strong leadership role to play to mitigate for the most extreme impacts of climate change as part of a global reduction in GHG emissions. Over the longer term, if enacted globally mitigation itself is an adaptive action.

2. **Enhance current adaptations.** Already Sydney is adapting to climate change as it enhances its existing infrastructure, communications, and emergency response systems in order to address gradual increases in extreme weather and related events. An increased focus on reviewing and reassessing those systems will be needed as the ramifications of climate change emerge. The city will also need to prepare for steep changes in the magnitude, frequency, and severity of impacts into the future that go beyond current business as usual.
3. **Densify for sustainability.** Sydney's extremely low density and expanding population—and the large ecological footprint that has resulted—are key issues for the city's sustainability and resilience. Population growth is feasible and may even offer sustainability benefits overall, but not if it comes at low density with concomitant sprawl. Compared to inner and eastern Sydney, the city's urban edge appears to be among the more vulnerable areas to climate change impacts. The social and cultural opportunities offered by a more compact city may also offer enhanced adaptive capacity and resilience to extreme events.
4. **Focus on existing development.** While land use planning plays a key role in adapting to climate change, the city's existing built form will only be adjusted over time. Retrofitting the existing city to adapt to climate change and become far more sustainable in form may not occur naturally or at a pace that accommodates climate change. This enormous challenge includes expensive retrofitting for improved public transport, increased vegetation, and energy efficiency.
5. **Determine who pays.** The question of who should own the various risks of climate change and, as a result, who pays for them poses a difficult policy question. Public and private interests will blur when climate change in key areas is concerned. When economic losses result from climate change that occurs at a large scale, private interests are likely to be portrayed as public ones. Currently public health impacts of extreme heat remain largely private and underreported because they are not geographically colocated or in the public view.
6. **Coordinate governance.** Information and governance structures need to be delivered and integrated in ways that suit the scale of particular climate change impacts. State and national governments are poorly suited to overall sustainability and to delivery of citywide programs that maintain

Blakely Disaster Readings

a nonurban regional focus. At the same time, fragmentation and limited resources for local government result in a lack of a coordinated and cohesive response. The absence of a metropolitan level of governance in Sydney is likely to frustrate urban-scale delivery of climate change adaptation measures. Structures and systems need to be in place to ensure that adaptive processes stay locally focused but are based on coordinated and meaningful regional and national frameworks.

7. **Integrate actions.** An overarching integration of actions, policies, and approaches must be set in place. Ameliorating a single climate change issue must be coordinated across the entire spectrum of activities in order to ensure that other climate impacts are not affected adversely. Long-term mitigation activities have to be integrated to ensure that shorter-term adaptations also are not impeded.

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Figure 8.1 South East Queensland

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 8

South East Queensland

Greg Laves and Peter Waterman

South East Queensland is the fastest-growing regional entity in Australia (figure 8.1). The Australian Government (Allen Consulting Group 2005) and the Intergovernmental Panel on Climate Change (IPCC 2007a) have identified this region as one of the nation's six "hotspots" most at risk from the adverse impacts of climate change. In response to this threat, a range of adaptive responses is emerging, mostly driven from the top down by a variety of policy initiatives from the Australian Government, the Queensland Government, and regional councils. From the bottom up, "climate proofing" has been initiated as an adaptation response through regionally based natural resources management groups and independent community-based actions.

This chapter provides an overview of the regional setting as a spatial framework from which to examine the implications of changing climatic conditions and the emerging adaptive responses. It also indicates the range of governmental responses that are applicable to South East Queensland and offers an example of a growing community-based or bottom-up response to the climate challenge. Overall, it illustrates how adaptive responses can be brought into focus to encompass policy formulation and analysis, strategic and statutory planning, and on-the-ground community actions.

South East Queensland: An Overview

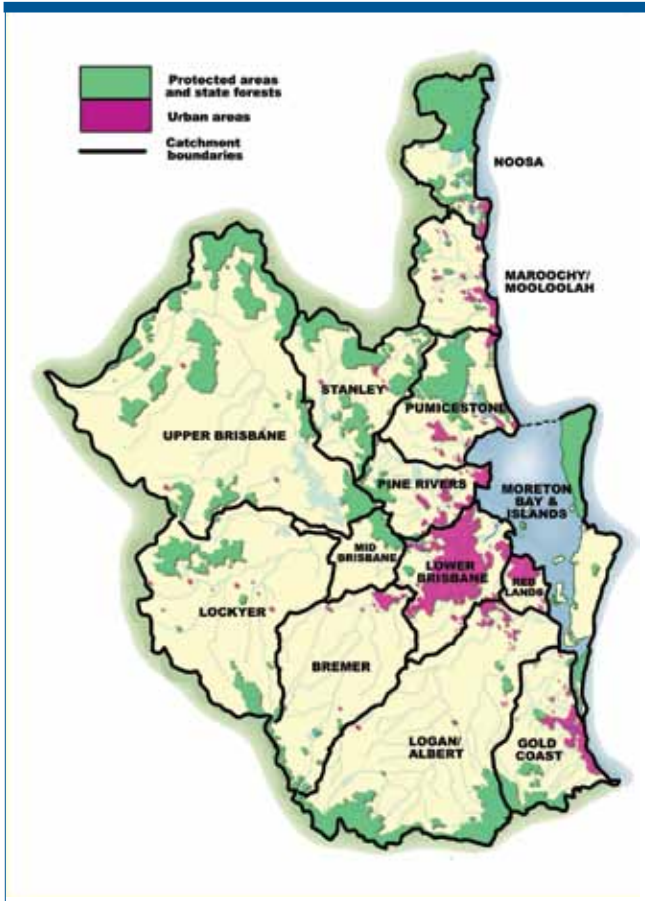
The South East Queensland (SEQ) region encompasses a landscape of changing catchments and coastal regions exposed to the pressures of rapidly increasing populations and associated expansion of settlements and infrastructure that typically accompany them. At the same time, the region is exposed to the hazards and risks arising from climatically induced changes, including more extreme weather, greater climatic variability, and the vulnerability of the region's natural and built environments. These risks are especially significant along its coastal margins, where eroding shorelines and storm-induced flooding have begun to result in significant impacts.

Geography of the Region

The region now known as SEQ was established in the 1830s as a penal settlement administered as part of the colony of New South Wales (NSW).

Figure 8.2 SEQ Catchment Areas

Source: *Healthy Waterways (2007) and SEQ Catchments (2010)*.



Queensland separated from NSW in 1859, and over the past 150 years has become the third-largest state in the Australian Federation. Settlement of the coastal areas preceded expansion into inland areas in search of grazing land for sheep and cattle. In the latter part of the nineteenth century, the discovery of gold, copper, and other minerals coupled with the export trade in timber and processed meat led to the development of distinctive ports as nodes for the inland-rail network. This pattern has been consolidated over the past century as the export of bauxite, aluminum, coal, petroleum products, and nickel added to the economic diversity and strength of the state.

SEQ extends across 14 major river catchments and covers an area of approximately 22,890 square kilometers [km] (figure 8.2). The region stretches from Noosa in the north to the Gold Coast in the south Upper Bris-

bane and Lockyer in the west. It is the most heavily populated region within the much larger state of Queensland and has the largest concentration of urban development in the state (DIP 2008). In terms of land use, however, built-up and urban areas account for only 2.3 percent of the total land area.

In 2007 the region's population was 2.77 million, and population growth projections from the Department of Infrastructure and Planning (DIP) indicate that it may reach 4.4 million by 2031, when it will account for around 70 percent of the state's population. The current annual growth rate of 2.5 percent is expected to be maintained in the short term and then ease to 1.4 percent by 2031. The major city in the region is Brisbane, the state capital, but extensive development is occurring in the areas known as the Gold Coast and Sunshine Coast. The largest increase in future population is anticipated to be in the two satellite local government areas of Ipswich and Logan (DIP 2008). Among several impediments that may inhibit the continuing population growth are provision of adequate infrastructure, affordable housing,

water security, land degradation, and exposure to high-level impacts from climate change.

The SEQ region is made up of ten local government entities, each of which has its own unique character (figure 8.3).

Brisbane: the capital and largest city in Queensland.

Gold Coast City: a major tourist and retirement destination; largest non-capital city in Australia.

Ipswich City: a Brisbane suburb with an industrial and mining heritage.

Lockyer Valley Region: an agricultural area known for its fruit and vegetables.

Logan City: a largely residential area south of Brisbane.

Moreton Bay Region: a largely residential area north of Brisbane.

Redland City: a residential and agricultural area.

Scenic Rim Region: a pastoral area inland from the Gold Coast known for scenic mountains and villages.

Somerset Region: a pastoral area northwest of Brisbane; location of two major dams supplying water to SEQ.

Sunshine Coast Region: a coastal tourist and agricultural region.

The SEQ region contains extensive alluvial valleys, volcanic hills and ranges, and coastal sand masses that support an extensive range of biodiversity. It is renowned for its many unique plants and animals with high conservation significance. A low-lying and narrow coastal plain, sandy beaches, and a series of sand islands along the eastern margin of Moreton Bay characterize the coastal zone. SEQ also hosts a wide range of marine and terrestrial habitats including reefs, rocky shores, mangroves, subtropical rainforest, waterways, lakes, wetlands, and eucalypt forests. Vegetation cover is predominantly of two types, with native forests and woodlands accounting for approximately 45 per cent, and annual crops and highly modified pasture making up around 35 per

Figure 8.3 The 10 Local Governments in SEQ

Source: Laves et al. (2010).



cent. Grazing is the dominant land use for nearly 50 percent of the land in the region (BRS 2003).

Apart from the traditional agricultural areas, the region contains a range of sectors devoted to industry, manufacturing, and technology, which include aviation and aerospace, biotechnology, professional and business services, information and communications, mining, and pharmaceuticals. SEQ's natural attractions make tourism an important asset that contributes more than \$3.7 billion to the economy and provides employment for more than 61,000 people.* International tourism is particularly significant and is growing at an annual rate of 8 percent.

Regional Temperature and Rainfall Trends

Currently, SEQ experiences a humid, subtropical climate with mild winters and warm summers. December and January are the hottest months, during which daytime temperatures often reach 35°–38°C. In July, the coldest month, mean temperatures may drop below 10°C. This amiable climate is a key factor in the rapid growth of both the permanent residential and the seasonal tourist populations. Compared to the baseline established between 1961 and 1990, annual temperature rose 0.2°C to 19.4°C during the period from 1971 to 2000. The 2010 decade shows that temperatures have risen further by 0.4°C to 19.8°C, indicating that the rising temperature trend is not only continuing but accelerating. In addition, mean maximum temperatures are showing a steady increase, rising by 1.0°C over the last decade compared to the 1961–1990 baseline.

Seasonal variations range between a 0.9°C increase in summer and a 1.3°C increase in winter. The number of hot days above 35°C have a northwest gradient, with Brisbane on the southern coast experiencing an average of one day per year, Tewantin on the northern coast averaging three days, and the inland area of Amberley at twelve. While no discernible change has been observed in the coastal areas, the Amberley vicinity has displayed an increasing trend in the annual number of hot days since the 1950s (OCC 2009a).

Rainfall in SEQ is highly variable and influenced by local landform features and vegetation as well as large-scale weather patterns, such as the El Niño–Southern Oscillation. The current mean annual rainfall for the region is 1,135 millimeters (mm) and is characterized by distinct wet and dry seasons. Rainfall tends to be high during summer, when precipitation is delivered by convective storms produced by low pressure troughs moving down from the north. During the winter months rainfall is low and associated with cold fronts moving up from depressions in the south. The northern coastal area of SEQ and the southern border's coastal strip experience annual rainfall in excess of 1,200 mm, while the rest of the region, including Brisbane, may receive annual rainfalls between 650 and 1,200 mm (BOM 2010).

* Unless otherwise noted, dollar amounts cited in this chapter refer to Australian currency.

Compared to the 1961–1990 baseline period, over the last decade rainfall has shown a marked downward trend of 18 percent, with the most significant decline being in autumn, which has experienced a 32.1 percent decrease. An assessment of whether this trend is associated with climate change is difficult to make, however, due to the high natural variability experienced in the region historically. While the “Millennium Drought”—the longest and driest on record—has dominated the last decade, similar conditions were also recorded during the “Federation Drought” at the beginning of the twentieth century (OCC 2009b).

Extreme weather in January 2011 caused catastrophic floods in SEQ, resulting in loss of lives and livestock as well as considerable damage to property in Toowoomba, the Lockyer Valley, Ipswich, and Brisbane. Following these floods, the management of levels at the Wivenhoe Dam became a major point of controversy. As a consequence, the popular perception that dams can prevent or avert the worst effects of inundation has been drawn into question.

A key point of contention has been whether strategically it is more advisable to conserve water supplies as a hedge against severe drought conditions or to mitigate potential downstream flooding. The operations of SEQ’s retention systems, including the adequacy of water releases from the Wivenhoe Dam, are among the issues investigated by the Queensland Floods Commission of Inquiry, which is vested with the powers of a royal commission—the highest form of public inquiry under Australian law. New policy and operational procedures for dealing with extreme weather and climatic variability on storage systems are anticipated as part of the package of this commission’s longer-term outcomes.

Climate Change in South East Queensland

Climate Change Projections

The uncertainties embodied in projected climatic conditions for the region present a considerable challenge to those responsible for protecting its people, assets, and environment against such impacts. Among the several indicators that may compel planners in the region to move forward are a discernible trend of increasing temperatures, a drying shift since the 1950s of 50 mm per decade, and the level of global greenhouse gas (GHG) emissions, which as of 2011 is greater than the highest emissions level the IPCC has projected for this time period.

Together, these trends point to a progressively hotter and drier future that may reach the upper ranges of modeled projections. Ultimately, the extent of global warming will depend on the amount of GHG emissions. At the international level, however, advancement on this issue is not progressing at the rate the IPCC has indicated is necessary in order to keep average temperatures at a safe or manageable level globally. It is prudent, therefore, to test adaptation actions with a “no regrets policy” against a model with a degree of risk appropriate to the level of investment.



Areas close to Brisbane's central business district were inundated during flooding in January 2011.

Photograph: © Reuters; Tim Wimbourne.

The shifts in distribution and intensity of regional temperature and rainfall patterns were modeled for the years 2050 and 2100 employing a worst-case scenario that called on the HadGEM GCM climate model developed at the Hadley Climate Centre, an A1FI (high) GHG emissions scenario, and high climate sensitivity. The results compared to the 1961–1990 baseline period are shown in figures 8.4 and 8.5 (Laves et al. 2010). These projections, which are in line with the upper range of those endorsed by the government, indicate the extent of the challenges that the region may face by the end of the century in terms of water security, biodiversity, and human health.

Table 8.1 shows a summary of climate change projections for SEQ from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) that was released by the Queensland Office of Climate Change (OCC 2009a). The potential ranges for key elements indicate that by 2070 climatic conditions may include:

- an increase in mean annual temperatures of up to 4°C, which is above the range of temperatures experienced previously in the region;
- an increase in heat waves and days with temperatures above 35°C (four-fold in the case of Tewantin);
- a decrease in rainfall by up to 30 percent;
- an increase in potential evaporation by as much as 16 percent; and
- an increase in extreme weather events (e.g., storm surges, cyclones, droughts, bushfires).

Figure 8.4 Mean Annual Temperature Changes in SEQ (°C) by 2030, 2070, and 2100

Source: Laves et al. (2010).

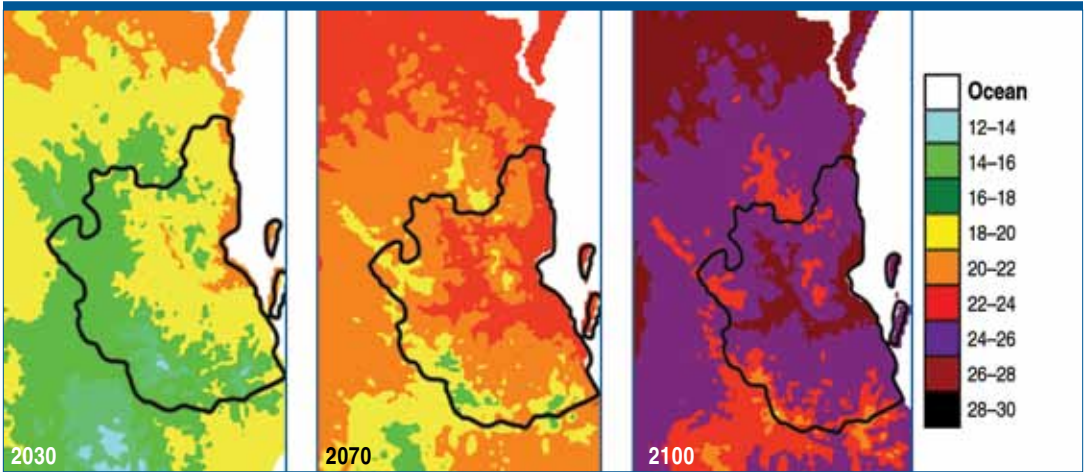


Figure 8.5 Mean Annual Rainfall Changes in SEQ (mm) by 2030, 2070, and 2100

Source: Laves et al. (2010).

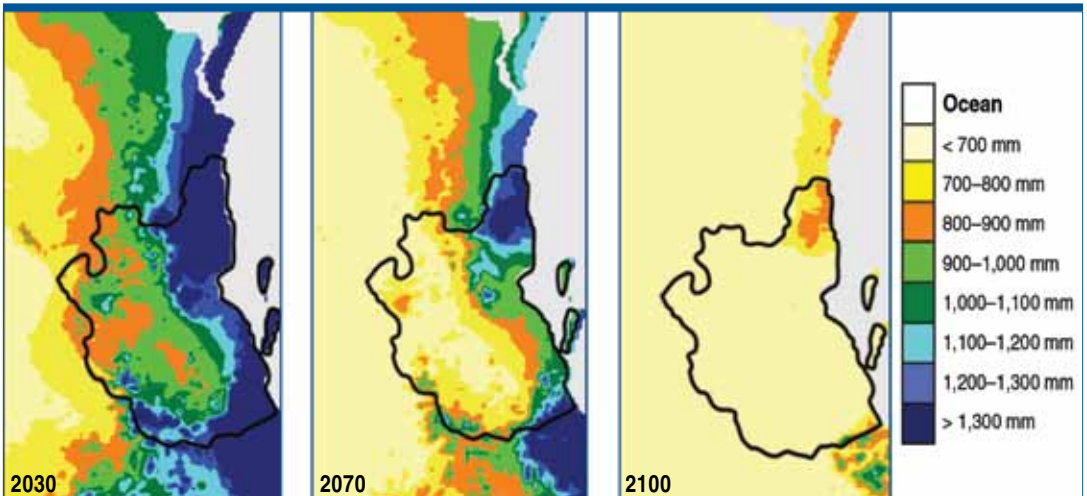


Table 8.1 Changes to Regional Climate in SEQ

Source: OCC (2009a).

	Historical Mean	2030	2050	2070
Temperature Increase (°C)	19.4	0.6 to 1.3	0.7 to 2.5	1.0 to 4.0
Rainfall Variation (%)	1135 mm	-11 to +5	-20 to +10	-30 to +17
Potential Evaporation Increase (%)	1553 mm	+2 to +5	+4 to +10	+3 to +16

A number of uncertainties within the scientific and modeling processes used to produce potential climate scenarios make the exact nature of future climatic conditions unclear and have led to much controversy and confusion over how to plan for the best way forward. Such forecasting uncertainties arise from three main sources:

- limited capabilities endemic to global circulation models and the diversity of outputs among various models;
- lack of surety concerning the amount of GHG that eventually will be emitted over any given time period; and
- the global climatic system's sensitivity to increases in atmospheric GHG.

These uncertainties are reflected in the range of potential outcomes for the SEQ region, as illustrated in table 8.1. For example, the variability in mean annual temperatures indicates that the SEQ region may warm between 1°C and 4°C by 2070. Rainfall has an even broader band of uncertainty, both in magnitude and direction. Current best estimates suggest that by 2070 the mean annual regional rainfall may decrease as much as 30 percent, or it may increase by up to 17 percent. The vagueness of these projections frustrates regional planners, policy makers, and other practitioners involved in developing climate change adaptation strategies. The message for climate adaptation workshops and other practitioner forums is very clear: The formulation of adaptive strategies to reduce climate impacts and protect regional assets cannot be driven by the inadequate information now available. Rather, a limited and consistent set of scenarios is needed to identify potential risks that the various sectors should address.

Risks to Water Supply and Security

Rapid population growth and climate change are the key factors that will have negative impacts on the SEQ region's future water security. The projected high population growth will result in a comparable increase in the demand for water in the home, workplace, and recreational environments. The ability to meet this greater demand will be further complicated by the lack of new opportunities to expand harvesting of both surface water and groundwater. Existing climate-dependant water resources are anticipated to diminish due to the reductions in rainfall and increases in evaporation that are indicated by regional climate projections. The water shortages experienced in SEQ since 2005 initiated responses to the longest, most severe drought on record and served to highlight the vulnerability of traditional approaches to water supply. In turn, this has provided a lens to focus attention on the significant challenges facing the planners and resource managers responsible for ensuring long-term water security.

Initially, reaction to the drought was a typical Australian response of imposing restrictions on the use of water outdoors. Up to one-half of household water use is outside the home, so such restrictions traditionally provided a simple, easily

policed solution. As the drought continued, and combined dam levels fell to 16 percent of capacity, restrictions became more draconian and had severe impacts on the domestic, commercial, and industrial sectors. Prior to the drought, domestic water consumption was more than 300 liters per person per day (L/p/d). By 2009, Level 6 restrictions—which prohibited the use of water outdoors and limited consumption to 140 L/p/d—had been introduced. At the peak of the drought, in April 2009, household water consumption had dropped to a low of 103 L/p/d (QWC 2009).

Educational programs that encouraged voluntary demand management complemented these mandatory reductions. The programs' primary focus was raising awareness of simple water-saving strategies, such as timing showers, using dual-flush toilets, implementing simple maintenance regimes to reduce losses from leakage, and capturing wastewater from the laundry and shower for reuse in the garden. Financial incentives also were provided to further encourage the transition to low water usage. Evaluation and maintenance services were offered free of charge, and subsidies for the purchase and installation of water-efficient showerheads, toilets, dishwashers, and washing machines were available. It was clear, however, that reducing demand would not be sufficient to ward off the potential disaster of a major city running out of water. Rather, the entire water sector management system required major review and reform.

The need for significant urban water reforms was recognized formally in the 1994 Council of Australian Governments' (COAG) Water Reform Framework, which identified the risks associated with unsustainable water practices. COAG followed this in 2004 with the Australian blueprint for national water reform outlined in the National Water Initiative (NWI). During the drought SEQ adopted many of the NWI's recommendations focused on sourcing and securing climate resilient supplies. Apart from demand management practices, these reforms included providing nonclimate-dependant water sources, such as recycling and desalination; making use of local resources and decentralized approaches, especially in the area of rainwater harvesting; and treating poor quality water so it reaches a level considered "fit for use."

Recognition of the irony of having rain fall over populated areas while catchments that supplied dams remained dry led to the adoption of household rainwater tanks that would provide water for nonpotable uses, such as garden irrigation and toilet flushing. While initially the community was slow to adopt these practices, substantial financial subsidies for the purchase and installation of water tanks and greywater recycling units quickly turned this initiative into one of the region's most successful drought strategies. The recognition that the tanks potentially could supply almost one-third of annual household demand for water led to introduction of legislation making it mandatory for all new free-standing residential dwellings to provide 70 kiloliters per annum of water from local, alternate sources. This regulation is addressed by the inclusion of water tanks in new homes, but the provision of choice has been left open to encourage the development of other decentralized supply options such as recycling.

A plan to upgrade regional-scale centralized systems was also developed during the drought. It included building new dams, although the federal government later ruled out this option on environmental grounds; a regionwide water grid that allows redistribution of water from areas with surplus supplies to those experiencing shortages; the Western Corridor Recycled Water Project, which provides water for industry and power stations; and the construction of a desalination plant on the Gold Coast, with other plants earmarked for construction elsewhere on the coast in the near future.

The drought finally broke early in 2010, and a series of intense summer storms raised dam levels to 97 percent of capacity. Nevertheless, the events of the previous five years left an impression on the collective psyche of the public and the government. Despite the fact that SEQ presently has enough water storage to last several years, a state of permanent water restrictions has been declared with a consumption target of 200 L/p/d. Curiously, however, household consumption has remained below 160 L/p/d, which suggests that consumer attitudes toward conservation may, at least temporarily, have become embedded in daily behavior. The recent events clearly highlighted the potential threat associated with increasingly variable climatic conditions and the need to build climate resilience into the regional water strategy.

Until recent years, SEQ was largely dependent on the capture and storage of surface water. However, investigations into the implications of climate change for water supplied from the region's dams have indicated that its impacts may be dramatic (CSIRO 2006; QWC 2010). The CSIRO (2006, 22) report on climate change risk management states that, in SEQ, "a decline in annual rainfall with higher evaporative rates would lead to a tendency for less run-off into rivers" and consequently into water impoundments, such as dams and weirs. The report also makes the point that "water resources are likely to be further stressed due to climate driven changes in supply for irrigation, cities, industry and environmental flows" (CSIRO 2006, 24).

The SEQ Water Strategy reports that assessments of climate change impacts on the region's dams have identified reductions to dam yields of about 10 percent by 2030 under mid-range emission scenarios (QWC 2009). Specific case studies of particular dams indicate that in some cases reductions of 28 percent of annual inflows may occur, which could result in decreases in yield of approximately 17 percent. The SEQ Water Strategy also states: "Modelling clearly shows that SEQ should be prepared for droughts that are significantly worse than what was experienced during the Millennium Drought" (QWC 2010, 4).

The prospect of expanding the network of dams to meet future demand is poor because "there are few sound opportunities for significant further development of major surface water storages in the region" (QWC 2010, 34). The last potential site for a major dam—at Traveston Crossing—was disallowed by the Australian Government on environmental grounds, thus severely limiting the region's ongoing practice of meeting demand from traditional water sources.

Groundwater resources also are almost fully developed, and in some cases overdeveloped, which accentuates the need to incorporate new strategies that will address the growing problem of water security.

The SEQ Water Strategy outlines a pathway intended to meet demand in the region for the next 50 years (QWC 2010). Among its key elements are:

- reducing per capita water consumption by 24 percent compared to pre-drought trends of more than 300 L/p/d;
- completing a regionwide water grid to allow redistribution from catchments with surplus water to those experiencing shortages;
- developing up to five desalination plants, which will be brought on line and incorporated into the water grid to keep pace with increasing regional demands;
- using more local supplies, such as those from water tanks, storm-water harvesting, and recycling;
- planning for droughts; and
- supplementing water for industry, power generation, and rural irrigation through major recycling schemes including the newly constructed Western Corridor Recycled Water Project.

While strides in regional water reform have been significant, for the most part they have been taken in reaction to an extreme climatic event and are not the result of proactive, reasoned planning. This is typical of the way most climate change adaptation strategies are being developed in Australia—not as part of a unified and coherent climate change framework, but as a series of ad hoc actions, introduced in the guise of sustainability policies, urban water planning principles, or other nonintegrated management instruments. Although these responses are a step in the right direction, developing tactics in isolation can prove maladaptive if they provide benefits to one sector that other areas find problematic. For example, some prefer the solution of building climate-independent desalination plants, in order to establish a guaranteed, continuous water supply, but this approach increases energy use at least threefold over current methods, further contributing to the root cause of global warming. Caution should be taken before committing to a strategy with such a consequence. The opportunity exists to undertake a thorough examination of all emerging options, particularly low-energy, decentralized systems, to ensure that an informed and appropriate strategy is developed.

Sea Level Rise and Coastal Impacts

The IPCC Fourth Assessment Report (IPCC 2007b) indicates that by 2100 global sea level rises are projected to reach between 9 and 88 centimeters (cm). Sources published since the IPCC report, such as Rahmstorf (2007), however, indicate that increases may be as high as 140 cm. The two key processes that

generate sea level rise are the thermal expansion of the oceans and melting land ice, and both are driven by the anthropogenic increase of global temperatures. Average sea level rise from 1990 to 2100 has been modeled for the SEQ region using a high (A1FI) emissions scenario (figure 8.6).

Many parts of the coastline are highly developed and include some of the region's most valuable real estate. SEQ also contains extensive stretches of subdivisions with artificial canals created to satisfy the high demand for waterfront properties. For example, the Gold Coast in the southern part of the region has 57 km of coastline, but canal estates have been constructed to provide an additional 800 km of residential waterfront land (Gold Coast City Council 2011). Many of these estates were developed over recent decades with no consideration of the implications of sea level rise or the increased risks from storm surge and coastal erosion.

While inundation from rising sea levels will present a considerable threat to low-lying natural and built environments, the irrevocable retreat of coastlines due to erosion is likely to have a greater impact on near-coast infrastructure, housing, and environmental resources. Shoreline retreat will vary in extent from site to site depending on the local coastal geomorphology. Currently, identification of hotspots is underway through processes such as the National Coastal Vulnerability Assessment and the Queensland Coastal Plan.

The greatest impact of sea level rise will most likely occur during extreme storm conditions, when strong winds and falling barometric pressure create a temporary, localized increase in sea level (MacInnes, O'Grady, and Macadam 2009). Storm surges occurring at higher sea levels allow waves to penetrate further inland, which increases flooding, erosion, and destruction of infrastructure and ecosystems. Using the Bruun rule, a preliminary assessment was conducted on several coastal settlements to arrive at the potential range of coastal erosion implications for sites with different coastal morphologies (Berry and Waterman 2009).

Figure 8.7 shows the extent of possible shoreline retreat for two coastal settlements under mid-range (A1B) and high-range (A1FI) emissions scenarios. While both sites are within tens of kilometers of each other, potential coastal retreat for the two locations varied between 23 and 190 meters for a mid-range scenario and 50 and 389 meters for one based on high emissions. This range of potential threat has highlighted the risk of addressing coastal hazards with a generic policy and the necessity of developing local plans to address local conditions.

Sea level rise implications will be wide ranging and not only will affect those living directly on the coast, but also will have significant economic and social repercussions for coastal communities and the region in general, including the following concerns and outcomes.

- Because more severe storm surges will breach fore-dune areas more frequently and with greater impact, the risk of coastal flooding and storm damage increases with sea level rise ((Berry and Waterman 2009)). In some areas coastal flooding due to storm surges could reach as far as 1 km inland.

Figure 8.6 Impact of Sea Level Rise on Three Coastal Communities Along the Sunshine Coast: (A) Caloundra; (B) Mooloolaba; and (C) Noosa

Source: Laves et al. (2010).

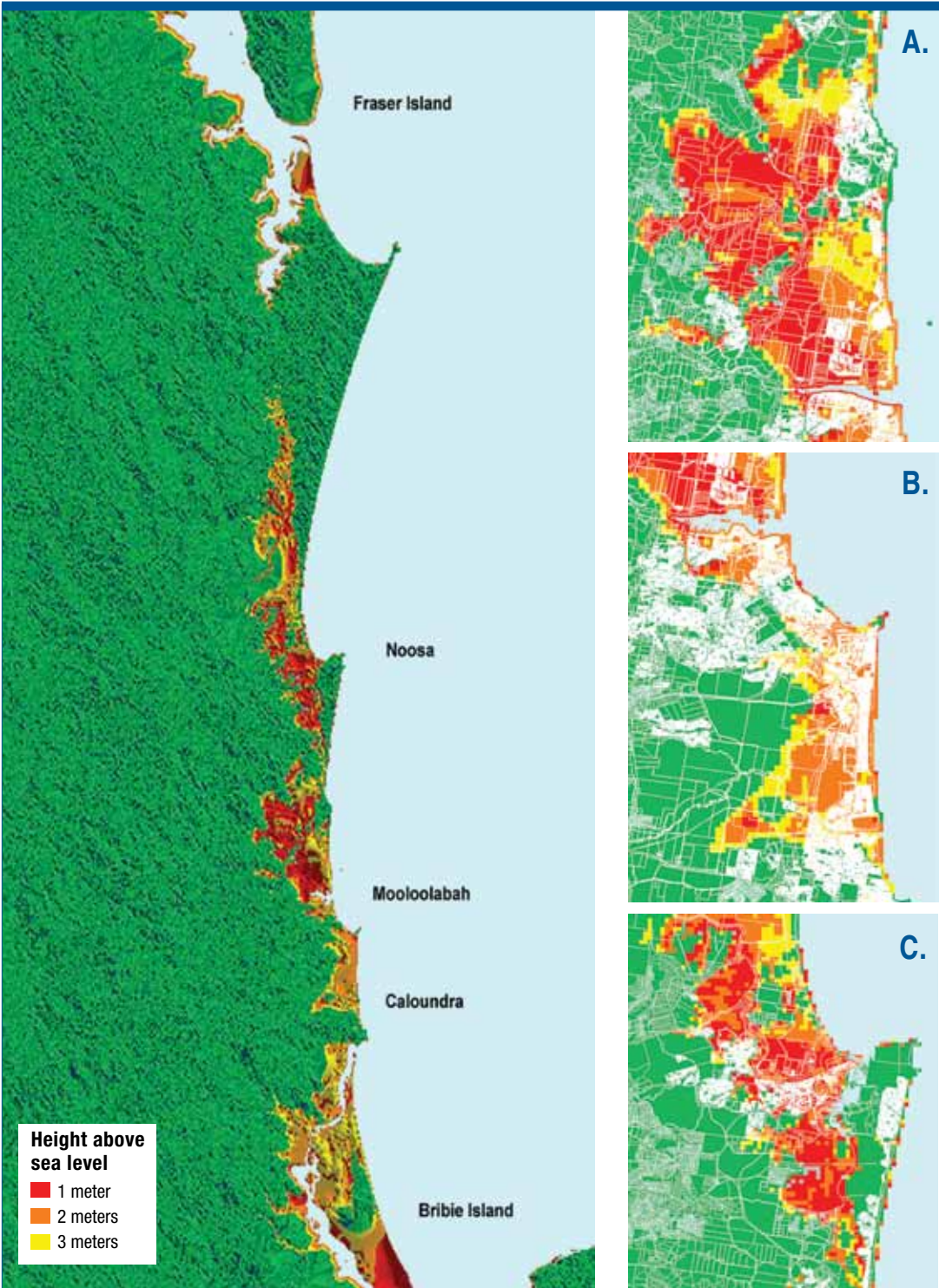


Figure 8.7 Two Mid- and High-Range Coastal Retreat Scenarios, by 2100

Source: Berry and Waterman (2009).



- Losses to coastal biodiversity and ecosystem services will reduce the viability of commercial and recreational fishing, coastal tourism (the mainstay of many coastal towns in the region), and many supporting and service industries.
- The impact on coastal industries, including fishing and tourism, will in turn affect local communities through the loss of employment. Reductions in monies generated by these industries will impact local and state economies in particular.
- Salination of coastal surface water and groundwater will decrease the viability of coastal agriculture that is dependent on irrigation from bores.
- Agricultural land flooded with seawater is more likely to become too salty for continued production.
- Risk of damage and destruction will affect coastal housing and infrastructure.
- The massive cost of coastal protection and relocation, even for small towns, may not be viable in the long term.
- Coastal flooding can increase the risk of water-borne disease and infection.
- The area of liability for coastal erosion and retreat and its ramifications are only beginning to be discussed and realized. Who is responsible? Who pays?

In Australian jurisdictions a number of coastal management plans are beginning to emerge, including the Queensland Coastal Plan, which aims to provide policy direction and guidance on managing the state's coastal areas (DERM 2011). This plan recognizes the implications that climate change related issues—sea level rise, coastal erosion, and storm surge hazards, for example—have for continuing development, and it recommends ways to adapt to the rapidly changing, uncertain conditions. The plan also points out the complications that would arise from armoring coastlines to defend existing developments against the natural but undesirable consequences of sea level rise. Such a defensive approach was described as problematic, impractical, and likely to produce negative tradeoffs, such as:

- loss of beaches and intertidal habitat;
- reduced coastal amenities, which impacts local lifestyles and tourism revenues;
- extreme costs;
- transference of erosion problems to adjacent areas; and
- potential risks to property and people.

Rather, the plan's proposed outcomes ensure the protection of people, property, amenity, and the environment, while allowing for natural, physical coastal processes and fluctuations, including those that result from sea level rise. The recommended vehicle for driving these outcomes is adoption of proactive and local planning processes that easily can be suited to local needs and issues. The plan also recommends a set of simple interim guidelines that include:

- incorporating a planning horizon of 100 years;
- assuming a minimum sea level rise of 80 cm by 2100;
- adopting the 100-year-average recurrence interval for extreme events;
- assuming a cyclone intensity at an additional 10 percent over current maximums; and
- providing decadal sea level rise assumptions to guide safety parameters based on the asset life of proposed developments.

Through coastal vulnerability studies and climate change management plans, a proactive process is beginning to emerge in the SEQ region. At present, however, coastal development is proceeding unchecked with little regard for future sea level rise and coastal flooding. Enormous sums of money continue to be invested in urban, residential, and recreation facilities, industrial plants and equipment as well as supporting infrastructure in areas that are likely to be inundated over the next 50 to 100 years. The lack of time to act and the scale of the problem require urgent adaptive action to mitigate the worst of the damage from sea level rise and coastal flooding.

Responding from the Top Down: Regional Realities and Government-Based Adaptive Responses

The impetus and leadership for addressing climate change in Australia as a nation, and in South East Queensland as a region, arose from a top-down approach. At the international level, the United Nations Development Programme and the IPCC have alerted the world to the implications of climate change and initiated global responses such as the Kyoto Protocol. Responding to these concerns, Australia's federal and state governments have acted via the COAG to adopt a range of mitigation and adaptation policies and action plans under the National Climate Change Adaptation Framework (COAG 2007). Following initiatives of various commonwealth, state, and territory governments, regional and local statutory authorities have begun to translate these policies into on-the-ground actions.

Australian Government

Governmentally, Australia shares some commonalities with the United States in that both are federations of states and territories. With respect to land use planning, environmental management, and implementing adaptive responses to climatic change, both countries rest key powers with the states and the territories. Commonly, Australia's national government is referred to as the Commonwealth or the Federal Government. Currently, however, the correct nomenclature is *Australian Government*.

The Australian Government has introduced a broad spectrum of initiatives that address climate change at national, regional, and local scales. Its climate change policy is underpinned by three pillars: mitigation, to reduce Australia's GHG emissions; adaptation, to adapt to the climate change impacts that cannot be avoided; and the global solution, to help shape a collective international response (DCCEE 2010). Queensland is but one of the six states and two territories that constitute the Commonwealth of Australia collectively. Each jurisdiction is addressing the climate change challenge in its own way, albeit within a broad national framework. In their discussion (Byrne et al. 2009), Jason Byrne and his colleagues have examined the national context as well as South East Queensland's situation and urban resilience. They establish a broad comparative benchmark from which to review Queensland's adaptive responses to changing climate conditions.

The National Climate Change Adaptation Framework aims to improve general understanding of foreseeable impacts and strengthen decision makers' capacity to respond concerning major areas of national vulnerability. Among the subprograms that address this goal are the National Climate Change Adaptation Research Facility, CSIRO's Climate Adaptation Flagship, and the Climate Change Adaptation Skills for Professionals Program. Additionally, the Local Adaptation Pathways Program and the Integrated Assessment of Human Settlements subprogram are designed to assist local governments with identifying local climate change challenges and developing their capacity to respond to their impacts.

A number of other Australian government initiatives have strong regional and local implications for SEQ. The intent of the National Coastal Risk Assessments program is to develop an understanding of how climate change may impact coastal settlements. Complementing it, the Caring for Our Coasts policy aims to assist coastal communities in addressing the issues of climate change and rapid population growth. The government's biodiversity vulnerability assessments identify threats facing the nation's rich array of flora and fauna in order to increase understanding of effective adaptation strategies. These assessments are supported by additional investigations of valuable natural assets, including World Heritage properties and the National Reserve System, which includes more than 9,300 protected areas covering nearly 13 percent of the country. Australia's Farming Future, the Community Networks and Capacity Building program, and Water for the Future are among the various related federal policy initiatives.

State Government

Through COAG, the Queensland Government collaborated with the Australian Government and other state governments in 2007 to establish the Working Group on Climate Change and Water and the National Climate Change Adaptation Framework. The Queensland Office of Climate Change (OCC) was also established in 2007 to provide policy and scientific expertise by means of the Queensland Climate Change Centre of Excellence. Shortly thereafter, the OCC produced Australia's first climate action plan, ClimateSmart Adaptation 2007–12, and Queensland's climate change strategy, ClimateSmart 2050. These strategic policies have since been updated with the release in 2009 of the policy document *Climate Q: Toward a Greener Queensland* (OCC 2009b).

The five key action themes that Climate Q addresses are reducing GHG emissions; investing in energy efficiency; investing in technologies for a carbon-constrained world; protecting the state's natural wonders; and adapting to the impacts of climate change. The strategy tackles climate change mitigation and adaptation through a series of initiatives in the areas of energy, planning and building, business, community, primary industry, ecosystems, transport, and government.

Climate Q also recognizes that the potential climatic impacts on the regions will vary and that each region has its own unique set of assets, vulnerabilities, and capacity to develop and implement adaptation strategies. To this end, a series of regional assessments are provided within Climate Q to assist decision makers in the development and prioritization of regional climate change actions and policies (OCC 2009b).

Regional Responses

Regions can focus attention, give a sense of purpose, and provide a framework for a distinctive set of governmental actions. For example, using catchments as regional boundaries provides a specific spatial context that is relatively easy to delineate and understand (see figure 8.2). SEQ was identified in the Climate Q

strategy as having the potential to face major challenges as a result of climate change. Its coastal settlements are at additional risk from sea level rise, coastal development, and rapid population growth. To respond to these and other regional challenges, a number of policy and planning instruments, sustainability programs, and a climate change management plan have been embodied in or implemented through the SEQ Regional Plan.

The first policy instrument is the three-year South East Queensland Climate Adaptation Research Initiative (SEQCARI), which aims to determine the region's vulnerability to climate change and identify appropriate adaptation strategies for the government, industry, and communities (DIP 2009b). While research and government partners fund the initiative, the process is guided by an advisory panel of regional stakeholders. Research outcomes from SEQCARI will be used to inform the actions of the second major policy instrument, the South East Queensland Climate Change Management Plan (SEQCCMP 2009).

Structurally, the SEQCCMP is a component of the SEQ Regional Plan 2009–2031, a statutory and preeminent planning scheme that determines regional outcomes, principles, and policies in relation to a broad range of planning issues (DIP 2009a). The incorporation of the SEQCCMP into the regional plan ensures that adaptation and mitigation doctrines are embedded within the planning process and that future development needs will be balanced with climate-resilient and sustainable best practices.

The SEQ Regional Plan emphasizes the need for sustainable growth and the importance of addressing climate change. Adaptation principles focus on the need to increase resilience to natural hazards in communities, infrastructures, the environment, and the economic sector. To achieve this, proposed policies and programs aim to reduce risks from natural hazards, implement planning schemes and development decisions, align and coordinate implementation of regional policies in order to increase resilience, and develop planning and design performance criteria for development and infrastructure. The plan also recognizes that, to be successful, the elements of the regional hierarchy—the region overall, local government authorities (LGAs), neighborhoods, buildings, individuals, and communities of space and interest—must embrace its principles. This approach is defined clearly in a set of climate change aspirations (DIP 2009a).

Local Government

Three key factors need to be taken into account when considering how Australia's LGAs can play a role in adapting to changing climatic conditions. First, since the local sphere of government does not have constitutional recognition, LGAs comprise an arm of the state. As such, local government operates under specific state or territorial legislation (including a Local Government Act), and the Australian Capital Territory (ACT) entails no local government. As benchmarked by the Advisory Council for Inter-Governmental Relations (ACIR 1986), wide differences in roles and responsibilities exist among local governments in each state and the Northern Territory.

The second factor arises from the fact that Australia's population is concentrated in coastal metropolitan regions, making the country one of the most metrocentric in the world. Some 85 percent of the population lives in the capital cities and within 50 km of the coastline (Beeton et al. 2006). Nationally, LGAs are separated by enormous geographic and demographic differences, including the spatial extent accommodated by individual local councils; the patterns of settlement encompassed within council boundaries; and the size, density, and distribution of the various populations.

The last of the three key factors reflects the widely differing levels of awareness that elected members and staff of local councils have concerning their specific LGAs' inherent vulnerabilities to the climate challenge. In turn, the capacity and capability of individual councils to respond in the context of their geographic and demographic realities is affected.

Three additional factors set local governments in Queensland apart from their counterparts in other Australian jurisdictions. First, its LGAs are delineated on a regional basis and encompass quite large populations. All elected members in Queensland are employed full-time in the position of councilor, whereas in New South Wales only mayors of the larger cities and coastal LGAs are employed full-time. In other jurisdictions, councilors usually are part-time employees and receive allowances or sitting fees, although they may also have other forms of employment. Thus, councilors in Queensland can become more involved in addressing day-to-day problems as well as strategic issues, such as responding to changing climatic conditions, than their counterparts in other states can. This also means that Queensland's LGAs may be viewed as having a greater capacity to respond to current and emerging issues using climate change policy and statutory planning instruments.

Second, the climate change policy setting in Queensland is better developed than it is in other jurisdictions, which endows its councilors with greater strategic guidance. Climate change concerns are embedded within the key statutory planning instruments for the SEQ region, and these plans are complemented by specific responses, as illustrated by the SEQCCMP (2009). Specifically, the regionally delineated coastal councils have major responsibility for developing and implementing statutory land use planning instruments. These cover settlement patterns and demographic pressures; provision of regional and local infrastructure; emerging issues, such as climate change adaptation and mitigation at the regional and local scales; short-term impacts such as extreme weather events leading to flooding, drought, and bushfires; and long-term issues including the sustainability of water supplies, loss of regional biodiversity, and rising sea levels. In short, elected members and officers of the regionally delineated LGAs already hold the key tools and roles needed to plan for climate change.

Third, a number of LGAs in Queensland have developed their own regionally based responses as illustrated by the Gold Coast City Council, Morton Bay Regional Council, and Sunshine Coast Regional Council (SCRC). Brisbane's city council is also responding to the climate challenge through planning policy

and sustainability initiatives. Various policy instruments have been prepared using expert input from consultants and, in the case of the SCRC, an officer of the council whose postgraduate qualifications are specifically in climate change adaptation. Broad community response was sought during preparation of the various documents. Collectively, the strategies and action pathways have been well received by the respective communities of space, interest, and spirit.

The Way Forward from the Bottom Up: Climate Proofing Regions and Communities

Peter Waterman (2009) and his colleagues (Waterman et al. 2009) make the point that climate proofing is a bottom-up approach to adaptation that has been adopted by international bodies such as the Asian Development Bank (ADB 2006), the World Bank (2006; 2008a; and 2008b), and several European organizations. Climate proofing describes the suite of actions needed to make areas and assets resistant to climate variability and change and to make communities and people more resilient (Hay et al. 2004). As such, it can be a useful strategy to help regions and communities focus on mainstreaming climate change adaptation into planning and development actions. Advocates also argue that such adaptive responses are needed at multiple scales. It follows that climate proofing activities at the regional, local, and community levels can assist in preparing SEQ governments and civil society to meet the climate challenge (White 2006).

Natural resource management groups, such as South East Queensland Catchments (SEQC) and the Burnett Mary Regional Group (BMRG) in collaboration with the Climate Change, Coasts, and Catchments program at the University of the Sunshine Coast have promoted climate proofing in SEQ. This initiative is coordinated through the SEQ Climate Proofing Demonstration Project, which began as a practical response to the governments' and communities' growing concerns over the vulnerability of coastal regions to the projected impacts of changes in climate and the environment. In particular, the project is responding to a key question—What can we do to adapt to climate change?—that stakeholders from across industry sectors, communities of space and interest, and members of the public are asking.

The project's approach has three components: (1) fostering integrated approaches to climate change adaptation through risk reduction; (2) identifying and developing tools and techniques for integrated vulnerability assessment and management that address regional, local, and site-specific environmental conditions; and (3) initiating and supporting community awareness and capacity building to equip local and regional stakeholders to deal with current climatic variability and projected climate change and sea level rise.

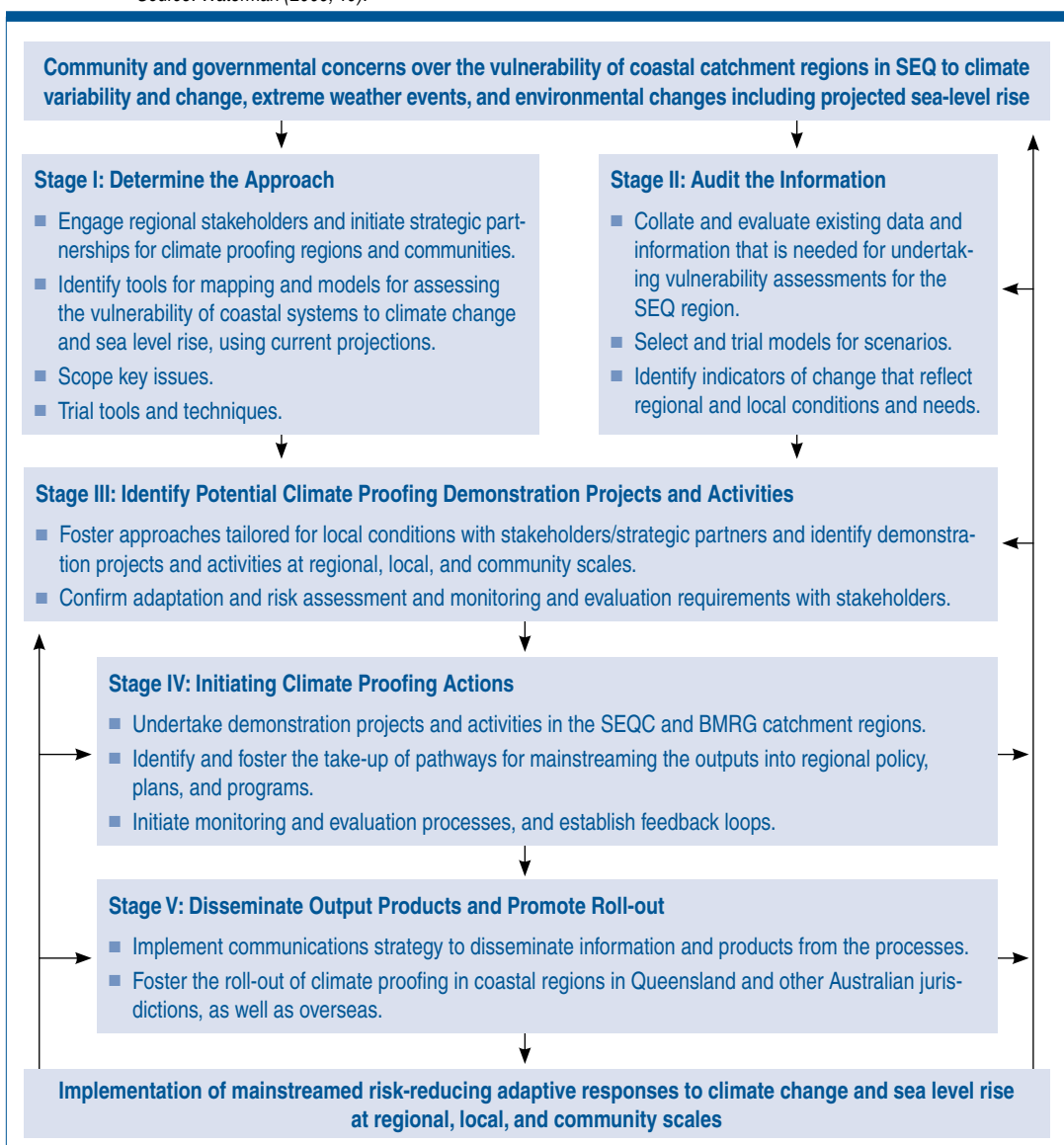
Angie White and Peter Waterman (Waterman 2009; White 2006; White and Waterman 2006) make the case that, together with the accompanying integrated environmental management, vulnerability and adaptation assessment can be tailored to the geographic realities of specific regions and localities, including community capacities. In other words, they can be applied to form

a regional development strategy. The approach is shown schematically in figure 8.8, the chronology of work undertaken is summarized in table 8.2, and the achievements to date are shown in table 8.3.

A case has been developed to illustrate how the project work in SEQ to date could be built on and rolled out by regional bodies, LGAs, and communities as a long-term regional development strategy. The bottom-up approach demonstrated in SEQ has been implemented at very low cost and has received great community support. It is easy to adopt because it builds on the organizational and governance strengths inherent in regional communities and the personal and professional skills and experience offered within civil society.

Figure 8.8 A Staged Approach for Climate Proofing Coastal Regions and Communities in SEQ

Source: Waterman (2009, 10).



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Table 8.2 Chronology of Climate Proofing Work Undertaken Through SEGRA, SEQC, BMRG, and Shell Australia–CVA Initiative, 2005–2009

Source: Waterman et al. (2009, 12).

Year	Workshop and Forum Activities	SEQ Catchments (SEQC)	Burnett Mary Regional Group (BMRG)
2005	SEGRA* climate proofing (CP) workshop: Yeppoon	Phase I: Awareness and capacity-building workshops	
2006	SEGRA CP workshop: Launceston	Phase I: Awareness and capacity-building workshops; applied research on regional climate change scenarios	
2007	SEGRA CP workshop: Wollongong	Phase II, Part 1: Community climate proofing activities on Coochiemudlo Bribie Island Phase II, Part 2: Climate change and ecosystem-services mapping project	Scenarios building and planning project, encompassing: <ul style="list-style-type: none"> • regional climate change scenarios; • coastal vulnerability; • settlements, and infrastructure • water security; and • farm and plantation forestry sectors
2008	SEGRA CP workshop: Albury	Phase II, Part 3: Climate proofing biodiversity corridors	Regional CP workshops
2009–2011	SEGRA CP workshops: Kalgoorlie-Boulder, Townsville, and Geelong Shell Australia and Conservation Volunteers Australia Climate Change Forums: Gladstone, Sunshine Coast, Toowoomba, Adelaide, Broome, Newcastle, Wollongong, Mackay, Cairns, Geelong, Ballarat, Launceston, Bathurst and Darwin	World Environment Day Festival for the Sunshine Coast Region at the University of the Sunshine Coast Finalize climate proofing biodiversity corridors and continue “Coochie and Bribie” activities Roll-out of promotion of climate proofing through conference presentations and community-based awareness-raising activities	Finalize working papers, scoping reports, and “planning for climate change” awareness-raising materials for the Burnett Mary region as source information for regional local government authorities and community-based organizations. Information dissemination and evaluation

*Sustainable Economic Growth for Regional Australia (SEGRA) Conference

Table 8.3 Overview of Work Undertaken for SEQ Climate Proofing Demonstration Project

Source: Waterman et al. (2009, 12–13).

Stage	Actions, Activities, and Outcomes	Products and Comments
I	<p>Project conceptualization:</p> <ul style="list-style-type: none"> • Strategic partners frame and agree on multiple approaches • Initial stakeholder engagement meetings held with community organizations and local governments in SEQ and Burnett Mary regions <p>Phase I climate proofing initiated by SEQC:</p> <ul style="list-style-type: none"> • Successful awareness raising, issues scoping, and capacity-building workshops held in SEQ region by SEQC and Climate Change, Coasts, and Catchments program at University of the Sunshine Coast 	<ul style="list-style-type: none"> • Concept flyers promoting climate proofing • Conference presentations and papers • Capacity building with hands-on use of climate-modeling software, such as SimCLIM • USC professional development programs in climate change adaptation and Integrated coastal zone management
II	<ul style="list-style-type: none"> • Audit regional and local scale digital elevation models (DEM) and meteorological data • Identify key information requirements for vulnerability assessments and climate proofing activities 	<ul style="list-style-type: none"> • Honors thesis on model selection and information auditing • SimCLIM trials at regional scale
III	<p>Confirm approaches with stakeholders</p> <p>Phase II climate proofing initiated by SEQC; includes</p> <ul style="list-style-type: none"> • climate proofing Coochiemudlo and Bribie Islands <p>The Building Local Government Resilience through Scenario Planning Project initiated by the BMRG focuses on climate change implications for:</p> <ul style="list-style-type: none"> • Coastal vulnerability; • Water security; • Residential, tourism, and recreational pressures on infrastructure; and • Plantation and farm forestry 	<p>Reports to SEQC on mapping climate change dimensions of ecosystem services and biodiversity corridors</p> <p>SimCLIM applied to regional climatic conditions in areas covered by SEQC and BMRG regional scenarios</p> <p>Scoping reports and working papers for scenario themes for BMRG</p>
IV	<ul style="list-style-type: none"> • Climate proofing meetings and workshops on Coochiemudlo and Bribie Islands • Community groups on islands set priorities for actions to suit local conditions and needs • BMRG state and local government stakeholder-focused workshops for coastal and catchment LGAs 	<p>Initial set of climate change projections for the SEQ-BMRG region</p> <ul style="list-style-type: none"> • Observed climate change over the last 60 years is consistent with global predictions • Trends are indicative of expected future changes
V	<ul style="list-style-type: none"> • Workshops on climate proofing regions as part of annual SEGRA conferences • Initiation of interstate activities (e.g., Goldfields-Esperance Development Commission and Conservation Volunteers Australia) 	<ul style="list-style-type: none"> • Dissemination of SEQC and BMRG working papers and scoping reports • Conference papers and public presentation

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Figure 9.1 Perth

Source: Weiss and Overpeck, University of Arizona.



dark blue overlay areas = low-lying coastal areas of \leq one meter elevation vulnerable to future sea-level rise

Chapter 9

Perth

Laura Stocker, Peter Newman, and James Duggie

Perth is a rapidly growing, modern city of 1.6 million people in the southwestern corner of Australia—more than 2,000 kilometers (km) from the nearest Australian city and 12 time zones from the East Coast of the United States (figure 9.1). The adjacent Indian Ocean provides a powerful sense of place for many Western Australians. A favorite local novelist, Tim Winton (1993, 3), has commented: “There is nowhere else I’d rather be than here, nothing else I would prefer to be doing. I am at the beach looking west with the continent behind me as the sun tracks down to the sea. I have my bearings.”

The Indian Ocean and the west coast of the Australian continent are beginning to change climatically, however, and as a consequence so will the residents’ lifestyles. Perth has been identified as a miner’s canary for climate change (Sadler 2004). Early modeling in a global assessment of greenhouse issues suggested that this corner of Australia would suffer rainfall decline, and indeed it has (Pittock 1988). After recording a 50 percent decline in rainfall run-off, in the late 1990s the Water Corporation, which manages water services in Western Australia, changed its policy in recognition that this decline was due not to drought but to climate change.

Neither the global community nor Australia has been able to find an adequate, large-scale, internationally accepted solution to climate change, but many smaller solutions are well underway and need to be expanded. In this chapter we describe some examples of practices in Perth and its bioregion that offer lessons in understanding the science, learning to adapt, and beginning to mitigate the effects of climate change.

Perth: The Place and the Problem

Perth is the capital of Western Australia, the state that occupies the western third of the continent and occupies a land area of about 2,529,880 square kilometers (km²) (ABS 2011a). It is the most isolated capital city in the world. The state’s population of 2,236,900 comprises 10 percent of the country’s total population, but most of the state is sparsely populated, with almost three-quarters of its residents living in metropolitan Perth (ABS 2011b). Both the state’s population and its economy have been growing rapidly in recent decades, and these trends are projected to continue over the next 20 years or more. Perth is the

administrative and commercial center for much of the economic activity of the state, including the mineral and natural gas resources industries, which together make a significant contribution to the economic growth and wealth of the state and Australia as a whole. Western Australia also has a very productive agricultural industry and attracts a growing number of tourists.

Perth is located on the Swan Coastal Plain and centers on the Swan River and its estuary (figure 9.2). The plain is roughly 100 km wide, running far to the north and south of the city, and is bounded to the east by the Darling Scarp. The city has developed in a low-density, radial settlement pattern that has been modified by the parallel boundary constraints of the coast to the west and Darling Scarp to the east as well as by the region's groundwater resources. Although a small number of urban and peri-urban settlements occur east of the Darling Scarp, it generally acts as a natural boundary beyond which native forests managed by the state government dominate a rolling landscape. This region is dissected by the catchments for 13 relatively small-scale public water supply dams. Further east beyond the forests is an extensive and largely cleared agricultural landscape in the southwestern corner of the state, which receives high- to medium-rainfall levels.

The temperate Mediterranean climate brings hot, relatively dry summers, and colder, comparatively wet winters. Mean maximum temperatures are 30.8°C in January and 18.3°C in July; mean annual rainfall is 751 millimeters (mm) (ABS 2011b). This chapter examines observed and projected climate change impacts for Perth, surveys some of its greenhouse gas (GHG) mitigation responses, and describes some adaptation responses, such as adjusting public water supplies to take into account declining water availability and dealing with coastal management and local government issues.

Impacts of Climate Change

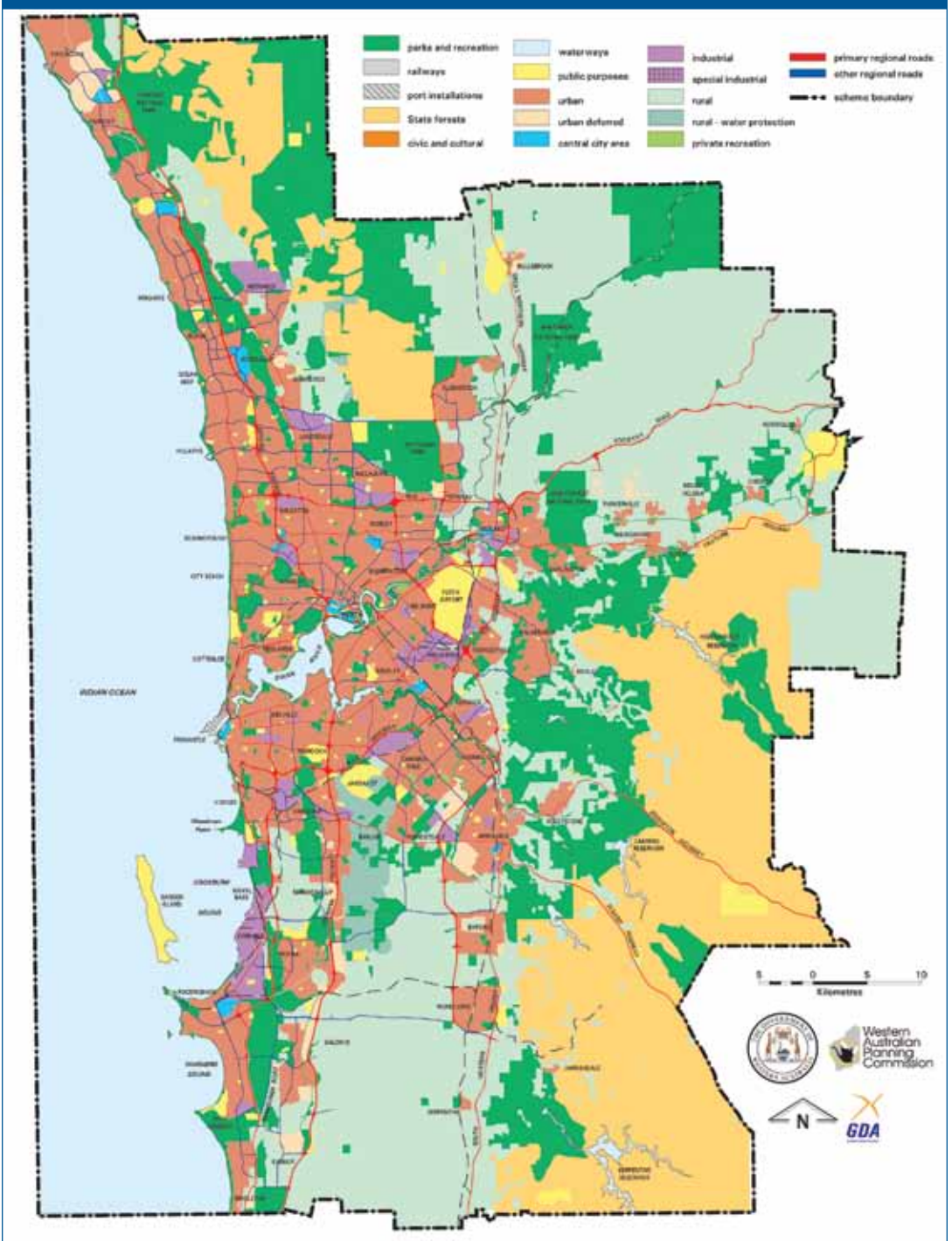
Rising temperatures in the atmosphere and sea are affecting atmospheric circulation as it approaches the state, and in turn these changing patterns have had an impact on rainfall and increased risks of extreme climatic events.

Temperature Rise

Average temperatures in Western Australia increased by 0.8°C between 1910 and 2005, with most of the increase occurring after 1950. The trend in mean temperature has varied within the state, and Perth is among the areas that have experienced the highest levels of warming (Cramb 2005). From 1910 to 2009 the trend in mean temperature for Perth was a warming of 0.15°C every 10 years, and from 1970 to 2009 it increased to 0.20°C every 10 years (BOM 2010a). Winter and spring had the greatest levels of warming, and summer the lowest (Cramb 2005). Over the last 40 years Perth has also experienced a slow increase in the number of very hot days (above 35°C).

Figure 9.2 Perth Metropolitan Region Scheme Zones

Source: Western Australian Planning Commission (2011).



This map indicates the location of urban zoned land as well as transport corridors, including rail lines; state forests and other native vegetation; and protected water supply catchments and groundwater sources.

<http://www.planning.wa.gov.au/5386.asp>

The summer of 2009–2010 was the hottest and driest on record. Throughout that season, from December 2009 to February 2010, Perth recorded just 0.2 mm of rain, whereas the long-term average is 32 mm during the same period. Perth also experienced a total of 59 days at or above 30°C, also a new record (*WA Today* 2010). The average number of days per year with temperatures greater than 35°C is projected to increase from 28 (between 1970 and 2000) to between 30 and 43 days in 2040 (Suppiah et al. 2007). Projections for Perth's mean temperature suggest it could increase by between 0.6°C and 1.5°C by 2030 (figure 9.3).

Sea Temperature Rise

To the west, Western Australia is bordered by the Indian Ocean, which has a major influence on the atmospheric circulation patterns affecting the state and thus on the regional climate that they bring. The sea surface temperatures of the Indian Ocean vary over its spatial extent and over various time scales, but they have been warming over the last 50 years. For the decade from 1991 to 2000, the average sea surface temperature over the entire basin increased by 0.6°C above the baseline established during the 1900–1960 period, and since 2000 it has continued to warm (Feng, Meyers, and Church 2005). One of the areas of greatest increase in surface temperature is the coastal area around Perth, where it is projected to continue this rise (Caputi et al. 2009; figure 9.4).

The Leeuwin Current, a boundary ocean current that flows southward along the coast, dominates the Perth region's coastal environment. The current's strength varies as a function of several factors, including the occurrence and intensity of La Niña and El Niño climate patterns. A decline in its strength was observed between 1950 and the 1990s, and climate scientists think it is possible that climate change may further weaken the Leeuwin Current, which will have many ecological and economic implications for both the Western Australian marine environment and the continuing decline in rainfall (Feng, Meyers, and Church 2009).

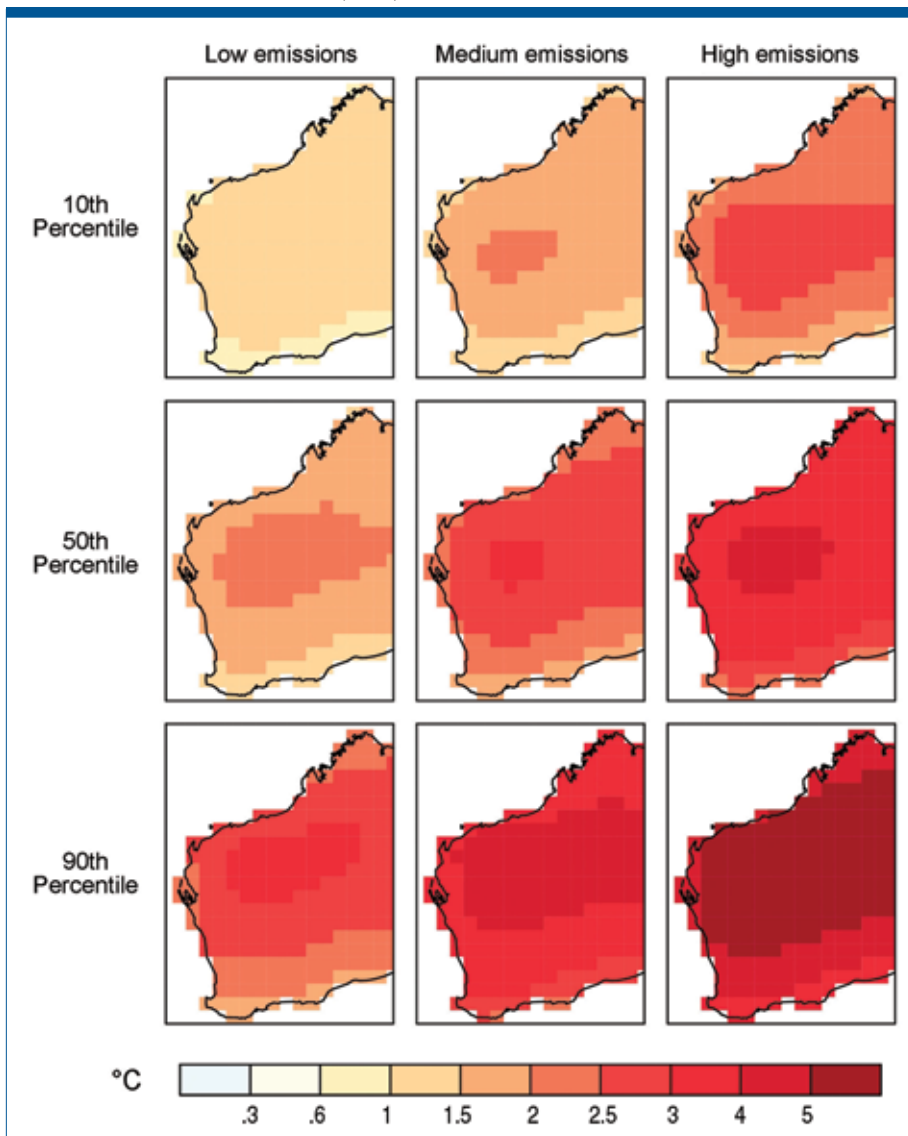
In particular, “any seasonal variation in water temperature increase has important implications for fisheries and the marine ecosystem because it may affect many aspects of the annual life cycle such as timing of growth, moulting, mating, spawning and recruitment,” which have to be taken into account in the stock assessment and management of fisheries (Caputi et al. 2009, 130). For example, in the last few years the western rock lobster fishery has experienced a dramatic decline in numbers at an important early life cycle stage of this economically valuable species.

In February 2011, Western Australia experienced a marine heat wave. Over a large area extending from Ningaloo to the Abrolhos and more than 200 km offshore, surface temperatures were more than 3°C above average for the time of year. In an area that reached from Exmouth to Cape Naturaliste and

500 km offshore, the average temperature was more than 2°C warmer. This heat wave was associated with a number of fish kills along the midwest coast and in the Abrolhos, Kalbarri, and Leeman areas. Rock lobster and abalone deaths also were reported in areas of very warm and calm water (Department of Fisheries 2011).

Figure 9.3 Projected Summer Temperature Increases (°C) for Western Australia in 2070

Source: BOM and CSIRO (2010b).



Projections, cited relative to the 1980–1999 period, give an estimate of the average climate around 2070. The 50th percentile (midpoint of the spread of model results) provides a best-estimate result; the 10th and 90th percentiles (lowest and highest 10 percent of the spread of model results) indicate a range of uncertainty. Emissions scenarios are taken from the IPCC Special Report on Emission Scenarios: The B1 scenario accommodates low emissions, A1B is medium, and high is A1FI.

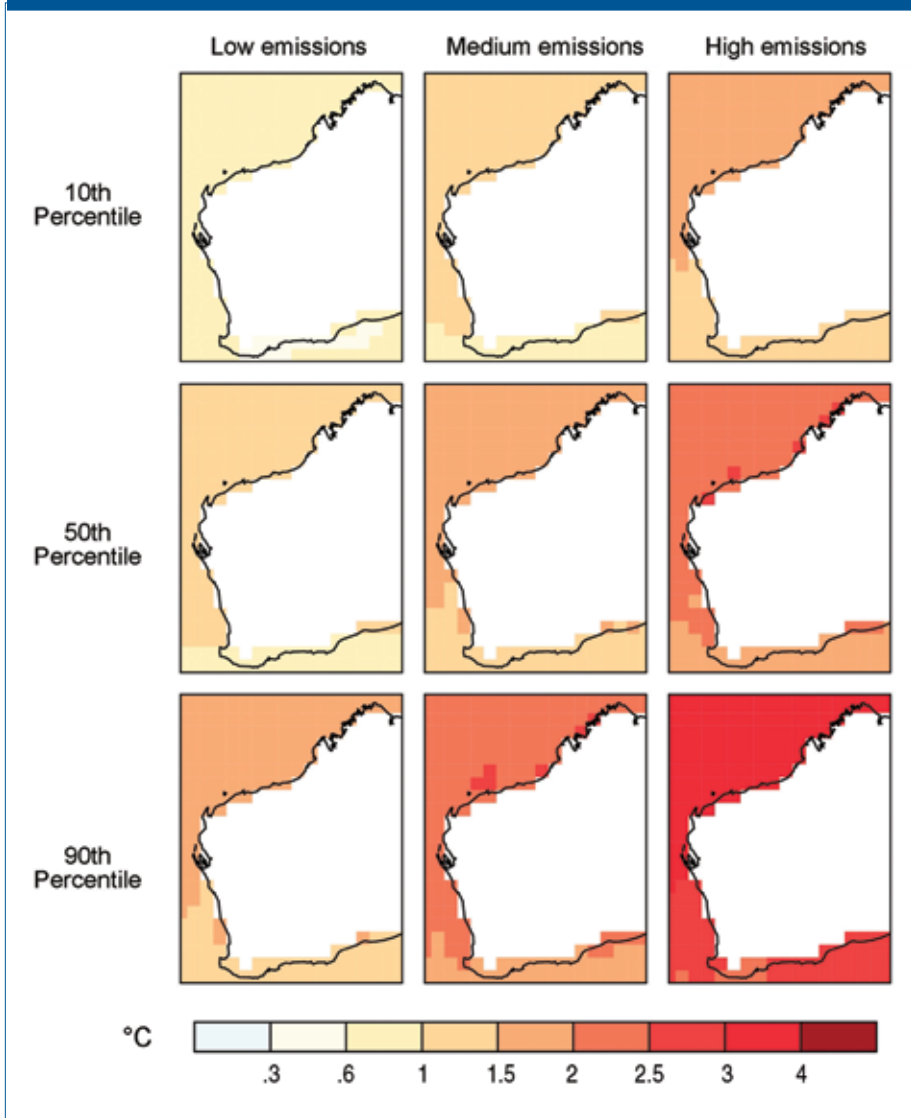
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Sea Level Rise

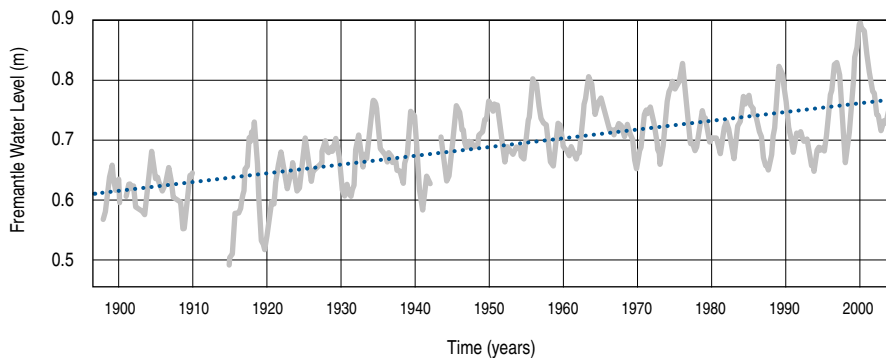
Perth's port activity takes place in the Fremantle area, which has recorded one of the longest time series of sea level data in the Southern Hemisphere (figure 9.5). Mean sea level rise at Fremantle has increased by nearly 20 cen-

Figure 9.4 Projections for Sea Surface Temperature Change (°C) for Western Australian in 2070

Source: BOM and CSIRO (2010c).



Projections, cited relative to the 1980–1999 period, give an estimate of the average climate around 2070, but individual years will show variations from this average. The 50th percentile (midpoint of the spread of model results) provides a best-estimate result; the 10th and 90th percentiles (lowest and highest 10 percent of the spread of model results) indicate a range of uncertainty. Emissions scenarios are taken from the IPCC Special Report on Emission Scenarios: The B1 scenario accommodates low emissions, A1B is medium, and high is A1FI.

Figure 9.5 Mean Sea Level Rise at Fremantle, 1900–2000*Source: Pattiaratchi and Eliot (2005).*

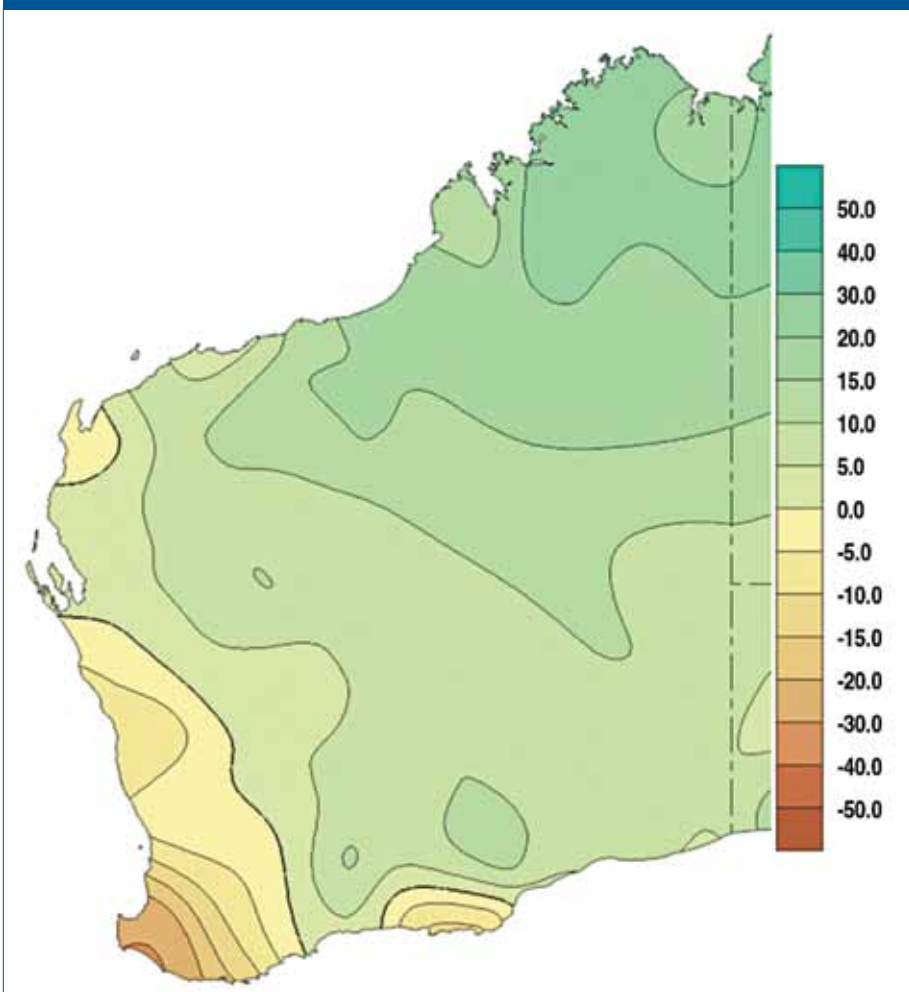
timeters (cm) since 1897, representing an average rate of increase of 1.54 mm per year, which is equivalent to 20 percent of the maximum tidal range for the port (Pattiaratchi and Eliot 2005). This average increase is consistent with the 1.7 mm per year global average sea level rise, which is also increasing; between 1993 and 2009 it rose by 3 mm per year (BOM and CSIRO 2010a). Although these might appear to be relatively small increases, they can result in greater return frequencies for storm surge and other temporary high sea level rise events.

Further complicating the trends in sea level rise is the interannual variability driven by the El Niño–Southern Oscillation (EN–SO), which is superimposed on the sea level data. Sometimes the EN–SO slows the rate of observed sea level rise over a period of years, and at others it temporarily accelerates it. The latter reinforcing effect, along with the long-term sea level rise, has contributed to the apparent increased frequency of coastal flooding in the period from 1995 until 2004 (Eliot 2009), and the historic maximum sea levels recorded in Fremantle in 2003 and 2004 (Pattiaratchi and Eliot 2008). The increased frequency of flooding events has helped raise public awareness of coastal hazards. In terms of future sea level rise in the Perth region, “the predicted increase is up to 0.30 m and 0.88 m by 2040 and 2100, respectively. For sandy beaches this could result in beach recession of 30 m by 2040” (Pattiaratchi and Eliot 2005).

Rainfall Loss

The Perth region has experienced a 20 percent decrease from its long-term average rainfall (figure 9.6). Any reduction in rainfall causes an even greater reduction in stream flows into areas that are rain dependent, as illustrated by up to 50 percent reductions in stream inflow into the public water supply dams for the region (figure 9.7). The annual inflow into the Perth dams has declined from an average of 338 giga-liters (gL), between 1911 and 1974, to 177 gL between

Figure 9.6 Trends in Total Rainfall for Western Australia, 1910–2009 (mm per 10 years)
Source: BOM (2010b).

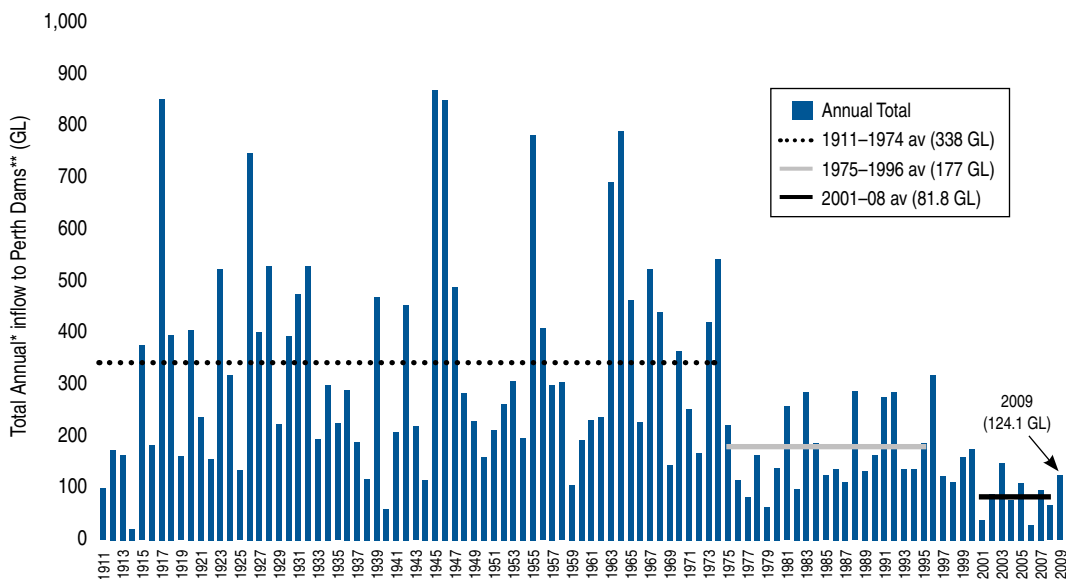


1975 and 1996, and it dropped again to an average of just 81.8 gL between 1996 and 2008 (Water Corporation 2009a). The average inflow over the last decade has been 75 percent less than the pre-1970s average. This dramatic reduction in inflow into the dams has resulted in a consequent loss in their capacity to supply water for the public water system.

Climate change projections for future rainfall in Perth suggest that annual total rainfall could decrease by as much as 20 percent by 2030, with mid-estimates being 5 to 10 percent (Suppiah et al. 2007). Figure 9.8 shows projections for rainfall change to 2070. Its already limited rainfall has led Perth to begin to access extensive groundwater supplies in the sandy shallow aquifer to the east of the city, and more recently to develop a greater reliance on desalination plants.

Figure 9.7 Annual Inflow into Perth Dams

Source: Water Corporation (2009a).



* Year runs from 1 May to 30 April. ** 2009/10 inflow to 21 October 2009.

Storms, Droughts, and Bushfires

The Perth region has experienced fewer winter storm fronts over the last three decades, and climate change may result in further declines. Projecting how climate change will affect storms, in particular cyclones, is quite difficult. However, climate scientists currently believe that the cyclone frequency in North West Western Australia is likely to decline, although their relative intensity may increase. Occasionally cyclones from the state’s northwestern region travel as far south as Perth. While likely to happen less often in the future, risks will increase that those cyclones that do reach Perth will be more severe and cause more damage.

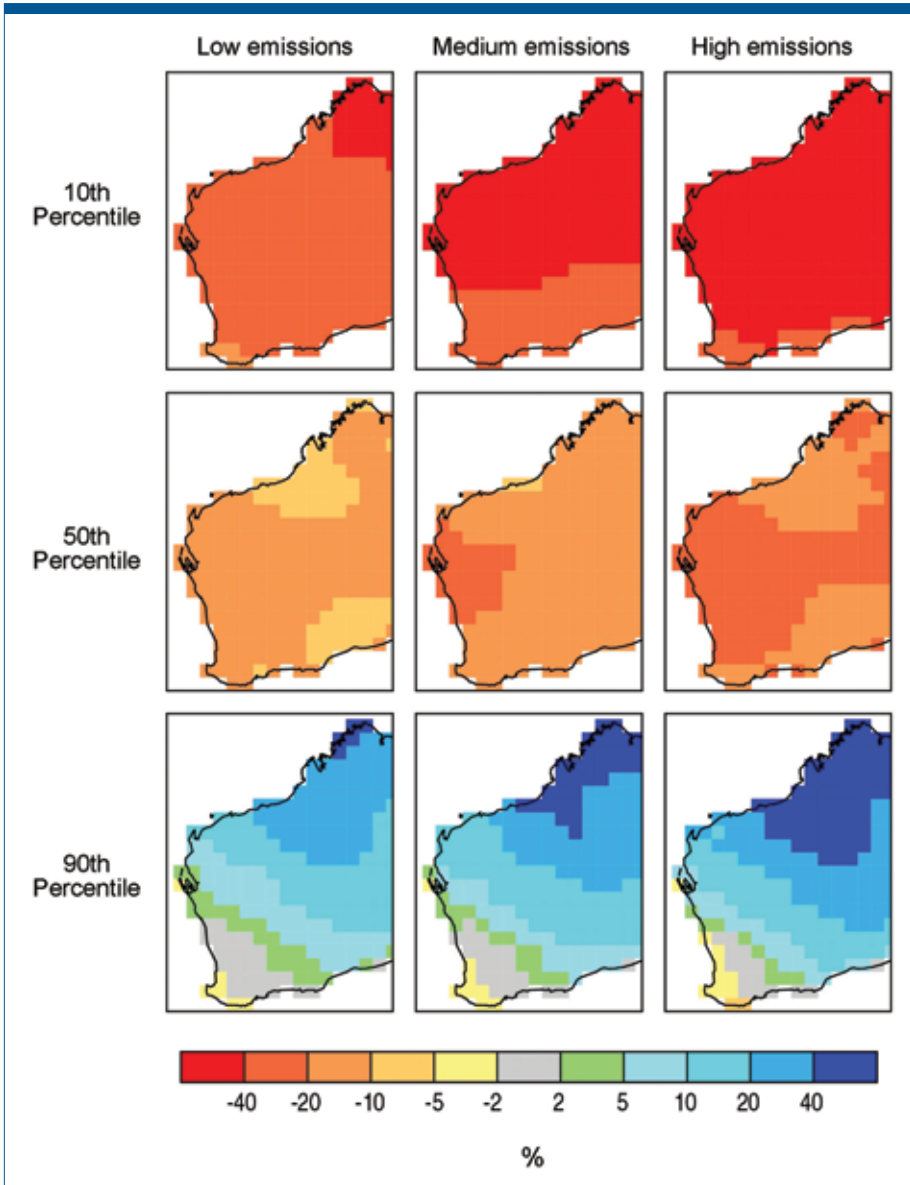
Furthermore, a rising sea level of 0.5 m in coastal areas will increase the probable return rate of high sea level events, such as storm tide surges, by 100 times in the Perth/Fremantle area. For example, with just 0.5 m sea level rise, storm tide surges that occurred once in 100 years in the twentieth century could come to occur annually (ACE CRC 2008). This shift in probabilities will have dramatic implications for coastal erosion and recession.

An assessment of the recent history and future projections of drought in Australia reported that if the rainfall in South West Western Australia declines by 10 percent by 2030, the risk of droughts will triple. A 20 percent rainfall decline would create a six-fold increase in the risk of drought (BOM and CSIRO 2008). Both of these levels are within the range of rainfall decline that

Blakely Disaster Readings

Figure 9.8 Rainfall Projections for Western Australia in 2070

Source: BOM and CSIRO (2010b).



climate change models have projected for Perth. The Water Corporation (2010) has recognized this risk in its 50-year plan for Perth’s water supply, basing its planning on a scenario of a 20 percent decline in rainfall by 2030 and a 40 percent reduction by 2060.

Due to the combination of climate, topography, and vegetation, many regions in Australia have some of the most severe fire climates in the world, and many factors contribute to the risk of severe bushfires. If existing bushfire-prone areas become hotter, drier, and/or windier due to climate change impacts,

the risks will increase (Bushfire CRC 2008). Observed decreases in rainfall, increases in temperature, and more frequent very hot days have already increased bushfire risk around Perth, and climate change projections suggest that these risk factors will continue. Increased lightning frequency, a key cause of fires, is associated with increased storm activity. In 2011 Cyclone Yasi, a Category 6 storm, crossed the Queensland coast of Eastern Australia and created extensive property damage there before sweeping across 3,000 km and causing severe easterly winds around Perth, where 72 houses on the Darling Scarp were burnt to the ground.

Mitigation Responses

Western Australia has a rapidly expanding economy, with almost limitless resources and relatively few people. Over many decades, it also has established a strong environmental record and a substantial and growing number of national parks—the most recent of which comprises 30 reserves of old-growth forest protected from logging. One reason for this environmental awareness is the region's status as one of the world's biodiversity hotspots because, in part, for 2 billion years it has been largely unaffected by geological or glacial activity. The state has been one of the leaders in developing programs and projects related to climate change mitigation and adaptation that include local, state, and federal government responses and industry and community initiatives.

Local Government

One of the first global climate change programs was the Cities for Climate Protection (CCP), an initiative of the International Council for Local Environmental Initiatives. By 2010 CCP had led to a reduction in greenhouse gases of 4.7 million tons—the equivalent of taking around 1 million vehicles off the road. With federal government support, all 40 Perth-area local governments joined this program in the early 2000s. The City of Fremantle, for example, recently became carbon neutral; it also is committed to demonstrating that an urban wind farm can be established at the port as well as how to achieve low-carbon characteristics in urban regeneration projects.

The City of Perth has been a leader in reaching the highest level of CCP participation and has played a global role as part of the World Energy Cities Partnership. By 2010 its Greenhouse Gas Emissions Reduction Strategy, established in 2001, came close to achieving its target of a 20 percent reduction from 1996 levels. An innovative aspect of this effort is to be part of a national program called CitySwitch Green Office that enables any commercial office to receive advice on energy savings. Another recent strategy in the city center has been to improve walkability and reduce car use. Jan Gehl did a study of central Perth in 1994 and later led other research projects across Australia and in the United States, where he redesigned city centers, making them more human-centered. He returned to Perth in 2008 to assess the city's progress and found

increases of 13 percent in pedestrian traffic and 57 percent in use of city spaces (Gehl and Associates 2009).

State Government

In Western Australia grassroots concern about GHG emissions began in the early 1980s, but a strategy for dealing with the issue was not developed until 1991 (WAGCC 1991). The approach followed a state GHG audit, the first of its kind in Australia (Stocker 1991). In 2003 the State Sustainability Strategy was developed as a comprehensive approach to long-term GHG-related issues across 42 areas of government (Government of Western Australia 2003). This program was followed by the Western Australian Greenhouse Strategy in 2004 (Government of Western Australia 2004), which was later complemented by the Premier's Climate Change Action Statement (Government of Western Australia 2007). The Office of Climate Change was established in 2007 to:

- lead development policy advice on greenhouse issues in Western Australia and coordinate government responses to climate change concerns;
- implement the government's program on adaptation to climate change, coordinate the Indian Ocean Climate Initiative, and translate and communicate climate change science for government policies and programs, the community, and industry;
- work across each sector of the economy in conjunction with relevant state agencies to assess GHG abatement opportunities and policy measures;
- work with conservation and natural resource management agencies and organizations to develop and monitor implementation of climate change policies and programs to protect biodiversity, create carbon sinks, and realize other environmental benefits;
- analyze monitoring and reporting data, prepare advice to government officials on trends and issues, and develop standards and methodologies for GHG monitoring, reporting, accounting, and registration;
- provide advice to the Environmental Protection Authority and other statutory authorities on climate change and greenhouse policy;
- coordinate monitoring, reporting, and evaluation of climate change policies and programs across government agencies;
- implement climate change education and communication programs; and
- administer the Low Emissions Energy Development (LEED) Fund, a \$30 million leveraged technology fund over five years.*

* Unless otherwise noted, dollar amounts cited in this chapter refer to Australian currency.

The state government is currently developing a new and updated state climate change strategy that will include an expanded focus on adaptation policy, but a range of policies have been enacted already to assist mitigation, including carbon rights, the TravelSmart and Living Smart programs, and metropolitan planning and public transport initiatives.

Carbon rights. State legislation passed in 2003 enables landholders to claim carbon-trading rights for reforestation of farmland. Much of the wheat belt in the South West region surrounding Perth had been cleared before 1990. Since then major reforestation and revegetation programs have been implemented, and much of this effort has developed carbon credits under the global voluntary trading scheme. A large Japanese energy utility developed a 1,000 hectare (ha) project on 24 properties, using all the best methods of integration with cropping. Other large resource companies have followed this model with extensive integrated tree planting for carbon sequestration.

The Oil Mallee Association was established in 1997 to advise farmers about the multiple benefits of tree crops, such as salinity reduction, biodiversity enhancement, the potential for eucalyptus oil production, and small-scale power generation as well as carbon credits. With funding assistance from Australia Landcare Ltd., by 2009 more than 14,000 ha of mallee eucalypts had been established across 1,000 properties. The improved species, now referred to as an “oil mallee,” is a very hardy native tree from the arid stretches of South West Western Australia. It has an extensive root system, and individual trees have been known to last for hundreds of years, making them ideal for carbon storage. This is also an excellent species to harvest because the trees regrow or coppice immediately after every harvest, a process that presumably can continue for decades.

TravelSmart. This household behavior change program was one of the first to achieve real, repeatable results to reduce automobile use. German sociologist Werner Brög developed an approach to travel demand management based in the social capital of communities (Brög et al. 2009). After some early trials in Europe, Brög’s approach was adopted for large-scale projects in Perth (Ashton-Graham and John 2006). It has since spread to most Australian cities, other European cities, especially in the U.K., and has been piloted in six cities in the United States.

TravelSmart has become a national program in Australia with a new \$20 million project to reach 300,000 households in Brisbane, SEQ. The approach directly targets households, seeking their participation in the program through a letter from the mayor or state minister, and the funds usually are provided via a partnership of local and state authorities. Follow-up phone calls elicit a household’s interest in receiving information and a potential visit from a TravelSmart officer. The trained officers (usually people with a real interest in sustainable

transport) arrive at households by bicycle, towing a trailer of material, including specially designed TravelSmart bags with walking and transit information, free tickets for the local transit system, and pamphlets on why reducing car travel is good for the health of family members and the planet. The officers encourage people to start by limiting the number of local trips, especially school trips for children, which are seen as an essential part of the healthy development of a sense of place and belonging in any community.

Communities where TravelSmart has been conducted show a consistent reduction in vehicle kilometers traveled of 12 to 14 percent, and this pattern seems durable for at least five years after the program is introduced. In places where transit is not readily available and destinations are more spread out, the program may reduce car use by only 8 percent; those locales where extensive transit is available, however, have witnessed reductions as high as 15 percent (Ashton-Graham et al. 2005). While this outcome is not revolutionary, few “silver bullet” actions can transform transport’s impacts more significantly.

TravelSmart also has many positive synergistic outcomes. People involved in the program become dedicated advocates of sustainable transport, often telling their friends how much better they feel after bicycling or walking or taking transit instead of driving. They also share how they have saved money and how they feel better about doing their part to combat global warming and counter oil vulnerability. Evidence in Brisbane when the surveys were conducted showed that many who followed the program had not been involved in the initial household interviews, indicating that friends and colleagues were spreading the message and expanding the number of participants (Ker 2008).

When people start to change their lifestyles and see benefits as a result, they are apt to become advocates for other sustainable transport policies. As communities begin to change themselves, governments find it easier to manage the politics of such transformations. For example, Perth has been rebuilding its rail system over the past 20 years as a result of a strong social movement that demanded improvement (Newman 2011). Now extended to 172 km, patronage of the rail system has increased from 7 to 55 million over a 17-year period. It is relevant that, parallel to this infrastructure-building process, Perth had some 330,000 households participating in the TravelSmart program. The suburbs involved in TravelSmart had significantly higher use of the new train line, and it has become an icon across Australia for other cities that are now determined to upgrade their rail systems. A report sponsored by the Organisation for Economic and Community Development stated that improved acceptance of hard measures, such as taxes and expensive infrastructure, is the prime benefit of soft measures, like TravelSmart (Salzman 2008).

The TravelSmart program is making clear a fundamental principle about behavior change—it works best when supported by a community and is part of the development of social capital. TravelSmart develops its social capital by promoting sustainable transport modes rather than the dominant automobile

culture and by establishing relationships between the TravelSmart officer and others in the local community who take the first steps to get out of their cars. In workplaces, the program works well when a TravelSmart club is formed to enable people to share experiences, sponsor local speakers, and lobby employers for facilities such as showers for bike riders and transit passes instead of parking spaces. When a city's government program facilitates a social movement for more sustainable transport options, that city can then begin to imagine its realization of a more sustainable future.

Living Smart. The same approach to changing travel behavior has been applied at the household level to aspects of sustainability, such as how to reduce waste and use of energy and water. A program known as Living Smart began in Perth, and similar approaches are developing across Australia as climate change emerges as a major political force. The Perth program, under the auspices of the state's Department of Transport, builds on the success of household education and social capital by one-on-one discussions in residents' homes of educationally sound and locally relevant material. The eco-coaches have worked in 30,000 trial households and found enormous enthusiasm from those who had been looking for this kind of targeted assistance. A cold-call process yielded some 80 percent of households expressing interest in making changes to improve energy, water, waste, and travel sustainability. Of those households, 50 percent have been signing up for continued coaching on special water meters, gardening, and home audits.

Unlike TravelSmart, where change tends to occur slowly and incrementally, the Living Smart program receives reports from households that have made instant, radical changes, such as replacing inefficient lights and installing photovoltaic panels (PV), solar hot water systems, and greywater recycling systems. The program is on track to reduce CO₂ by 1.5 tons per household annually from an average in Australia of 14 tons per household. This reduction will save the households more than 10 percent on their gas, electric, water, and petroleum bills (Department of Transport 2009).

The social capital being built up around these new technologies and lifestyles is also proving highly infectious, and it can become the basis of a major social movement if governments are prepared to adopt the approach more broadly. At low cost to the government, the reduction of household GHG has the potential to make a major contribution to climate change mitigation policy worldwide.

Metropolitan planning and public transport. The state government of Western Australia has had a bipartisan approach to regional planning for 50 years, and it wields full planning powers to enable strategic and statutory planning at the local government level to be coordinated with metropolitan Perth and other regional centers. For most of the past half-century, the region has been built

around the car, but it has also implemented an extensive open space system as well as the reclamation of all foreshores and beach frontages.

In recent times the urbanized area has begun to accommodate public transport more extensively and to facilitate more integrated, less car-dependant land uses. The revival of the metropolitan rail system has been very successful through electrification and extension of fast rail along several corridors, providing 172 km of rail with 32 stations. The state is now committed to increasing the number of transit-oriented developments (TODs) around these stations, and its Directions 31 plan provides population and job targets for these centers. A public transport strategy is being prepared to plan the next stage in this integrated approach to future development. Several TODs, such as Stirling City Centre, are designed to be model developments of low carbon use.

Federal Government Programs

The federal government also has created a number of climate change mitigation programs that are being demonstrated in Perth and its bioregion.

Solar cities. Perth's eastern suburbs were chosen to demonstrate how to make renewable energy part of the future city. This program is an opportunity not only to provide several thousand homes with PV, but also to test how these systems, along with smart meters and electric vehicles, can work together to exemplify a renewable city (Droegge 2009; Went, Newman, and James 2009).

Energy efficiency and household assessments. An offer of free insulation enabled 950,000 homes in Australia—90,000 in Perth alone—to become much more energy efficient. Subsidized PVs were built into these grants as well. Householders can have a free assessment of their energy and water use and receive a trained assessor's house-specific recommendations for actions that will improve their home's sustainability.

Renewable energy target. In August 2009, the Federal Government implemented its Renewable Energy Target (RET) scheme, which is designed to deliver on the government's commitment to ensure that, by 2020, 20 percent of Australia's electricity supply will come from renewable sources. In June 2010, Parliament passed legislation to separate the RET into two parts: the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES). The changes provide greater certainty for households, large-scale renewable energy projects, and installers of small-scale renewable energy systems. This statutory requirement for utilities has led to some \$20 billion of investment in wind farms, solar PV, and other renewable projects across Australia. A new wind farm has joined three existing ones in the Perth region, and together they bring the city's renewables contribution to 9 percent of the electricity grid.

Industry

Western Australia is the center of a major gas production area. The Gorgon Gas Field, the most recent project to be approved, was controversial because it is using Barrow Island, an A-class reserve, as the location where gas is brought onshore and processed for export. One reason for development of this site is the availability, deep under the island, of geological formations that enable CO₂ to be pumped down and stored, or “sequestered.” The government of Western Australia has required Chevron and its joint partners, the \$43 billion project’s proponents, to design and construct a carbon capture and storage (CCS) system that will be one of the largest of its kind in the world. Perth will supply most of the labor and receive substantial amounts of energy for space heating, cooking, and electricity generation, resulting in lower GHG emissions than realized from the use of coal, the region’s other major energy source (Barnett 2009).

Nongovernment Organizations

One of the largest and most visionary nongovernment organization (NGO) initiatives in climate change has been rebuilding a 2,000 km natural link from one side of the state to the other. This project, known as Gondwana Link, is revegetating farmland to connect reserves from the coastal Karri forests to the inland Kalgoorlie woodlands. It will create a biodiversity corridor to encourage long-term species survival under climate change pressures and will provide an opportunity for farmers, industry, and NGOs to work together. First envisaged by the Wilderness Society (in consultation with the Nature Conservancy), the project now has partnerships with groups such as Greening Australia and Men of the Trees. Industry has been a substantial contributor through carbon credit processes being developed for biodiversity planting along the reserve. Gondwana Link also provides an opportunity for Perth residents to buy carbon offsets.

Another Perth NGO, Days of Change, challenges householders, businesses, sporting clubs, and others to pledge various levels of GHG reductions personally. Its growing support base recently resulted in 40 percent of the residents in the nearby town of York to commit to substantial reductions in GHG use.

Many households are not waiting for government, industry, or even NGOs to help them contribute to climate change–inspired reductions. In South Fremantle, Hulbert Street residents Shani Graham and Tim Darby decided they would help make their street sustainable and have fun doing it. In just two years, the permaculture-based system for growing vegetables they have developed now involves nearly every household on the street. In addition, more than 20 percent of households have installed PVs on their roofs; a skills register enables people to share tools, trades, and tasks; a bicycle freight system is used to carry items between houses; a Hulbert Street choir has been started; most residents have taken a Living Smart course; and some residents now are taking the program to other streets. Each Friday night Hulbert Street is closed off

for outdoor movies on relevant topics, and each year the residents' Sustainability Fiesta attracts thousands of visitors, who come to see how one street is setting—and meeting—its own goals for the future.

Adaptation Responses to a Drying Climate

Indian Ocean Climate Initiative

In the 1990s many residents in the Perth region expressed considerable resistance to the idea that reduced rainfall could be due to climate change. They preferred the explanation that the reduction was simply natural variability in the weather, because that interpretation implied the decline in rainfall was temporary and higher rainfall levels would return eventually. The doubters further advised caution toward and delay in investing in adaptations to the public water supply system that might address the potential of a permanently reduced rainfall scenario. Substantial public debate continued during that decade over whether natural variability, climate change, or some combination of the two was responsible for observed rainfall declines.

The Western Australian state government acknowledged the decreased rainfall and projections that climate change may cause further reductions, and it recognized the need to understand the causes better. In 1997 the government established a climate science research program with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Bureau of Meteorology (BOM), the two premier climate science research institutions in the country. This collaboration, called the Indian Ocean Climate Initiative (IOCI), has led three successive four-year-long research programs, each based on separate funding and service agreement contracts. The results of IOCI Stages 1 and 2 have been pivotal to public policy making in Western Australia and influential in the national climate science and policy scene. Numerous reports and papers have concluded that climate change is a significant contributor to the reduced rainfall experienced (IOCI 2009). IOCI Stage 3 was completed in 2011.

IOCI research played a key role in convincing decision makers to commit to large, additional public investment in water source developments, even while many voices still argued that such investment should be delayed. Perth, therefore, compares favorably to other Australian capital cities that have experienced reduced rainfall more recently, but it still had to introduce full water restrictions because its public water supply systems could not cope with the reduced water storage in their dams. The value of the IOCI's work has been recognized widely, and many other Australian states have now established similar dedicated climate research programs, in particular the South Eastern Australian Climate Initiative.

Water Resource Planning

Relevant predictions indicate that under a climate changed future the rainfall levels in the Perth region will continue to decline, the city will be

populated by roughly twice its current number of residents, and the environmental impact of water provision will need to be reduced. The Water Corporation, which has primary responsibility for planning water supply and storage in Western Australia, has made major investments in systems to pump groundwater from major aquifers near Perth. During the 1980s and 1990s these efforts diversified the sources for the public water supply system and expanded the proportion of water being sourced from groundwater. Reduced rainfall also resulted in a decrease in groundwater recharge, thus reducing further the sustainable water yield that can be pumped from the region's major groundwater resources.

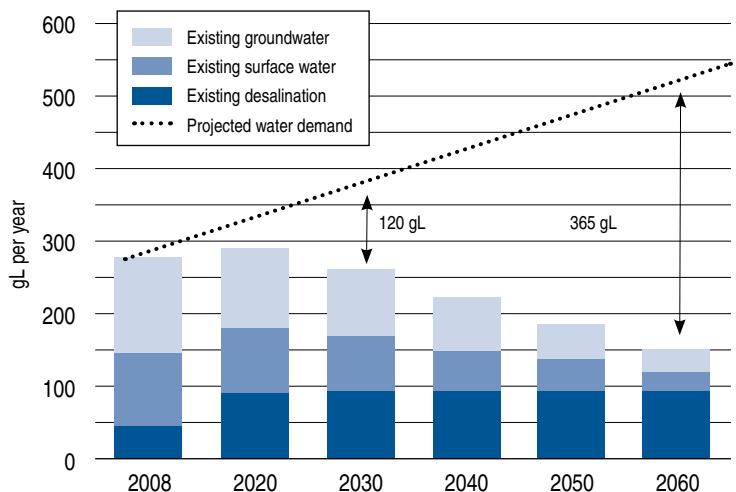
When a severe drought started in 2001, more than 50 percent of the public water supply was sourced from groundwater. The growing awareness that climate change was likely to cause further declines in rainfall, however, caused many officials to recognize the value of diversifying water sources to include those that are independent of rainfall. Thus the state government committed to building the largest seawater desalination plant in the Southern Hemisphere. Australia's first large-scale plant cost \$387 million and began operation in 2006. Since that initial commitment, four other Australian states have made investments in desalination plants. With the construction of a second large seawater desalination plant to supply Perth, the city will obtain 40 percent of its water supply from desalination. Wind powers all of these plants.

The rainfall reduction led the Western Australian state government to invest a total of \$673 million in 10 separate water source development projects between 1996 and 2006, and it has increased water supply capacity by a total of 199 gL (Water Corporation 2010), compared with total water use of 286 gL in 2008 (Water Corporation 2009b). To accommodate for both declining rainfall and increasing population, the Water Corporation has forecast that Perth and its connected towns will need an extra 365 gL of drinking water by 2060 (figure 9.9). In a strategic study, the Water Corporation (2009b) identified this three-part strategy for meeting Perth's water needs in a changing climate:

- reduce water use by 25 percent per capita;

Figure 9.9 Gap Between Perth's Water Supply and Demand to 2060

Source: Water Corporation (2009b, 7).



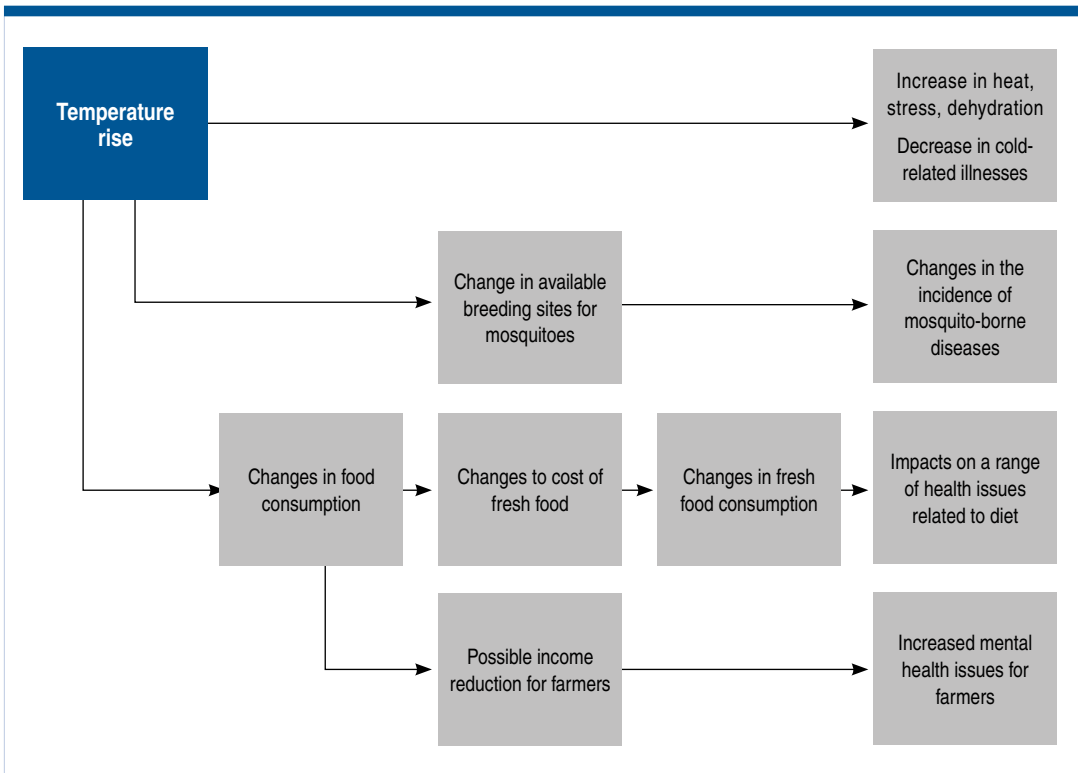
- increase the proportion of metropolitan water that is recycled from 6 per cent to 60 percent; and
- develop new sources, primarily more desalination plants.

Public Health

Western Australia’s Department of Health has recognized that climate change represents a significant and growing threat to public health, with impacts resulting from extreme weather events, air pollution, water- and food-borne diseases, vector-borne diseases, and indirect effects on mental health. In partnership with Curtin University, the department produced an initial study of climate change induced health issues (Spickett, Brown, and Katscherian 2008). The two-phase project sought first to identify potential health impacts that could result from a scenario of climate change in the context of the region’s current ability to cope and the existing socioeconomic vulnerabilities, such as temperature rise (figure 9.10). The second phase involved a risk assessment, which found that the lack of detailed information made a quantitative study impossible. Use of a qualitative review, however, established a good understanding of current activities,

Figure 9.10 Potential Health Impacts of Temperature Rise

Source: Spickett, Brown, and Katscherian (2008).



their adequacy with respect to health, and a range of desirable adaptations and supporting research. This research provides the basis for an active approach to protecting the community from climate change impacts and future planning and adaptation.

Local Governments and the Eastern Metropolitan Regional Council

Under the hotter, drier conditions projected for Perth, bushfires, declining water availability, and waterway health present a range of hazards that will only increase. The consequences are too great for local governments to handle alone, so a regional approach has been adopted in one cutting-edge adaptation process, in which local governments of metropolitan Perth are grouped together into regional councils to provide services such as resource recovery, environmental management, regional development, and risk management. The Eastern Metropolitan Regional Council (EMRC) comprises six member councils, which collectively cover one-third of the metropolitan region and include large stretches of native forest and bushland. These areas are especially vulnerable to the impacts of bushfires on human life, ecosystems, infrastructure, industry, and homes. The river systems within them, and water availability generally, are also under pressure from drying conditions.

The EMRC developed an idea for a regionally based climate change adaptation plan and obtained funds from the Local Adaptation Pathways Program of the Australian government's Department of Climate Change. The EMRC also contributed core funding. The framework, known as Future Proofing Perth's Eastern Region, was developed to complement regional mitigation actions by identifying the major climate change risks and providing assistance with developing a regional adaptation plan to address them. Key stakeholders and decision makers held a regional forum in February 2009, and ongoing consultation and data collection has included a series of workshops with the member councils' staffs to ensure effective and relevant inputs into the risk assessment and asset identification process.

Perth's future proofing process developed a Regional Climate Change Adaptation Action Plan for 2009 through 2013 (EMRC n.d.). It has been approved by the EMRC and is now operational. The EMRC and its six member councils have provided four years of funding and commitment to help ensure that the recommended actions actually are implemented. Ten priority risk areas were identified by the EMRC project.

1. Infrastructure failure
2. Impacts on essential services
3. Watercourse damage and loss
4. Fire

5. Water decline and quality
6. GHG emissions and related air pollution
7. Ecosystem loss and public open space
8. Population health and displaced people
9. Economic decline
10. Changing leadership and development requirements

The EMRC is in the process of implementing actions, including:

- identifying existing information gaps and partnerships regarding the impacts of climate change on local government infrastructure (i.e., roads, paths, drainage);
- investigating current research and directions on power and fuel supply solutions and technologies;
- raising community awareness and behavior change toward riverbank erosion and subsidence issues;
- advocating that the state fire and emergency services authority support better fire management measures;
- raising community awareness about how and when residents should protect their houses to ensure that fire warning systems are in place;
- promoting water-efficient appliances, rainwater tanks, and greywater use; and
- advocating that state government produce a policy on climate change.

All six member councils have been motivated by the future proofing project and are now in the process of developing their own local climate change adaptation action plans based on various forms of risk assessment. The EMRC is also sharing its best management practices with other regional councils such as the Western Suburbs Regional Organisation of Councils. Naomi Rakela, EMRC's manager of environmental services, has said it is logical and beneficial to deal with climate change as a two-level—regional and local—planning strategy in order to ensure that all the risks are captured and provide for a more holistic approach (personal communication, 18 March 2010).

Online Climate Management Toolkit

The Western Australian Local Government Association (WALGA 2009), funded by the Commonwealth of Australia's Department of Environment and Conservation, commissioned the Curtin University Sustainability Policy

Institute (CUSP) to build an online Climate Change Management Toolkit. Its purpose is to provide a set of resources and guidelines to local governments to enable them to respond to climate change concerns. It takes the user through a series of required actions and includes a set of resources for each step. The toolkit has been introduced to a large number of local governments, where it has been well received.

Adaptation Response to Coastal Risks

Perth Coastline

As in most places in Australia, indigenous people in Perth have interacted with the continent's coast for tens of thousands of years. There are many cultural stories about the Nyungar (Noongar) occupation of land that is now under water between Perth and Rottnest Island. As told by Dr. Noel Nannup, "When the Sea Level Rose" recounts the impact of such a catastrophe on his forebears, probably at the end of the last ice age some 7,000 years ago. The narrative follows Nyingarn the Echidna and Kaarda the Goanna as they cared for the spirits of those who had passed away. Wadjemup (Rottnest Island), when it was connected by a land bridge to the mainland, is described, and Mamong the whale and Kieler the dolphin, who helped Nyingarn and Kaarda, are introduced. The story centers on a time when the sea level rose and trapped the spirits of children underneath the sea. Mamong and Kieler helped bring the children back to the land (Nannup 2006).

Many coastal indigenous peoples of Australia have dwelt as clans that share some common features. Coastal clans use marine resources for subsistence, culture, and exchange, and rather than being radically discontinuous, they consider their "saltwater country" or "sea country" to be inseparable from the land. Cultural stories describe the features of sea country, and some names and sacred sites reflect these places, reinforcing clan identity closely tied to the sea. Clans manage their estates through cultural ceremonies, with song and dance, and traditionally they restricted access to the sea according to the season, status of clan member, totem, and presence of sacred sites (Smyth 2004).

Many of the names of islands and coastal features around Perth relate to these cultural or "dreaming" stories (WAPC 2008, 54).

Present-day Noongar oral history confirms the importance of the coast, the sea and the islands. In a restricted report made available to the AIC, several Noongar elders recounted Dreaming stories for the coast from Fremantle to Yanchep. In one version Crocodile, Shark and Whale encountered one another. Their fighting altered different parts of the landscape. Whale is associated with sand dunes at Leighton Beach. Shark and Crocodile fought in Cockburn Sound until the Creation Snake "Waugal" intervened. Crocodile on Waugal's advice travelled

to Yanchep where he metamorphosed into Emu (Waitj)... In another Dreaming story, a fight between Crocodile and Waugal broke up the land and created Rottnest, Garden and Carnac islands.... The Waugal is regarded as having created the sand dunes that follow the coast, as it has for all land features.

Since white settlement of Western Australian, human uses of and impacts on the coastal zone have increased dramatically, and more than 80 percent of the state's population currently lives within 30 kilometers of the coast. The variety of landforms and patterns of human usage of the contemporary coast-line include:

- urban coasts characterized by intensive residential, commercial, and industrial development, usually with high recreational usage;
- natural coasts with light residential and commercial usage with access for tourism and recreation; and
- wilderness coasts with little or no residential, commercial, or industrial usage, and little access to tourists.

The Perth shoreline is largely urban, with some natural coasts to the north and south of the metropolitan area. As the city expands, the conversion of coasts from natural to urban form is unfolding quickly, with much new development occurring close to the primary dunes. Western Australians value a coastal lifestyle and the unique opportunities that the shore provides. Perth's coastal waters are still relatively clean, and residents swim, dive, surf, fish, picnic, sail, and walk their dogs on the shore. For a holiday, they are most likely to visit another coastal location such as Rottnest Island or the Margaret River area. However, pressures on the coast are increasing from rapid population growth and development; catchment land and water use; marine industries (shipping, tourism, aquaculture, oil and gas extraction, tourism, and fishing); pollution; exotic species; and coastal infrastructure development. Climate change and extreme weather events have begun to interact with these existing pressures.

Governance of the coast is a challenge because it is characterized by multiple jurisdictions, a lack of integrated management tools, and continuing controversy over major developments. Perspectives on what constitutes appropriate coastal zone management and adaptation to climate change differ according to the jurisdictions' and stakeholders' worldviews and values (Kellert 2003; Stocker and Kennedy 2009).

State Coastal Planning

Western Australian State Planning Policy No. 2.6: State Coastal Planning Policy (SPP 2.6 2003) is the principal policy instrument for guiding new land developments in coastal regions. The policy's objectives are to:

- protect, conserve, and enhance coastal values, particularly in areas of landscape, nature conservation, indigenous, and cultural significance;
- provide for access to public foreshore areas;
- ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, and commercial and other activities; and
- ensure that the location of coastal facilities and development takes into account coastal processes including erosion, accretion, storm surge, tides, wave conditions, sea level change, and biophysical criteria.

Under a climate changed future, the first three objectives can be met only if the final one is accomplished. To achieve all its objectives, SPP 2.6 2003 relies on the use of measures to guide regional and local coastal planning; strategic coastal planning prior to development of an area; and development setback guidelines. Schedule One of the policy includes guidance on coastal setback requirements in relation to the potential impacts of climate change, sea level rise, and the dynamic nature of coastal processes, including the calculation of distances for absorbing extreme storm sequences and acute erosion and for allowing for historic trends and sea level change.

Although setback calculation varies according to factors such as coastal geomorphology, a total setback on the order of 100 meters from the horizontal setback datum is expected. This has proved to be a highly controversial aspect of the policy, resulting in struggles among government, developers, local residents, and conservationists over access to and use of the foreshore. A more defensible sea level rise formula is being developed, but the fundamentally complex and uncertain nature of climate change and sea level rise challenges the core goals of instrumental policy making and planning. The need for reflexivity and adaptive planning is critical.

Other ongoing coastal planning initiatives include the LiDAR/Airborne Laser Bathymetric survey of the coast from Two Rocks north of Perth to Cape Naturaliste in the southwest corner of Western Australia. This information will be used to support decision making on the coast, taking into account the effects of storm surge and sea level rise. The baseline modeling will ensure identification and better management of areas at risk of coastal inundation and/or flooding and the combined effects of storm surge and high winds.

Following a public engagement process, a coastal planning strategy for Perth is also underway. Its aim is to provide a regional overview, with strategic planning and policy guidance for dealing with development on the metropolitan coast. Considerations include coastal issues; environmental (terrestrial and marine) concerns; urban, commercial, and industrial uses; the place of tourism, recreation, and public use and access; and visual, landscape, and cultural issues. Public submissions on the draft strategy highlighted the importance of climate

change and the subsequent impact of sea level rise and associated concerns with coastal erosion. The final strategy will be an important planning tool for state and local government and other agencies to guide future planning decisions.

Local Government Coastal Vulnerability Assessments

Understanding the implications of locating development in particular areas is critical to managing and mitigating the impacts of climate change, including sea level rise and inundation, storm surge events, and erosion. Vulnerable areas in the Perth metropolitan region include Trigg, Rockingham, Cottesloe, and Mandurah.

The town of Cottesloe, for example, includes one of Perth's favorite and most iconic beaches, which is a major regional attraction for surfers, club goers, sunbathers, families, and coffee drinkers. An annual sculpture festival on the foreshore in March celebrates the interaction of culture and nature and attracts tens of thousands of visitors. Cottesloe Beach faces potential risk from coastal erosion, as development is very close to the present shoreline, with some structures built right on the beachfront. In response to this threat, the Town of Cottesloe (2008) commissioned a report to help officials prepare for future challenges in the management and maintenance of its valuable coast, resources, and infrastructure. The main aim of the report was to establish the potential risk to key existing coastal infrastructure under a range of future climate scenarios and to suggest adaptive pathways. The study found that the most extreme prediction of the modeling process was a shoreline recession of 97 m, which would destroy the main road and the front rows of houses.

Similar studies are underway for other areas in Geographe Bay, an exceptionally vulnerable region with an erosive coastline, large estuarine systems of great ecological and cultural value, and wealthy canal estates. Several local governments in the region are eager to undertake serious climate change adaptation.

Community-Based Adaptation Planning

In July 2009, in Fremantle, CUSP ran a community workshop at a site of early white settlement. Once a Labor Party stronghold, this port town now has an increasingly Greens-leaning electorate and a strong economic base that includes a university, tourism, arts, and designer fashion.

The daylong workshop used Google Earth and deliberation as the key consultation tools. The 150 participants listened to a series of short talks from scientists about the likely impacts of climate change on the Fremantle coastal zone. Local and state government speakers presented the governance perspective, and panel sessions provided time for questions and answers. Participants in groups of eight met around tables and used large physical maps of coastal Fremantle to choose five places of particular importance to the group and identify their values and uses for each of these places. Next they deliberated about their principal concerns regarding the likely impact of climate change on their

Conclusion

Transpacific Perspectives on Climate Action

Edward J. Blakely and Armando Carbonell

Coastal cities and states in the United States and Australia are stepping forward, in many cases well ahead of other developed nations and the international community, both to mitigate and adapt to climate change. During the course of our work on this book, expectations for climate action on the international level have been lowered, beginning with the 2009 United Nations Framework Convention that produced the disappointing, nonbinding Copenhagen Accord. At a subsequent meeting in Cancun, Mexico, in 2010, the convention agreed to create—but not pay for—a Green Climate Fund and Climate Technology Center and made little progress on mitigation targets. The 2011 Framework meeting in Durban, South Africa, although lacking in definitive action, saw progress in implementing the agreed-upon \$100 billion Green Climate Fund, extended for five years the Kyoto Protocol, which had been due to expire in 2012, and moved closer to a binding agreement on a global legal regime for climate by 2015. However, Canada’s withdrawal from Kyoto one day after the conclusion of the Durban meeting cannot be seen as a positive sign.

It is notable that *The Guardian* included the following dramatic headlines in its environmental news of the week shortly before the Durban meeting started: “World Headed for Irreversible Climate Change in 5 Years, IEA Warns”; and “Australian Senate Passes Carbon Tax.” The first article refers to a finding by the International Energy Agency that over the next five years the lock-in effects of new fossil fuel power plants, factories, and inefficient buildings will result in disastrous and irreversible climate change. The second article notes the passage by Australia’s parliament of an AU\$23-per-ton carbon tax on the country’s 500 largest greenhouse gas (GHG) emitters, effective July 2012. *The Guardian* (2011a) lauds the vote as a victory for Prime Minister Julia Gillard in that it creates “the most comprehensive carbon price scheme outside Europe.” Former Prime Minister Kevin Rudd had staked his government and political career on climate action with a proposed carbon-trading scheme that later collapsed, and he was forced to step down in mid-2010.

Meanwhile, in the United States, issuance of rules to limit GHG emissions from power plants and other large polluters has been delayed since the U.S. Environmental Protection Agency missed its September 2011 deadline for issuing new rules on GHG emissions. The 111th Congress (2009–2010) permitted legislation dealing with climate and energy to die, and at this time no serious prospects for revival can be foreseen.

The pivotal environmental issue of our time has largely been pushed off national stages as governments around the globe struggle for economic stability in the wake of the financial crisis of 2008. In spite of mixed prospects for action at the international and national levels, state and local governments have shown a greater ability and willingness to respond to climate change. In public discussions, resilience and adaptation are coming to the fore, and increasing attention is being given to the impacts of changes in climate on human welfare and the integrity of ecosystems. Local governments are finding champions for higher-density settlement patterns and increased public transit. Both New York City and the state have embarked on an ambitious plan to increase their resilience to climate change. Melbourne and Sydney are moving ahead with increasingly bold urban revitalization plans that incorporate many climate change adaptation strategies, including requirements for water retention, increased use of energy-saving devices for all new homes, and a variety of inducements to retrofit existing buildings.

With drought followed by extreme flood events, Queensland is experiencing its worst weather swings in recorded history, thus reinforcing the political will to act to protect sensitive areas from climate volatility. At the same time, however, desalination plants, which entail notable GHG impacts themselves, are being built across Australia in anticipation of more severe droughts. In the United States, the BP Deepwater Horizon oil spill of April 2010 led to increased cooperation among the southeastern states with coasts on the Gulf of Mexico. The oil spill heightened recognition of these areas' increased vulnerability to environmental damage. The destruction of wetlands and loss of habitat portend potential disaster for inhabited areas as the chapters on the southeastern Atlantic states from the Carolinas to Florida and on New Orleans ably demonstrate.

While a variety of arguments and rationales can be advanced for change in urban spatial arrangements and planning regimes, some of the urban transformations beginning to emerge in the United States and Australia clearly are aimed at dealing with the risks of climate change. Moreover, it is apparent that each country is learning from the other. Study tours, conferences, and other means of sharing experiences are driving a common set of themes in the major cities discussed in this book, which we hope will make its own contribution to new understanding.

In each of our coastal city cases, a trigger event or set of events and conditions can be associated with problem recognition that leads to action. In Los Angeles, where the Southern California Association of Governments represents more than 18 million people living in 6 counties and 191 cities, a patchwork water system initially designed to accommodate only a few million people is now

seriously stressed due to population growth and the effects of climate change that have caused a decline in distant water supplies. The sources and systems that supply water to the Los Angeles basin from the Colorado River, eastern Sierra Mountains, and California Delta are exceedingly fragile. Rampant fires may signal impending catastrophe, as the second-largest metropolitan area in the United States faces the prospect of simply running dry, even while rising sea levels, extreme tides, and storm surge threaten the coast. Through legislation and executive order as well as at the ballot box, the state of California has responded vigorously and now requires regional approaches to mitigate GHG emissions and encourages communities to become more resilient to the unavoidable effects of climate change. Across the Pacific, in Queensland, the state government and local government authorities are concerned with many of the same forces at work in Los Angeles and are taking action to deal with similar extreme conditions.

A new-found recognition is emerging that the landscape entailed within a “climate region” is larger than the jurisdictional boundaries that were created in earlier times. The entire central area of Australia is a single climate region with similar conditions prevailing over millions of square kilometers of the land mass. The Murray-Darling River provides water for crops and human consumption across four states and the Australian Capitol Territory. Similarly, New York City and the Hudson River Valley to its north belong to a single watershed, but jurisdictions throughout the metropolitan area were carved up with scant attention to water or other natural systems. This watershed and others in both countries lack governance arrangements sufficient to the task of effectively addressing volatile climatic conditions. We see the impacts on fragile ecologies in Queensland, in California, and especially in New Orleans at the mouth of the mighty Mississippi River. While the search for better governance structures for these natural systems is a consistent theme in *Resilient Coastal City Regions*, so is the awareness that there are no easy answers. While it may not always be feasible to redraw boundaries to reflect ecological reality, new ways of organizing ourselves across space are being developed to deal with an uncertain and risky future.

Both mitigation and adaptation policies are necessary components of a rational societal response to climate change. Because of the long half-life of GHGs released into the atmosphere since the advent of the industrial era, the planet will continue to warm, even if we are able to achieve reductions in future emissions. This means that, regardless of our success with various mitigation measures, we still need to deal with the kinds of impacts described in these chapters. Further, although many of the cities and states examined here have taken important steps to reduce GHG emissions, in the absence of enforceable national and international mitigation targets and robust strategies to achieve them, we cannot expect to avert a range of more extreme climate effects. It is noteworthy that cities and states have stepped up to take the initiative on mitigation despite our failure to date to achieve international consensus or, in the United States, even to craft a national policy.

Adaptation—reducing the impacts of unavoidable climate change—is the main thrust in New Orleans, where more than US\$10 billion is being spent to contain the Mississippi River and fend off storm surges from the Gulf of Mexico. Flood damage in New Orleans can be reduced by restoring the pre-twentieth-century deltaic urban form, allowing the river to flow into privately owned properties to restore wetland habitats and relieve pressure on the levees during high river stages. The recently adopted New Orleans master plan and Louisiana’s 2012 coastal master plan both recognize the need for this approach, but its implementation will require significant political courage and financial resources.

Similarly, New York City is considering strategies to protect the world financial marketplace in Lower Manhattan, which is highly vulnerable to storm surge. Strategic retreat is now being discussed in northern New South Wales and the Sydney region, as the cost and difficulty of defending existing development is prohibitive. Perth, with 50 percent of its water supply now provided by desalination plants, has recognized the impacts of climate change on dwindling groundwater supplies over two decades. The region’s winter rainfall average is now insufficient to fully replenish surface water storage systems. Melbourne and most of the surrounding region have taken an adaptive posture in responding to flood risks in low-lying areas, but the local government has been loath to deny homeowners permission to rebuild in the hills above the city scarred by the devastating Black Sunday fires in 2009. The same can be said for much of Southern California’s hill country, where major fires have occurred regularly during the past decade.

Why are cities and states stepping forward, in many cases well ahead of nations and the international community, both to mitigate and adapt to climate change? The benefits of mitigation accrue to the entire planet, so there can be said to exist a “free rider” problem that would argue against local action. However, the economic benefits associated with a wide range of mitigation actions—those providing cost savings from energy efficiency, for example—can be captured locally. And the innovations spurred on by California’s aggressive climate policies may position that state competitively as others catch up under future national mandates. Adaptation will continue to be a local imperative as the benefits of action—and the costs of inaction—will, to a great extent, be felt locally.

In publishing this volume, it is our intent to document approaches that will be useful not just in the United States and Australia, but more broadly in coastal regions throughout the world. We are humbly aware that this is only an initial response to a challenge with a magnitude of potential impacts never before experienced in human history, a challenge that will test our ability to work together at every scale, from the local to the planetary.

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Blakely Disaster Readings

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There are no easy answers to these questions, and we do not aim to address them here in favor of careful place-based assessments being made but rather seek to acknowledge and highlight the need to address social systems beyond just recovery.

Another example of financial incentives and assistance are incidental cash flows for jobs that residents are capable of undertaking as part of recovery processes. The cobenefits here are that activities such as cleanup of debris from sites can be achieved by able residents, such as those in the post-Haiti earthquake recovery (see [Chapter 4](#)). The challenges of such exercises include limited money or work suitable for all, limitations associated with age, care responsibilities, and physical abilities to undertake a job. Furthermore, cash flow and the role of local markets have twofold elements. From one perspective, cash flow is important in the developing world as it provides an access to income for some actors, but on the other hand they can pose threats associated with hyperinflation, uneven distribution, and impacts on the value of savings.

The equity and fairness of financial aid is often challenged by land tenure, or more accurately, a lack of tenure proof or rights. While it is often considered a problem of informal settlements in the developing world, questions of tenure in relation to financial distribution are also prominent in the developed world. For example, Hurricane Katrina revealed complex and sometimes unregulated land inheritance practices in New Orleans, resulting in the inability of residents to prove their tenure status ([Baab, 2008](#)). Reflecting on this, we argue that there is a need to address fundamental planning dynamics and political questions of land ownership and to honor the local particularities of an area.

Insurance is traditionally seen as a relatively fair mean of financial assistance after a disaster event—an affected household receives compensation based on damage and premium. Such measures, however, often do not allow for improvements to be made to achieve more resilient structures and, as a result, may contribute to the overall resilience of a community. The German practices reported in [Chapter 9](#) demonstrate State and Federal governments' dedication to recovery through provision of 80% of reconstruction costs for homeowners without insurance. While this exemplar is fairer compared to the US practice of spending most funding on infrastructure and to provide personal loans for households, there is still a potential for those with insurance to be disadvantaged, as discussed above. Thus, we consider governance of insurance policies applied in the New Zealand as fairer and inclusive as the government established mechanisms to link with insurance companies, acknowledging that it is common for poorer people to be uninsured, often due to risk profiling meaning that riskier properties incur significantly higher premiums.

OPPORTUNITIES, PATH DEPENDENCIES, AND CHANGE

The *prior quality and arrangements of governance and community interconnectedness* have significant impacts on the ability to improve resilience in recovery processes. It is tempting for decision makers and politicians during recovery to simply seek to *rebuild without building upon strengths and making fundamental changes* and improvements where needed, due to limited resources, even when recovery may

offer possibilities to change approaches. In parallel however, *many settlements are in highly dynamic states* in terms of growth, change, expansion or contraction of populations, economies, impacts on the environment, and quality and type of the built form, and it may not be advisable or even possible to seek to recreate prior arrangements.

Moreover, it is not always rational to bluntly restrict or prevent development in areas with high-risk profiles. Rather, there is a need to treat them and seek solutions for reducing risks by increasing resilience. For example, Hallegatte (2011) discusses the comparative investment advantages of hazardous areas such as ports—despite being subject to floods, storm surge, waste, dangerous goods, and pollution risks—they are often key foundations of social and economic capitals of local and national importance. Thus, development should be permitted and risk reduction practices should not compromise other needs of the community, particularly if significant prior investment has been made in these areas. However, such areas tend to attract ongoing development, including housing projects, the owners and residents of which are not necessarily aware of risks associated with the location. This suggests that there is a need to ensure that governance processes include ongoing community education. However, a fundamental question remains whether development of risky but community benefit providing areas should be permitted at all. If it is permitted, then what is the minimum risk benchmark, and if not—who is responsible for existing settlements and threats to them? We cannot provide a blanket response to this paradox but rather illustrate this point as a provocation for built environment and relevant professionals to consider as part of dynamic system change management.

Prior long-term investments in settlements, such as infrastructure and services, are significant, and it is prudent and usually necessary to maximize these to the greatest extent if appropriate. While not addressed directly in this book, the importance of services such as sewerage, water, electricity, and various hazard solutions (e.g., levees) are mentioned in the majority of cases in this book. The failure of some of these can add significantly to or even cause disasters. For example, the failure of high voltage power lines was identified as a significant cause of fire ignition on February 7, 2009, in Victoria, Australia (Victorian Bushfires Royal Commission, 2010). Another example of need to invest in infrastructure was noted in the Hurricane Katrina case, when damaged infrastructure released the toxic sewage and pollutants, and residents were exposed to what has been described as a “toxic bath,” leading to ongoing health problems and adding to fatalities (American Society of Civil Engineers Hurricane Katrina External Review Panel, 2007; US Army Corps of Engineers, 2009).

Transportation and in particular roads are a key infrastructure element requiring fundamental investment. Roads’ spatial arrangement, network, and connectivity to other areas and between sites, capacity, quality, width, and so forth influence evacuation and response, as well as recovery and further prevention. The problematics associated with these are the limits to risk treatments imposed by landscape and natural factors, such as steep slopes in wildfire-prone areas (Kornakova & March, 2017), low-lying terrain in areas susceptible to flooding, such as parts of New Orleans (Comfort, 2006), or roads limited in width and accessibility in mountain terrains

of Nepal and India. Focused on questions of social vulnerability, the recovery process after the 2013 German floods demonstrated the severity of oil contamination in affected areas and highlighting the need to address core services as part of recovery.

Developing new understandings and support may be difficult in circumstances where the capability to plan is bounded by formal decision processes that have limited scope for modification. The scope for new planning possibilities allowed by current regulatory structures may challenge the ability to modify settlements' physical and functional form. Furthermore, mass and local media, politics, and bureaucracies may confuse "truths" and possibilities in recovery. However, the Swiss case (see [Chapter 7](#)) demonstrates positive examples of political interventions into ongoing development and regulatory structures. Addressing large-scale land speculation that was facilitating risky development in avalanche-prone areas, political conviction provided a base for the enforcement of new regulatory arrangement for land management in the country and led to the establishment of land use and planning regulations, specifically targeted to address natural hazards risks.

It is common for *existing planning approaches to be maintained*, even when many of the risk profiles associated with the disaster were to some extent brought about by the planning system itself. Because planning systems are complex and cross over into many other aspects of urban management, service provision, and tenure systems, it is usually challenging to change fundamental planning approaches. Accordingly, it is common to change one or two main aspects of the planning system or to use one type of approach at the expense of an overall change. For example, it is common to change key regulations after the event, when a wider view may suggest that this would be only one aspect of a suite of planning approaches that might be used to improve resilience. This is illustrated in Victorian wildfire planning, which responded to 2009 season by updating hazard mapping systems and tightening planning regulations.

It should be noted although that *new rules and approaches, however sensible, may be unsuccessful*. The development of new approaches, understandings and regulations among experts, decisions makers, and formal bodies does not guarantee compliance and acceptance among the community. This is illustrated to some extent in Victorian planning for wildfire, where a lack of meaningful communication and consultation with residents led to a backlash against changes in regulations. In summary, the introduction of overly restrictive regulations was so unpopular that the government was concerned for its reelection chances and rapidly relaxed the controls accordingly. Other successful community engagement in a number of recovery cases from the developing world, however, demonstrates the value of successful participation exercises. For example, the relocation of sites in India (see [Chapter 8](#)) or engaging with local communities in Haiti and Sri Lanka (see [Chapters 12 and 11](#), respectively) show how engagement builds community trust and capacity. Building techniques negotiated in Sri Lanka post-2004 tsunami demonstrate effective collaboration between government officials and local organizations resulted in alternative livelihood sources for local divers, leading to building resilience and capacities of the community.

NEW AND EXISTING KNOWLEDGE VERSUS TIMELY REBUILDING

Disasters present opportunities to deliver new and improved settlements, based on the learning that can come about by studying events and consolidating other up-to-date evidence, international scientific knowledge, and community insights. However, it is typically a time-consuming and complex task to modify underlying rules, regulations, and mechanisms for recovery and ongoing settlement management processes. For example, limited in time and under pressure by various stakeholders, decision makers in the Victorian wildfire case, documented in [Chapter 10](#), adopted new building codes that were imperfect resulting in ongoing construction of housing stock, which is sound structurally but not adequately resistant to potential fire disasters. In contrast, the history of land use and hazard mapping of Switzerland discussed in [Chapter 7](#) demonstrates processes required to establish new systems in a meaningful way that is also accepted by the community. While such prolonged processes might not be desirable in all cases, it demonstrates that there are benefits of extending the temporal scale of processes compared to hasty or ad hoc rebuilding.

The development and use of new and existing evidence is integral to improved resilience in recovery processes. For example, considering the ways that data were collected and used in the Swiss case mentioned above, we argue that good planning process or good governance of the disaster recovery directly depends on knowledge and application of science to manage and improve the ways settlements change over time. The careful assessment of avalanche risks and establishment of treatments ranging from restricting development, imposing design standards, and the use of avalanche barriers to protect towns and infrastructure have proven highly effective. Contrary to this, the Victorian chapter demonstrated how a relative lack of collaboration between science and decision makers could lead to the best practice being ignored in favor of “workarounds.”

TEMPORARY OR WORKAROUND SOLUTIONS MAY BE LONG LASTING

Temporary recovery arrangements such as relocation may result in eventual permanence or have significant influence on the expectations of citizens for ongoing care by authorities and may disrupt economic and social resilience and connectivity. Furthermore, temporary relocation may influence choices for future locations of homes or become permanent. Initial investment costs may have been so great that after initial finances have been expended by governments and the modifications to people’s lives, and the investments have made around “temporary” or extraordinary arrangements that they become permanent.

One of the documented cases of temporary housing becoming permanent is the post-Hurricane Mitch recovery in Honduras, when 6 years after the event, hundreds of affected residents remained in temporary or transitional housing ([Arnold, 2006](#), p. 262). While life span of transitional housing is 3–5 years according to the [Department for International Development \(2011\)](#), complicated governance in place, limited financial aid, poor quality of construction, lack of well-established infrastructure such as sewage system, and lack or uncertainty of source of livelihood leads

to health impacts, welfare dependency, difficulties with maladaptive coping mechanisms including drug and alcohol abuse, and education of children (Boano, 2013). For example, post-2010 Haiti earthquake, number of housing programs were recalled due to difficulties associated with distributing finances and working within settings of local governance, and, by 2013, more than 80,000 of affected residents were still living in transitional tents (Sanderson & Burnell, 2013).

Transitional housing is often used to provide immediate relief and shelter for affected residents. Cases such as the displacement of more than 60,000 residents in Aceh post-2004 Indian Ocean Tsunami to poorly constructed shelters for over a year after disaster (Da Silva, 2010) demonstrate the need to establish recovery planning strategies before disaster striking or immediately to work with the community on rebuilding. Supporting this point is the housing recovery post-2004 Indian tsunami in Lam Guron village, Indonesia. Compared to those villagers relocated into temporary shelters, community residents returned to their original settlement and initiated the recovery processes. Temporary housing constructed by residents was further augmented by relevant agencies through in situ upgrades and community development programs. The presence of the community at the time of rebuilding is considered as one of the key success factors for this community in comparison to other communities (Mantel, 2013).

There may also be impacts associated with temporary regulations, advice and financial aid mechanisms that establish dependency and expectations that may not be able to be maintained for long periods. For example, in the Victorian 2009 wildfire case time-limited dispensations and financial aid associated with politically motivated promises to facilitate speedy recovery created expectations that all victims would be able to rebuild with the financial assistance, whereas time limits to regulatory dispensations to rebuilding, necessary to ensure that new building in the future would achieve higher standards of fire resistance, were eventually imposed, preventing residents who psychologically took long periods to recover from rebuilding.

However, when intelligently applied temporary structures can provide alternatives for residents, such as the FEMA trailers as described in the case of post-Katrina New Orleans, in Chapter 11. While this might not be an ideal solution in a long run, it can certainly be used as a transitioning housing solution. Reconstruction of the shopping mall in Christchurch post-2011 Canterbury earthquake is an example of the successful use of temporary solutions for the economic benefit of the community (Re:START MALL, 2014). In fact, the use of shipping containers, such as in Christchurch, is increasingly understood as being attractive for transitional housing as they are relatively cheap and easy to use and adapt. While the challenges of such measures relate to both the nature of structures and the potential restriction of timely community recovery, we believe that there is a benefit of their use in temporary housing and potential further recycling as community facilities, such as those in Christchurch. The use of such containers for more than 10 years post-2003 earthquake in Bam, Chapter 8, supports this argument. On the flip side, an example of the use of adaptable core structures as described in Chapter 13 provides a positive example of targeting limited finances to be spent on a feature that can be permanent and around which adaptive change led by residents themselves can occur over time, rather than building a full temporary structure.

SITE SPECIFICITY VERSUS STANDARDIZATION AND HOMOGENEITY

Many aspects of settlement development and management over time are based on standardized and homogenous systems that, in nondisaster times, may offer certainty, efficiency, and fairness in bureaucratic or mass construction terms. However, many aspects of human settlements may actually require highly site-specific responses in terms of human and community needs and indeed to respond effectively to the risk profiles of places.

Urban planning, with its potential to deal with spatially specific matters, can align risk assessments and treatments directly with the locations that require them. This site specificity is well illustrated in the Swiss practice of applying hazard mapping to land use and zoning, thus identifying development types allowed based on risk levels and site-specific assessments. This can be understood as having relatively standardized overarching principles in place to ensure that lower tier site-specific assessments and tailored responses occur. However, it is recognized that such practices might not be possible in some areas due to the need for considerable resources to assess and treat certain risks and the need for mechanisms being in place to provide regulatory strength to enforce plans. Importantly, it is challenging to modify existing housing stock quickly, but with the use of regulatory mechanisms, it may be possible to use the potential of spatial planning to develop resilient settlements as building stock is modified over time. Wildfire planning in Victoria, described in [Chapter 10](#), illustrates the role of planning in the modification of natural features, such as fuel loads, allowing for greater maximization of settlements, based on understanding the context of settlements at a range of scales.

While not discussed directly in this book, the case of the 2015 wildfires in Wye River and Separation Creek, Victoria, Australia, illustrates need for application of site-specific planning and design codes. Located on the scenic coastal Great Ocean Road, these two townships are located on heavily vegetated and extremely steep slopes (up to 40 degrees), have no articulated gas system and have only one road in and out. The topography of the site encourages a building typology with understories, which are often used as storage for gas vessels, timber for heating, and other often combustible objects. The current state of houses and sites that survived the fire remains risky, highlighting the need to address human understandings and response to risks, as well as their needs ([Kornakova & March, 2016](#)).

Human settlements are overall systems of economic and social subsystems that interconnect with the environment and the physical elements of settlements. Individual elements within settlements, such as structures and buildings, need to be responsive to sites' risk profiles, within the wider context and functions of a settlement and region. The adaptability of housing is one potential measure in achieving this. Adaptability can refer to structural typology, such as the mechanisms of bracing and the struts for supporting structures. The problematics of these solutions are associated with construction costs, deficient knowledge of building function and maintenance among residents, and rapid rebuild programs that often restrict meaningful innovation and change in the design of new housing stock.

Housing adaptability also refers to addressing the needs of residents and providing them with opportunities to adapt and expand as they see suitable. The core house structures described in the Indonesian case set out in [Chapter 13](#) is an example of a structure that allows residents to expand and rebuild in manner and pace suitable for them, as well as reduces costs and time of recovery processes. This point overlaps with another category of challenge, the dynamic and interconnectedness of planning processes and systems ([Fig. 15.1](#)).

WAYS FORWARD TO DEAL WITH CORE CHALLENGES TO PLAN FOR DISASTER RECOVERY

Recovery and prevention processes overlap in settlements that undertake ongoing dynamic change—even if the “moment” and pressures of postdisaster rebuilding suggests otherwise—the actions taken in recovery set many of the fundamental risk profiles and adaptability into settlements’ futures. The dynamic nature of urban planning potentially allows it to address and reflect on changes in community composition, goals, needs, and so forth over time. The inclusive and collaborative basis of democratically based urban planning allows for the development of new knowledge and its further translation to various professionals, decision makers, agencies, and the community. More importantly, as community goals, views, and desires often conflict with those of other professionals, urban planning has the means to ensure that negotiated outcomes are arrived at to satisfy all parties. Being in a position to bring together various stakeholders, agencies, and institutions, urban planning contributes to successful recovery processes by addressing “high levels of political commitment and strong institutional frameworks, which provide greater opportunity for promoting risk reduction and building resilience, as well as a greater chance for recovery and reconstruction to be implemented in an efficient and effective manner that avoids negative consequences” ([UNISDR, 2015a](#), p. 2).

The discussion of the challenges undertaken above and as demonstrated in the cases examined in this book suggests that it is appropriate to restate the challenges addressed in the section above. They address the fundamental temporal, regulatory, and democratic aspects associated with settlements, and the need to act between individual and collective concerns. We argue that:

1. Recovery is for people and communities, even while we might focus on structures and physical outcomes.
2. Fairer and more inclusive settlements are more resilient. Facilitating improved community functions across a range of realms delivers wide benefits as well as resilience.
3. Opportunities to improve resilience across social, governance, physical, economic, and regulatory realms must be taken in predisaster planning and recovery settings.
4. The development and application of a range of knowledge types is key to resilient recovery, even if it might sometimes slow down physical rebuilding.

5. Care must be taken not to reduce long-term resilience and to unnecessarily expend resources if undertaking temporary measures.
6. Site-specific actions must be allowed if they deliver greater resilience even if standardization is encouraged by existing systems and regulation.

To address the challenges set out above, we must focus on people and ensure that the physical objects of recovery deal with ongoing social and economic needs allowing for “new normal” to be established and maintained over time. Maintenance requires not only community inclusion but also systematic “checkups” and, if necessary, interventions from professionals and agencies. We argue that these are integral to good urban planning in any case but are particularly highlighted in recovery settings. Governance of the new normal tackles questions of equity and fairness, and marginalized and vulnerable groups need to be equally included in all processes. Good governance must also address financial costs of disasters and their distribution post-disaster event. A key principle of building back better is “greater financial resilience and predictability within government to manage and respond to disaster triggered by natural hazards, and formalized strategic and resource commitments toward recovery planning, implementation and performance management” (UNISDR, 2015a, p. 3).

The devastation and losses brought by disasters, as harsh as it sounds, often open opportunities for more resilient development. We argue that by expanding spatial length of so-called window of opportunity, new paths for development can be successfully established. This can be achieved when the former or traditional processes are reconsidered and potentially changed. We must seek improved governance that will be robust and inclusive of all diverse stakeholders and their needs.

Effective recovery is timely, but we must ensure that it is based on the best knowledge available and new science, without discarding valuable traditional understandings and practices. Moreover, while the main premise of this book is to take advantage of the potential for change and improvement after disasters, we should not limit ourselves to settlements that have been affected by disasters. Rather, there is a need to continue to learn from other cases in this book and elsewhere to increase resilience and reduce vulnerability of settlements. This can be done in collaboration with other aspects and elements of the settlement processes and build upon (UNISDR, 2015a, p. 3) the principle of resilient recovery and “strengthening mechanisms for cooperation with services in areas of recovery and reconstruction that include sharing rosters of experts, capacity building, tools, bi-lateral support between countries, progress monitoring; and standardized approaches for post-disaster assessments and recovery planning frameworks.”

Immediate response and recovery often includes relocation of affected residents and the provision of temporary housing solutions. Governance must ensure that these do not fall into the problem that “nothing is more permanent than the temporary” (*Greek proverb*). We should not establish ad hoc settlements that lower long-term resilience. However, if relocation is necessary and unavoidable, we must ensure that new areas provide adequate social and economic opportunities for residents, sufficient and robust core infrastructure is in place, and risk levels are minimized or

managed. Finally, recovery must directly tackle and address risk profiles of the given site or an area; so standardized approaches need to be mediated with attention to understanding when site-specific responses are required.

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