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Natural catastrophes and man-made disasters in 2008:
North America and Asia suffer heavy losses

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Executive summary

Catastrophes claimed 240 500 lives in 2008, leading to high economic and insured losses

2008 was one of the costliest catastrophe years.

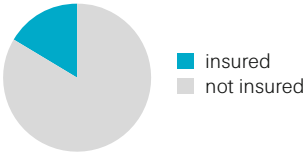
In 2008, natural catastrophes and man-made disasters caused 240 500 fatalities and led to economic losses of USD 269 bn.[1] The cost to property insurers was USD 52.5 bn, making 2008 one of the costliest catastrophe years in history. The extent of the damage once again revealed the need to introduce improved prevention and post disaster management practices. It also reaffirmed that the lack of insurance cover, particularly in the emerging markets, continues to leave many people vulnerable after a catastrophic event occurs.

Of the 311 catastrophic events in 2008, 137 were considered natural catastrophes, while the remaining 174 were man-made disasters.

Exceptionally high death toll and many human tragedies

Most of the 240 500 people who died in catastrophe events in 2008 lived in Asia. Tropical cyclones, typhoons and an earthquake claimed more than 228 400 lives in the region.

- In early May, cyclone Nargis caused more than 138 000 fatalities in Myanmar
- A May earthquake measuring 7.9 on the moment magnitude scale devastated China's Sichuan region, killing over 87 400
- 1 400 people died after typhoon Fengshen hit the Philippines, including 800 people who lost their lives aboard the ferry MV Princess of the Stars



Extremely high economic losses

Total damage to the economy amounted to approximately USD 269 bn in 2008, the highest total loss since 2005, when a series of hurricanes led to losses of USD 262 bn. Most of the 2008 losses could be attributed to the earthquake that struck China in May, which cost USD 124 bn.

With insured property catastrophe losses of USD 52.5 bn, 2008 was one of the costliest years since the hurricane-prone years 2004 and 2005. Of the USD 52.5 bn in insured losses, USD 44.7 bn were due to natural catastrophes, while the remaining USD 7.8 bn were related to major man-made disasters.

High insurance losses from storms

The events which caused the biggest insurance claims were related to storms:

- In the US, hurricanes Ike and Gustav resulted in insured losses estimated at USD 20 bn and USD 4 bn respectively, including offshore damages and the claims covered under the National Flood Insurance Program.
- Tornadoes and thunderstorms in the US in May caused losses of USD 1.3 bn and USD 1.1 bn respectively.
- Europe was hit by winter storm Emma in March and storm depression Hilal in May. Insured losses were estimated at USD 1.3 bn and USD 1 bn, respectively.
- Snow storms and freezing rain struck China in early 2008 costing USD 1.3 bn.

Of the USD 7.8 bn in damage from man-made disasters, more than two-thirds (USD 5.3 bn) were triggered by large-scale industrial fires and losses in the energy sector. Losses in aviation and space insurance, however, were low in comparison.

[1] All losses have been adjusted for inflation and reported at 2008 prices.

The mature insurance markets Japan and Australia dominated the Asian catastrophe loss statistics in the past, but China is catching up.

Given the rapid economic development of the Asia Pacific region, natural catastrophes are having more of an impact on the insurance industry. Moreover, many parts of Asia, especially along the coastlines, are highly exposed to natural hazards such as earthquakes, tsunamis, volcanoes, tropical cyclones, floods, hail, snow and thunderstorms. While Japan and Australia have dominated the Asian insurance loss statistics in the past, China is catching up due to its massive, fast-growing economy and increasing insurance penetration.

Public private partnerships – as developed outside Asia over the past years – could flourish in Asia.

In Asia, insurance protection against these risks has remained at very low levels. As a consequence, individuals, corporations and governments must bear the uninsured catastrophe losses. Government protection schemes, which have been successfully implemented in other regions in recent years, could lead to better catastrophe protection in Asia. Public private partnerships represent yet another option for strengthening the resilience of Asian countries to financial shocks arising from natural disasters.

In 2005, catastrophe reinsurance saved at least 12% of insurance companies from default.

Reinsurance continues to play a key role in absorbing catastrophe losses. In catastrophe intensive years such as 2005, reinsurance effectively protected insurers against catastrophe losses. Based on extrapolations of Swiss Re's book of business, 12% of direct insurers – representing 3.2% of gross premiums written – received payments from reinsurers in 2005 for natural catastrophe losses that were equal to or exceeded 100% of their shareholders' equity. About 23% of direct insurers – which accounted for 9.3% of gross premiums written – received payments from reinsurers that accounted for more than one-third of their equity capital.

Overview of catastrophes in 2008

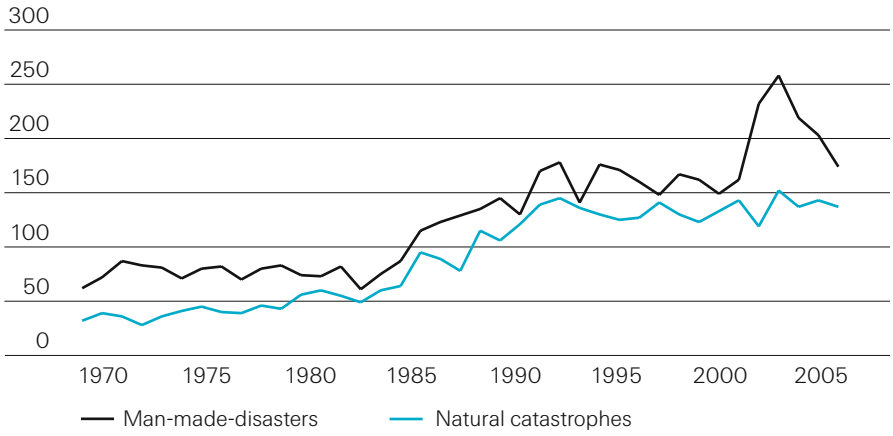
Selection criteria 2008

		in USDm
Insured claims	Maritime disasters	17.2
	Aviation	34.4
	Other losses	42.7
or Total losses		85.4
or Casualties	Dead or missing	20
	Injured	50
	Homeless	2000

More than three hundred catastrophes in 2008

Of the 311 events that occurred in 2008, 137 were due to natural catastrophes. The remaining 174 events were caused by man-made disasters. An event is included in the statistics if insured claims, total losses or the number of casualties exceeds a certain limit (refer to the text in the margin). Each year, the claims threshold is adjusted for inflation.

Figure 1
Number of events 1970 – 2008



More than 240 500 catastrophe victims across the globe

Natural catastrophes claimed 240 500 lives in 2008.

In 2008, 240 500 people worldwide died or were unaccounted for due to natural catastrophes or man-made disasters. In terms of the number of victims, 2008 was one of the worst years since 1970.

In Asia, more than 235 000 people died or disappeared after the region was hit by several catastrophes.[2] Storms, floods and landslides caused the most fatalities (143 000), with tropical cyclone Nargis alone claiming 138 000 victims. In China's Sichuan province, a devastating earthquake measuring 7.9 on the moment magnitude scale struck in May. Approximately 70 000 died and 18 000 disappeared, while another 374 000 were injured. Among the victims were 19 000 children and teachers who perished when their schools collapsed. Typhoon Fengshen and the ensuing flooding killed 1 400 people in June. In Afghanistan, heavy snowfall and a cold wave claimed more than 1 300 lives at the beginning of the year.

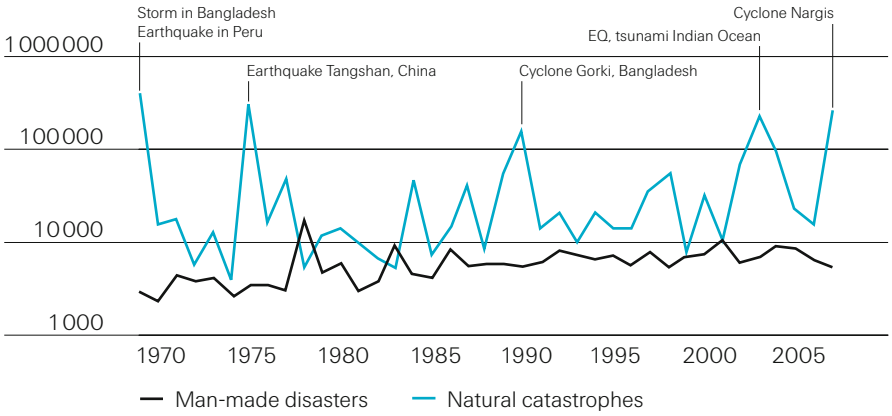
Haiti was the most affected country in the Caribbean. Tropical storm Fay in August and hurricanes Hanna, Ike, and Gustav in September resulted in more than 700 fatalities. The city of Gonaïves was also completely flooded, leading to more than 500 deaths.

[2] For a detailed summary of cyclone Nargis and the Sichuan earthquake see the chapter entitled "Natural catastrophe insurance in Asia set to grow", page 10.

Man-made disasters claimed more than 5 600 lives.

Approximately 5 600 people lost their lives due to man-made disasters in 2008. The most affected region was Asia with 2 700 fatalities, mainly due to shipping disasters, mining accidents, stampedes and terrorism. Bomb explosions in Pakistan claimed over 400 lives and injured 700 people. A four-day terrorist attack on luxury hotels and other facilities in Mumbai left another 172 people dead. Although the number of fatalities in the aviation sector decreased from 2007 to 2008, roughly 500 passengers and crew members perished in aviation accidents in 2008.

Figure 2
Number of victims 1970 – 2008



The scale is logarithmic – the number of victims increases tenfold per band.

Total financial losses estimated at USD 269bn

Total financial losses from natural catastrophes were USD 258bn. Man-made disasters cost USD 10.8bn.

Catastrophes and man-made disasters led to worldwide economic losses of USD 269bn in 2008. Virtually all of these losses (USD 258bn) were caused by natural catastrophes.[3] At USD 124bn, the Sichuan earthquake in China represented the largest single loss of 2008, surpassing the losses from the Great Hanshin earthquake that shook Kobe, Japan in 1995.

Hurricanes in the US also led to significant losses. Hurricane Ike caused USD 40bn in damages, followed by Gustav at USD 17.5bn. The severe and prolonged flooding in Iowa and other Midwest states in June generated losses of USD 10bn. Bridges and highways were swamped, and up to 40 000 homes and businesses were flooded. Factories were subsequently forced to shut down; water and power lines also sustained considerable damages.

Man-made disasters triggered losses of USD 10.8bn. A ruptured pipeline on Varanus Island in Western Australia in June 2008 was the costliest, resulting in losses of USD 1.7bn to local industries and the economy.

[3] See page 39 "Terms and selection criteria" for the calculation of total losses.

Insured catastrophe losses: in excess of USD 52bn

Insured losses due to natural catastrophes were USD 44.7bn.

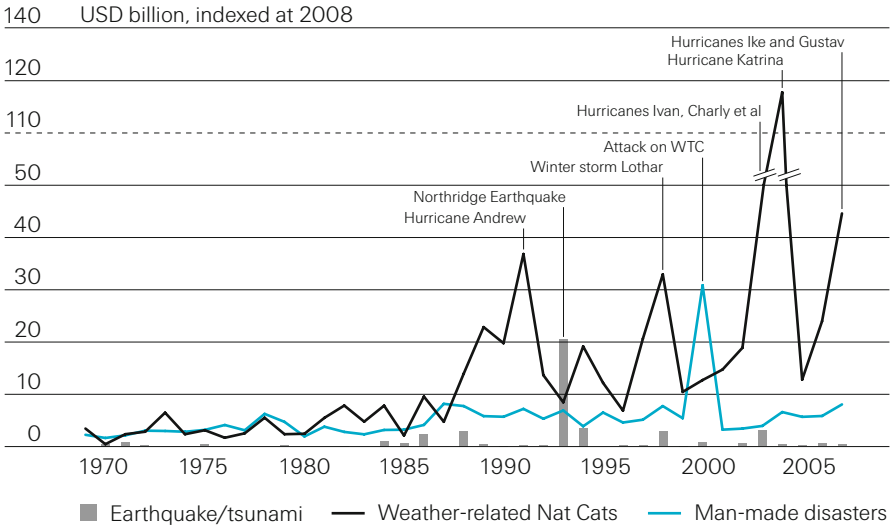
Individuals, companies or state institutions absorbed most of the USD 269bn in catastrophe losses in 2008. Only about 20% of the total losses (USD 52.5bn) were covered by insurers.

Overall, natural catastrophes led to insured losses of USD 44.7bn worldwide, with storms alone costing the insurance industry USD 39.3bn. In the US, claims from 22 storm-related events during the first half of 2008 soared to a record USD 10.2bn. During the third quarter, hurricanes drove losses, though the fourth quarter, in comparison, was relatively calm. Over the course of the year, four events triggered losses that exceeded USD 1bn: Hurricane Ike (USD 20bn), Hurricane Gustav (USD 4bn), tornadoes (USD 1.3bn) and thunderstorms (USD 1.1bn).

Insured losses within Europe were relatively moderate. Nevertheless, two events generated billion-dollar losses for the insurance industry. At the beginning of March, winter storm Emma swept across large parts of central Europe causing damages of USD 1.3bn. In May, storm depression Hilal led to insured losses of USD 1bn.

In Asia, only one event triggered losses that exceeded USD 1bn: in early 2008, ice and snow storms struck China, leading to insured losses of USD 1.3bn.

Figure 3
Insured catastrophe losses 1970–2008



Man-made disasters led to insured losses of USD 7.8bn.

Man-made disasters led to losses of USD 7.8bn worldwide in 2008. Fires and explosions in both the industrial and energy sectors each generated losses of USD 2bn. The single costliest event was a fire at Universal Studios in Los Angeles, which led to record property damages of over USD 500m.

High catastrophe losses in the US

Asia accounted for 98% of the world's catastrophe victims. North America accounted for 76% of the world's insured losses.

North America accounted for nearly USD 40 bn or 76% of the world's insured catastrophe losses in 2008 (see Table 1). The losses were driven by hurricanes Ike and Gustav as well as thunderstorms during the first half of 2008. Europe, which last year accounted for 45% of insured losses, contributed slightly over a tenth of the world total in 2008, largely due to lower storm and flood losses. In terms of fatalities, Asia suffered the heaviest losses in 2008 with over 235 000 victims, or 98% of the world total.

Table 1
Catastrophes in 2008 by region

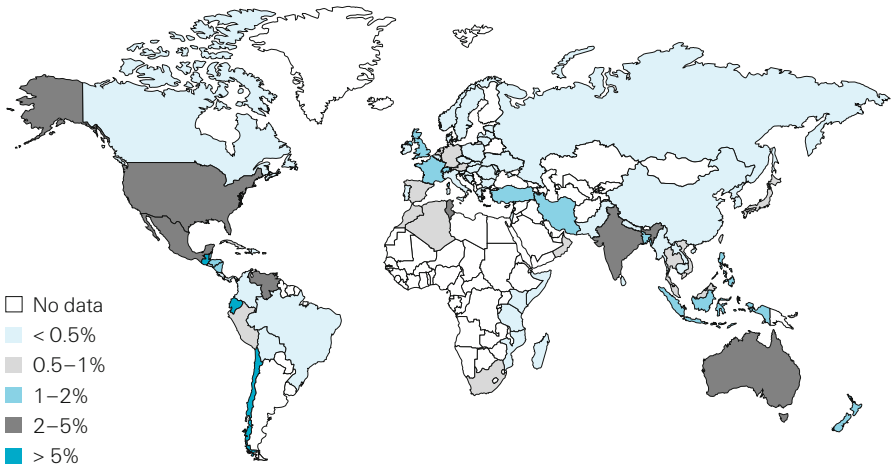
					Insured loss	
Region	**Number**	**in %**	**Victims**	**in %**	(in USD m)	in %
North America	54	17.3%	1 230	0.5%	39 881	76.0%
Europe	45	14.5%	506	0.2%	5 806	11.1%
Asia	129	41.5%	235 276	97.9%	3 014	5.7%
South America	13	4.2%	534	0.2%	360	0.7%
Oceania/Australia	7	2.3%	4	0.0%	2 272	4.3%
Africa	29	9.3%	1 543	0.6%	426	0.8%
Seas/Space/Worldwide	34	10.9%	1 367	0.6%	745	1.4%
World total	**311**	**100.0%**	**240 460**	**100.0%**	**52 504**	**100.0%**

In Ecuador, Guatemala and Chile, natural catastrophe losses accounted for more than 5% of total non-life premiums.

During the period 1970–2008, natural catastrophes in the US and Mexico cost insurers slightly more than 2% of non-life premiums per year. In Western Europe, natural catastrophe losses, as a percentage of non-premiums, reached record highs of about 1% in France, the United Kingdom, Switzerland, Germany and Spain. In Asia, the same percentage was attained in India, Turkey, Bangladesh, Indonesia, the Philippines, Iran and Thailand. The countries with the highest natural catastrophe losses – ie those with insured catastrophe losses of more than 5% of total non-life premiums – were Ecuador, Guatemala and Chile. These countries are exposed to all three major natural risks: storms, floods and earthquakes.

The catastrophe loss-to-premium ratio is determined by the actual exposure to natural catastrophes and the extent to which catastrophes are insured. In many emerging markets, the costs of catastrophes are either uninsured or insufficiently insured. As a result, individuals and companies are vulnerable, and tend to be overly dependent on government or other international organisations for aid.

Figure 4
Insured natural catastrophe losses as a percentage of total non-life premiums[4], average 1970–2008



Catastrophe data on Swiss Re's CatNet™

Swiss Re's CatNet™, the company's online natural hazard information and mapping system, is now readily accessible. CatNet™ offers the following features:

- Access to the geographical distribution of storms, earthquakes, floods and flood-prone coastal areas. The flood risk dataset is unique.
- The ability to select from a variety of backgrounds: eg satellite images, detailed road maps, hybrid maps as well as plane survey maps, population densities per square kilometer, etc
- The possibility to import Excel worksheets and text files (with geographic coordinates) and integrate them into the maps
- The ability to import files using Google Earth's standard data format, KML/KMZ
- CatNet™ can be accessed via www.swissre.com/catnet. Registration is required. Access is free of charge to Swiss Re clients.

Given the rapid economic development of the Asia/Pacific region, natural catastrophes are having more of an impact on the insurance industry (see Figure 5). Moreover, many parts of Asia, especially along the coastlines, are highly exposed to natural hazards, such as earthquakes, tsunamis, volcanoes, tropical cyclones, floods, hail, snow and thunderstorms.

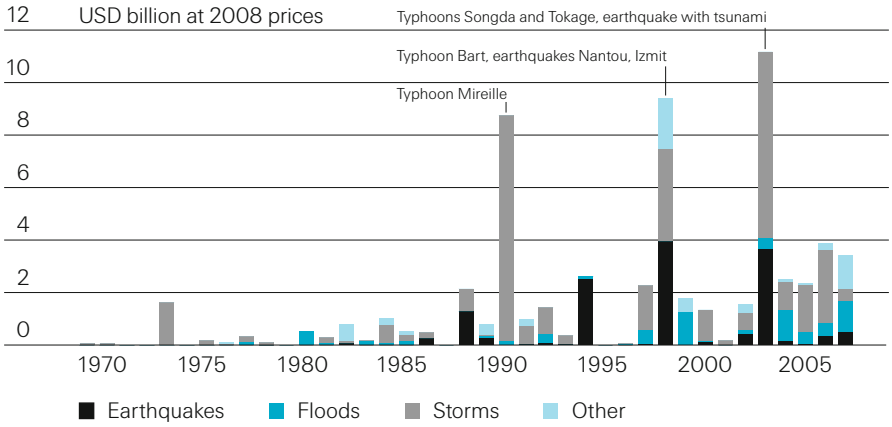
[4] To calculate 2008 ratios when premium data were not available, insured natural catastrophe losses are expressed as a percentage of the previous year's total direct non-life premiums. This results in an upward bias to absolute ratios, but does not affect the relative numbers across countries. For catastrophes which hit several countries, the same average loss-to-premium ratio was applied to each country.

Japan and Australia – mature markets driving the losses

In line with the growing trend of natural catastrophe losses in Asia, a few events in Japan and Australia stand out.

A few large insurance losses in Japan and Australia – both mature markets – have heavily influenced the loss statistics in the Asia/Pacific region. Tropical cyclones Mireille (1991), Bart (1999) and Songda (2004) all caused widespread damage in Japan. In 1995, the Japanese port city of Kobe was also struck by a devastating earthquake. A major hailstorm hit Sydney, Australia in 1999, leading to significant losses.

Figure 5
Insured property losses due to natural catastrophes in Asia and Oceania



Source: Swiss Re

Even without extreme catastrophes, the insured natural catastrophe losses in Asia and Oceania have exceeded USD 2bn per year since 2005.

Despite the strong overall impact of the mature markets on historic loss statistics, smaller markets and/or less prominent perils are also becoming important factors. Although there was no single extremely costly insurance loss event between 2005 and 2008, the average natural catastrophe bill nevertheless exceeded USD 2bn per year. Still partly driven by losses in Japan and Australia – ie tropical cyclones Shanshan and Larry in 2006, the Niigata earthquake in 2007, and the Australian east coast storms in 2007 and 2008 – this increasing "basic loss burden" was also driven by events such as floods in India (2005), floods and earthquakes in Indonesia (2005, 2007), tropical cyclones in South Korea (2003) and earthquakes, tropical cyclones, floods, snow and ice storms in China (2004, 2005, 2006, 2008).

Growing values – rising loss potentials

If China had a higher insurance penetration, insured catastrophe losses would be considerably higher.

As a basic rule, the loss potential due to natural catastrophes is highly correlated with insurance market growth. In China, for example, real non-life insurance premiums have increased by 14.4% per year over the past decade (1998 to 2007). Economic development, however, has not been even across the country; it has been stronger in areas which are significantly exposed to natural hazards, such as coastal regions.

Though the US state of Florida has often been cited as an example of a hazard-prone area with strong growth, Shenzhen, a city next to Hong Kong in southern China, is also noteworthy. Between 1980 and 2008, Shenzen's population grew from 300 000 to roughly 12 million. Given the history of powerful tropical cyclones hitting the South China Sea coast, the potential impact of this rapid growth on both insured and uninsured losses is enormous. Table 2 shows Swiss Re estimates of the total losses and insured losses which can be expected from a once-in-200-year event. It shows that the total loss potential in China is enormous and that there is a strong need to develop insurance. Today, a 200-year event would leave the vast majority of the losses uninsured. China serves only as an example. The situation in many other Asian emerging markets does not differ substantially from that of China.

Table 2
Property & Engineering loss potential in China, 200 year return period

	Insured property loss USD bn	Total property loss USD bn	Insured as % of total
Tropical cyclone	7.8	60	13%
Earthquake	3.0	190	2%
Flood	1.9	46	4%

Source: Swiss Re estimates

An insurer's view: natural catastrophes in Asia in 2008

The Sichuan earthquake in China was one of the severest catastrophes ever, but cost insurers less than one billion USD.

Sichuan Earthquake, China
In May 2008, a devastating earthquake with a magnitude of 7.9 struck Sichuan province, China. Approximately 70 000 people died and 18 000 disappeared, whilst another 374 000 were injured. It is estimated that at least 5 million people were left without shelter, though the number could be as high as 10 million. Some communities along the 300 kilometres of ruptured fault line were almost completely destroyed, whilst many more were severely damaged. Damage to the infrastructure and bad weather in the days after the event made access to the mountainous area difficult and hampered rescue operations. The large lakes that formed behind instable masses of landslide debris threatened to inundate cities downstream for weeks after the earthquake.

Estimates of economic damage differ to a large degree and strongly depend on how economic damage is defined. Although the direct economic damage has been reported at USD 124 bn, the Chinese National Development and Reform Commission (NDRC) announced reconstruction investment needs of USD 150 bn.

In stark contrast to the economic loss figures, insured losses (life and non-life insurance) are estimated at a comparatively modest USD 0.75bn. Insurance penetration (premiums as a percentage of GDP) in China was just 1.8% in life insurance and 1.1% in non-life insurance in 2007. Earthquake coverage, in contrast to insurance for storms and floods, is not automatically included in standard property fire policies, but can be purchased at an additional premium. Whilst large domestic or multinational companies often buy earthquake coverage, it is rather rare for small and medium-sized enterprises to purchase it; it is practically non-existent for residential property. Furthermore, insurance penetration in some of the mountainous areas most affected by earthquakes is even lower than the national average.

The Sichuan Earthquake has undoubtedly raised the awareness of earthquake risk in China, but it is unclear whether this will automatically result in the purchase of insurance to mitigate the impact of future disasters. The Chinese government's decision to work on a general concept for establishing an earthquake insurance pool, however, could rapidly pave the way for widespread and affordable earthquake insurance in China.

Snow/ice storms, southern China

Although less severe in terms of victims and total loss, the snowstorms in China cost insurers more than USD 1bn.

In early 2008, unusually cold weather coupled with heavy snow and ice paralysed southeast China. While harsh winter conditions are common in many parts of China, some of the provinces most severely affected by this event had not experienced such prolonged cold weather in decades. According to official figures, approximately 1 million homes were either destroyed or damaged. Infrastructure, especially power and water supply, as well as transportation (roads, railways, air traffic) came to a complete halt in many areas. Moreover, the snowstorms coincided with the Chinese New Year, a peak travel season in China. The agricultural sector was also hit hard, leading to significant losses of livestock and reduced crop yields.

Direct economic losses were estimated at USD 20bn, while the total insurance market losses were approximately USD 1.3bn. In contrast to earthquakes, snow storms are covered under standard property fire policies in China. The bulk of the insurance loss claims came from the commercial/industrial sector, where power transmission and distribution line operators were particularly affected. The precarious road conditions and prolonged below-zero temperatures also led to a number of accidents, resulting in high losses from motor insurance policies.

Tropical cyclone Nargis, Myanmar

Tropical cyclone Nargis in Myanmar was a humanitarian tragedy, but it was not insured.

With winds of up to 215 km/h, tropical cyclone Nargis slammed into the Irrawaddy Delta area in Myanmar in early May. The storm surge associated with this cyclone caused the inundation of large parts of the low-lying and densely populated river delta, including the Yangon Division. For the most part, the storm resulted in a total loss of property in the affected areas. Inadequate disaster relief operations aggravated the tragedy. Insurance as a means of mitigating the financial impact of such catastrophic events is virtually non-existent in Myanmar.

Cyclone Nargis was the worst natural disaster in the history of Myanmar and second deadliest in the region. Over 84 500 people died and another 53 800 disappeared. It was also estimated that about 1.5 million people were left homeless. However, the storm and flood catastrophe that hit Bangladesh in 1970 and claimed over 300 000 lives remains the deadliest disaster. Bangladesh was also hit by cyclone Gorky in April 1991, which killed 138 000 and ranks as the third deadliest cyclone in the region. For all three cyclones, the number of casualties remain vague.

Unenforceable insurance terms and conditions led to an insured loss of more than USD 1bn in Australia.

Storm and flood damage, Australia

In January and February 2008, storm events and subsequent flooding affected large areas of Queensland and New South Wales in eastern Australia. In many areas river banks burst, unable to cope with peak run-off from the heavy rainfall. The formation of these cloudbursts has been associated with the strong La Niña effect[5] over the Pacific Ocean, but was not connected to any tropical cyclones.

In general, flood damage from overflowing rivers or lakes is explicitly excluded from standard Australian insurance policies. However, as "storm" damage is generally covered, the insurance industry has often found itself paying losses in such events nonetheless, as the distinction between wind damage, rainfall/flash flood damage and flood overflow damage is difficult to prove and political pressure can be substantial. In the case of the January/February floods, however, most of the losses were explicitly covered by the insurance policies of coal mining companies operating in the area. Flooded mines, stocks, infrastructure and machinery in combination with prolonged bad weather led to large business interruption claims. The total insured loss from the events was USD 1.3bn.

In November, storms also hit the Brisbane region in southern Queensland. There were reports of very strong, tornado-like winds, which uprooted trees and caused severe property damage. Also, some areas reported extreme downpours with record amounts of rainfall. The insured losses from these events were estimated at USD 600m.

Towards comprehensive flood insurance in Australia

The development of a national flood information database will foster the development of flood insurance in Australia.

The provision of personal lines flood insurance has been debated in Australia since the early 1970s. For many years, river flood risk was excluded by most insurers, on the basis that the exposure was not easily assessed. The Insurance Council has recently been coordinating the development of the National Flood Information Database, which will soon enable insurers to properly assess, select and price residential flood risk. In the absence of stringent land use planning directives, some property developments have taken place in fairly flood prone locations. For property owners in these locations, the high flood risk might lead to insurance premiums that considerably reduce the economic value of the property.

[5] A La Niña effect may be defined as a drop in average sea-surface temperatures to more than 0.4 degrees Celsius (0.7 degrees Fahrenheit) below normal, lasting at least six months, across a specified part of the eastern tropical Pacific (http://hurricane.weathercenter.com/guide/lanina.thm, 31 January 2008).

Coping with disasters – public private partnerships

Asian insurers offer only limited coverage for natural catastrophe risks.

Despite the rising loss potential from natural disasters in Asia, insurance protection against these risks remains at very low levels compared to other parts of the world. As a consequence, uninsured catastrophe losses will ultimately fall on individuals, corporations and governments. In most of Asia's developing countries, it will take years or even decades for the insurance markets to grow sufficiently and absorb a meaningful portion of catastrophe losses. Domestic insurance companies are often far less diversified than their international counterparts, and are therefore less inclined to offer natural catastrophe insurance due to the potentially devastating effect on their balance sheets. For the insurance buyer, financial knowledge is often limited, and insurance as a means of mitigating future disaster losses is only slowly gaining acceptance.

Asian governments bear the bulk of catastrophe losses.

In this context, many Asian governments often face significant financial burdens after a natural catastrophe, as budget stability and liquidity can be severely impacted. However, significant value could be created by managing catastrophe risks via ex-ante disaster financing solutions. The insurance market can play a key role in such public private partnerships by sharing its knowledge and expertise and by helping to cede risks to the global insurance and capital markets.

Public private partnerships can improve disaster relief.

Outside of Asia, a number of government protection schemes have been successfully implemented over the last few years. As individual countries are exposed in varying degrees to natural disasters, their unique financial situations – ie debt ratios, economic development targets and budget constraints – require tailor-made solutions to address the country's specific needs. Public private partnerships can represent a milestone in sustainable development, strengthening the resilience of Asian countries to financial shocks arising from natural disasters.

Government disaster mitigation: the Mexican FONDEN solution

In the Mexican FONDEN catastrophe bond example, the government gets cash if an earthquake's magnitude exceeds a predefined trigger.

The Mexican government, through its Fondo de Desastres Naturales (FONDEN), aims to protect financial stability after a devastating earthquake, whilst simultaneously securing liquidity for relief deployment, especially to the poor who cannot afford insurance. By forming a reinsurance public private partnership with Swiss Re, the Mexican government implemented a sovereign earthquake insurance scheme that included the first catastrophe bond issued in Latin America. The implemented structure gives FONDEN access to relief funds based on a parametric trigger related to the earthquake's magnitude. The aggregate payout limit in the event of a disaster is USD 450m.

How do reinsurers protect insurers from catastrophe losses?

Reinsurance is a well-proven tool to protect insurers against catastrophe losses.

An insurance company can protect itself against catastrophe losses by:
1) controlling the accumulation of losses by setting limits to its covers,
2) diversifying its portfolio so that it is less vulnerable to catastrophes,
3) holding excess capital to pay catastrophe losses,
4) securitising its exposure to catastrophe risks and
5) buying reinsurance.

Cover limits reduce the amount of business and the range of protection offered to clients. Diversification may not be possible for a domestic company in a small country because a natural catastrophe might affect the entire country. Excess capital is expensive. Securitisation, which is often poorly suited to small and medium-sized companies, involves basis risk, and actual losses may differ from what is indicated by the trigger used in the securitisation contract with the insurer.

Finally, reinsurance can be expensive and involves credit risk because a reinsurer might not pay the losses. Nevertheless, reinsurance protects insurers against catastrophe losses. Reinsurers accept part of the loss burden and in turn assist direct insurers in assessing and underwriting catastrophe risks.

How insurers cede catastrophe losses to reinsurers

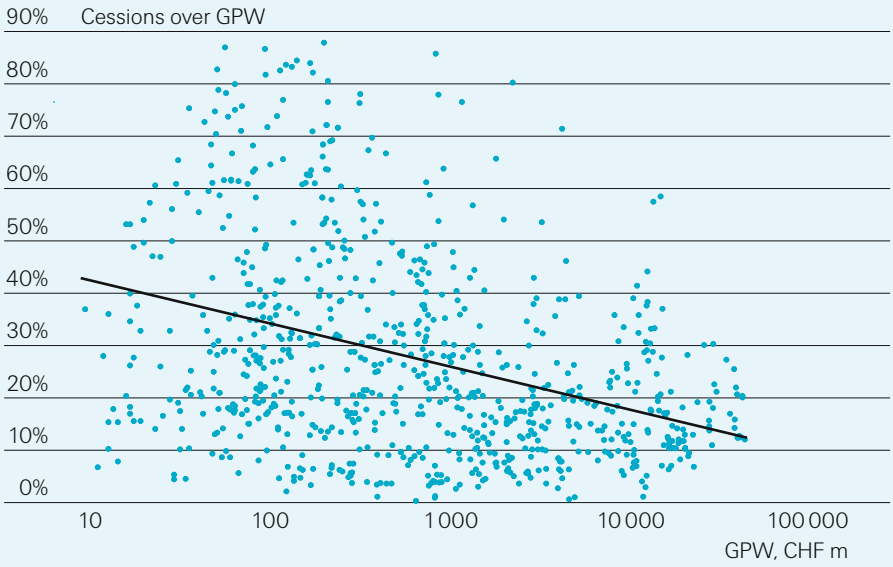
Catastrophe excess-of-loss reinsurance is the prevailing reinsurance tool to protect against catastrophe losses.

Catastrophe excess-of-loss reinsurance contracts (CatXL) are typically the best option for insurers seeking protection against catastrophe losses. Such contracts pay all of the insurer's losses for a defined event or peril that exceed a lower limit (attachment point) up to a preset limit (exit point). The attachment and exit points depend on the size of the insurance company and its risk appetite. For example, an insurer with property premiums of USD 100m could purchase protection starting at USD 10 m up to USD 100m or more. Proportional reinsurance contracts provide a cushion against catastrophes because reinsurers pay an agreed constant proportion of all losses. Catastrophe losses usually occur in property insurance, although such losses may also occur in other lines, such as marine, aviation, engineering and motor.

Big insurers need less reinsurance because they can diversify their risks better than small insurers.

The extent to which insurers transfer risk to reinsurers can be measured by the share of premiums ceded to reinsurance. In 2007, this share was roughly 27% in non-life insurance for a 2007 sample of 84 companies. Big insurance companies cede less because they can diversify part of the losses through international diversification – ie if earthquake losses in Japan do not occur in the same year as storm losses in the US or flood losses in Europe, the losses can be partly paid out of US and European premiums. The converse is true. Figure 6 shows the cession rates of a few non-life insurers between 1999 and 2007. An insurer with CHF 1 bn of gross premiums written ceded on average 8% less to reinsurers than a company with a premium volume of CHF 100m.

Figure 6
Cession rates and gross premiums written (GPW) of direct insurers



Source: annual reports of 385 insurers from 1999 to 2007

Well-capitalised insurers have less of a need for reinsurance.

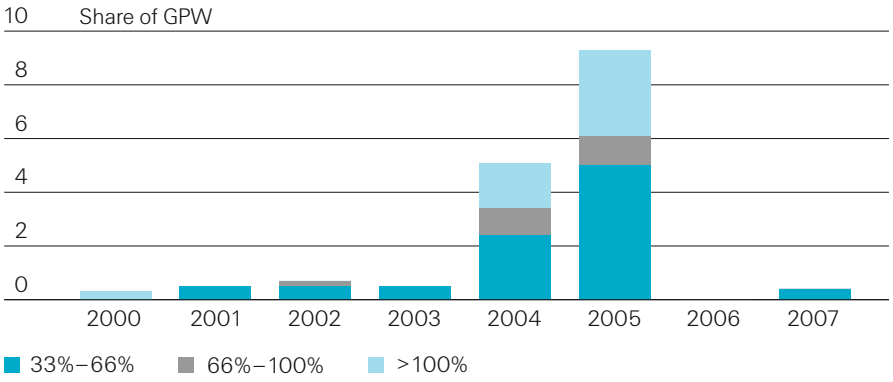
The capital position of insurance companies also influences cession behaviour: the more capital an insurer has compared to its size, the more losses it can bear and the less it has to cede to reinsurers. For the sample of insurance companies used in Figure 6, when the solvency ratio (defined here as capital over gross premiums written) is doubled, cession rates fall by about 2%.

In 2005, 12% of insurance companies received natural catastrophe loss payments from reinsurers that exceeded their capital.

Based on data compiled on Swiss Re clients, as many as 12% of companies (21 out of 179) – representing 3.2% of direct insurers' gross premiums written – received natural catastrophe loss payments from reinsurers in 2005 that exceeded their capital (see Figure 7). About 23% of direct insurers (41 of 179) – representing 9.3% of gross premiums written – received payments from reinsurers that exceeded one-third of their equity capital. For those insurers, the natural catastrophe losses would have put their capital position at risk if they had not purchased reinsurance.

In the less severe catastrophe year 2004, the share of insurers receiving more than 100% of their capital from reinsurers' natural catastrophe payments was as high as 11%, representing 1.7% of gross premiums written. The role that reinsurance plays is larger than the above analysis suggests because only natural catastrophe covers are considered.

Figure 7
Insurers grouped by reinsurance natural catastrophe loss-payments-to-capital ratios, grouped according to share of gross premiums written (GPW) of all analysed insurers



Sources: catastrophe loss payments from Swiss Re, capital and premium numbers from annual company reports, 385 companies

Table 3
List of major losses in 2008 according to loss category

	Number	in %	Victims[7]	in %	Insured loss[6] (in USD m)	in %
Natural catastrophes	**137**	**44.1%**	**234 842**	**97.7%**	**44 692**	**85.1%**
Floods	44		3 184		2 059	
Storms	62		141 913		39 288	
Earthquakes	12		87 829		422	
Droughts, bush fires, heat waves	2		32		500	
Cold, frost	7		1 750		1 575	
Hail	7		10		763	
Other natural catastrophes	3		124		85	
Man-made disasters	**174**	**55.9%**	**5 618**	**2.3%**	**7 812**	**14.9%**
Major fires, explosions	**45**	**14.5%**	**454**	**0.2%**	**5 255**	**10.0%**
Industry, warehouses	24		159		2 146	
Oil, gas	8		100		1 605	
Department stores	1		40			
Other buildings	10		126		1 086	
Other fires, explosions	2		29		418	
Aviation disasters	**17**	**5.5%**	**496**	**0.2%**	**758**	**1.4%**
Crashes	13		496		425	
Space	3				333	
Other aviation accidents	1					
Maritime disasters	**41**	**13.2%**	**1 598**	**0.7%**	**548**	**1.0%**
Freighters	5		25		207	
Passenger ships	32		1 553		31	
Other maritime incidents	4		20		310	
Rail disasters (incl. cableways)	**6**	**1.9%**	**166**	**0.1%**		**0.0%**
Mining accidents	**15**	**4.8%**	**686**	**0.2%**	**476**	**1.0%**
Collapse of buildings/bridges	**6**	**1.9%**	**204**	**0.1%**		**0.0%**
Miscellaneous	**44**	**14.1%**	**2 014**	**0.8%**	**775**	**1.5%**
Social unrest	8		359		70	
Terrorism	17		802		300	
Other miscellaneous losses	19		853		405	
Total	**311**	**100.0%**	**240 460**	**100.0%**	**52 504**	**100.0%**

[6] Property and business interruption, excluding liability and life insurance losses
[7] Dead and missing

Table 4
The 20 most costly insurance losses in 2008

Insured loss[8] (in USD m)	**Victims**[9]	**Date** (start)	**Event**	**Country**
20 000	136	06.09.2008	Hurricane Ike, winds up to 195 km/h; offshore damage, floods	US, Caribbean: Gulf of Mexico, Haiti et al
4 000	135	26.08.2008	Hurricane Gustav, winds up to 240 km/h; offshore damage, floods	US, Caribbean: Gulf of Mexico, Haiti et al
1 325	7	22.05.2008	Tornadoes, storms, winds up to 320 km/h, heavy rain, hail	US
1 321	15	29.02.2008	Winter storm Emma, winds up to 150 km/h; floods	Germany, Austria, Czech Rep et al
1 300	130	10.01.2008	Snow storms, freezing rain across the country	China
1 100	–	29.05.2008	Thunderstorms, winds up to 137 km/h, hail	US
973	4	29.05.2008	Storm Hilal, thunderstorms, hail; floods, landslides	Germany, Belgium, UK, France et al
955	56	05.02.2008	Tornadoes, winter storms, floods	US
800	–	09.04.2008	Storms, hail, heavy rain, floods	US
745	12	04.01.2008	Winter storm, heavy rain, snow; floods, mudslides	US
725	16	05.06.2008	Storms over Midwest, hail, rain; floods	US
585	22	10.05.2008	Tornadoes, winds up to 280 km/h, hail	US
560	2	15.03.2008	Thunderstorms, tornadoes, hail	US
550	–	13.01.2008	Floods caused by heavy rain	Australia
525	5	23.07.2008	Hurricane Dolly, winds up to 160 km/h, heavy rain; floods	US, Mexico, Gulf of Mexico
500	–	13.11.2008	Three urban forest fires, Santa Ana winds up to 130 km/h	US
470	–	17.04.2008	Thunderstorms, hail	US
ns[10]	–	01.06.2008	Fire at Universal Studios	US
ns	–	05.01.2008	Gas explosion at steel plant	US
ns	–	03.06.2008	Explosion and fire at gas processing plant	Australia

[8] Property and business interruption, excluding liability and life insurance losses
US natural catastrophe figures: with the permission of Property Claim Services (PCS)/incl. NFIP flood losses (see page 39 "Terms and selection criteria")
[9] Dead and missing
[10] ns = not shown

Table 5
The 20 worst catastrophes in terms of victims 2008

Victims[11]	Insured loss (in USD m)[12]	Date (start)	Event	Country
138 373	–	02.05.2008	Cyclone Nargis devastates Irrawaddy and Yangon Divisions; floods	Myanmar (Burma), Bay of Bengal
87 449	366	12.05.2008	Sichuan Earthquake (M_W 7.9), aftershocks	China
1 413	45	19.06.2008	Typhoon Fengshen/No 6, winds up to 140 km/h, heavy rain	Philippines, China, South China Sea
1 300	–	05.01.2008	Heavy snowfall	Afghanistan
950	–	10.06.2008	Floods caused by monsoon rain	India
500	80	01.09.2008	Hurricane Hanna, winds up to 130 km/h, floods	Haiti, Turks and Caicos Island et al
300	–	28.11.2008	Clashes over disputed election results	Nigeria
300	–	29.10.2008	Earthquake (M_W 6.4), aftershock (M_W 6.2)	Pakistan
275	–	18.12.2008	Boats carrying illegal immigrants disappear	Bay of Bengal, Myanmar (Burma)
271	–	08.09.2008	Mudslide causes dam to burst at Tashan ore mine	China
261	–	17.02.2008	Tropical cyclone Ivan with winds up to 230 km/h	Madagascar
230	–	04.01.2008	Cold wave	India
230	–	19.09.2008	Floods caused by heavy rain	India
224	–	30.09.2008	Stampede at Navaratri festival	India
208	–	08.08.2008	Typhoon Kammuri/No 9 with winds up to 100 km/h	Vietnam, China, Laos, Thailand et al
190	–	26.11.2008	Cyclone Nisha, heavy rain, floods	India, Sri Lanka
180	–	24.10.2008	Floods caused by heavy rain, tropical storm	Yemen
180	–	15.08.2008	Floods caused by heavy rain	India, Bangladesh, Nepal
172	ns[13]	26.11.2008	Attack on two luxury hotels and other facilities in Mumbai	India
168	–	01.05.2008	Poisoning due to alcohol laced with methanol	India

[11] Dead and missing
[12] Property and business interruption, excluding liability and life insurance losses
[13] ns = not shown

Table 6
Chronological list of all natural catastrophes 2008

Floods

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
13.1.–31.1.	Australia Queensland, Gold Coast	Floods caused by heavy rain; coal mining firm suffers production delays, buildings, roads flooded	USD 550m insured loss
15.1.–14.2.	Bolivia Cochabamba, Chuquisaca, Santa Cruz, Trinidad	Floods caused by heavy rain; over 600 000 hectares of crops flooded	52 dead 24 injured 16 500 homeless USD 500m total damage
15.1.–31.3.	Ecuador Los Rios, Manabí, el Oro, Guyas, Chimborazo, Azuay	Floods and mudslides caused by heavy rain; 150 000 hectares of crops destroyed	57 dead 13 500 homeless USD 1bn total damage
19.1.–29.1.	Australia NSW, Queensland, Emerald	Floods caused by heavy rain, Nogoa River bursts its bank; open coal pits flooded	AUD 350m (USD 244m) insured loss
20.1.–3.10.	Mozambique Zambezi, Pungoe, Buzi	Floods caused by heavy rain	29 dead
31.1.–14.2.	Namibia, Angola Cunene, Ondjiva, Oshakati	Floods caused by heavy rain	43 dead 10 000 homeless NAD 50m (USD 5m) total damage
1.2.	Indonesia Jakarta	Floods caused by heavy rain; slum area flooded	3 dead 100 000 homeless
4.2.–14.2.	Peru Amazonas, Ayacucho, Apurímac, Arequipa	Floods caused by heavy rain; Aguaitia and Yurac Rivers banks burst	14 dead, 24 missing 12 injured
9.2.–26.2.	Australia Queensland, Mackay	Floods caused by heavy rain; coal mining firm suffers production delays	2 dead USD 435m insured loss
15.2.–28.2.	Philippines Samar, Eastern Visayas, Leyte, Biliran	Floods and landslides caused by heavy rain; 16 600 hectares of crops destroyed	45 dead, 8 missing 27 injured 30 000 homeless PHP 1.31bn (USD 28m) total damage
20.2.–12.3.	Kazakhstan South Kazakhstan oblast, Ordabasy, Arys, Saryagash	Floods caused by heavy rain, snowmelt; Sir-Darya River bursts its banks	1 dead 12 000 homeless KZT 15.3bn (USD 127m) total damage
20.3.–27.3.	India Tamil Nadu, Karnataka	Floods caused by heavy rain	37 dead INR 102m (USD 2m) total damage
30.3.–11.4.	Brazil Maranhão, Paraiba, Piaui	Floods caused by heavy rain	36 dead 77 000 homeless BRL 614m (USD 263m) total damage
26.5.–28.6.	China Guizhou, Hunan, Hubei	Floods and landslides caused by heavy rain, hail	28 dead, 23 missing 166 injured
29.5.–4.6.	Sri Lanka Kalutara, Colombo, Galle	Floods caused by heavy rain	20 dead, 4 missing
7.6.–22.6.	China Guangdong, Guangxi, Guizhou, Yunnan, Hubei Zhejiang, Anhui, Jiangxi	Floods and landslides caused by heavy rain; 134 000 houses, 2.32 million hectares of agricultural land in Pearl River Delta flooded	63 dead, 13 missing 1 270 000 homeless USD 120m insured loss CNY 15bn (USD 2.2bn) total damage
9.6.–30.6.	United States IA, MO, IL, IN, WI	Severe and prolonged flooding across Midwest region along the Mississippi and Ohio River; 20 dam burst, over 2 million hectares of farmland flooded	22 dead 148 injured USD 400m insured loss USD 10bn total damage
10.6.–25.8.	India Uttar Pradesh, Orissa, Assam, West Bengal	Floods caused by monsoon rain	950 dead 300 000 homeless INR 6.01bn (USD 123m) total damage

28.6.–13.7.	Bangladesh Chittagong, Cox's Bazar	Floods and mudslide caused by heavy rain	20 dead 2 injured 20 000 homeless
6.7.–25.7.	Guatemala Poptún, Petén, Zacapa	Floods caused by heavy rain	64 dead
23.7.–5.8.	Ukraine, Moldova, Republic of, Romania, Slovakia, Hungary Ivano-Frankivsk	Floods caused by heavy rain, storms; high water levels on Prut and Dnjestr Rivers, 47 000 houses, 54 000 hectares of agricultural land flooded	at least 40 dead 4 injured UAH 4 bn (USD 521 m) total damage
4.8.–8.8.	Pakistan North West Frontier, Peshawar, Baluchistan	Floods caused by monsoon rain	36 dead 12 injured INR 5 bn (USD 103m) total damage
8.8.–12.8.	India Andhra Pradesh, Hyderabad	Floods and landslides caused by heavy rain	130 dead INR 9.49 bn (USD 195 m) total damage
15.8.–28.8.	India, Bangladesh, Nepal Uttar Pradesh, West Bengal, Assam, Orissa	Floods caused by heavy rain	180 dead
16.8.–26.8.	Ireland Belfast, Down, Antrim, Armagh	Floods caused by heavy rain; rivers burst their banks, bridges swept away, roads flooded	EUR 38m (USD 53m) insured loss
18.8.–19.8.	Bangladesh Chittagong, Moti Jharna	Floods and landslides caused by monsoon rains	14 dead, 10 missing 30 injured
18.8.–31.8.	India, Nepal Bihar, Supaul, Madhepura, Araria, Saharsa, Khagaria, Katihar	Monsoon rains, dyke bursts; Kosi River bursts its banks, changed course, causes flooding, 300 000 houses, 100 000 hectares of farmland destroyed	140 dead 3 000 000 homeless
30.8.–8.9.	India Assam, Bihar	Floods caused by heavy rain, 3.7 million hectares of farmland flooded	35 dead INR 982 m (USD 20m) total damage
13.9.–7.10.	Thailand Phitsanulok, Lop Buri, Phra Nakhon Si Aythaya	Floods caused by heavy rain; 98 bridges, over 3 000 roads, 87 500 hectares of farmland destroyed	26 dead, 1 missing THB 557 m (USD 16m) total damage
15.9.–24.10.	Colombia Cordoba, Bolivar, Sucre, Magdalena, Atlantico	Floods and landslides caused by heavy rain	59 dead, 18 missing 91 injured
17.9.–23.10.	Morocco Driouch, Tanger	Floods caused by heavy rain; 170 manufacturing plants flooded	25 dead
19.9.–23.9.	India Uttar Pradesh, Himachal Pradesh, Orissa, Bihar	Floods and landslides caused by heavy rain	230 dead 500 000 homeless
22.9.–27.9.	China Sichuan, Mianyang, Beichuan, Chengdu, Deyang, Guangyuan	Heavy rain, storms; floods and landslides; 1 100 houses, 65 000 hectares of farmland destroyed	16 dead, 48 missing 360 injured 6 000 homeless CNY 1.6 bn (USD 235 m) total damage
1.10.–17.10.	Algeria Ghardaia, Djemai valley, Ain Torki	Floods and landslides caused by heavy rain; over 1 400 houses destroyed	43 dead 68 injured 11 800 homeless EUR 250m (USD 348m) total damage
10.10.–18.10.	Vietnam Quang Nam, Thua Thien-Hue, Thanh Hoa	Floods caused by heavy rain; 11 500 hectares of rice flooded	20 dead VND 77 bn (USD 4m) total damage
14.10.–25.10.	Costa Rica, Honduras, Nicaragua, El Salvador, Belize	Floods caused by heavy rain; 90 000 hectares of farmland destroyed	29 dead USD 23m total damage
24.10.–7.11.	Yemen Hadramout, Mahrah	Floods caused by heavy rain, tropical storm; 2 000 houses destroyed, damage to infrastructure	180 dead 3 500 homeless USD 400 m total damage
27.10.–4.11.	Vietnam Hanoi, Ha Nam, Ninh Binh	Floods caused by heavy rain; 278 000 hectares of crops destroyed	79 dead VND 6 300 bn (USD 360m) total damage
1.11.–3.11.	China Yunnan, Guangxi, Chuxiong Yi	Floods, land- and mudslides caused by heavy rain; over 1 000 houses destroyed	31 dead, 45 missing CNY 200m (USD 29m) total damage

16.11.–20.11.	Colombia El Poblado	Floods caused by heavy rain	5 dead, 6 missing 475 000 homeless
21.11.–2.12.	Brazil Santa Catarina, Ilhota	Floods and landslides in Itajai Valley caused by heavy rain; damage to Port of Itajai	118 dead 15 injured 23 000 homeless BRL 600m (USD 257m) insured loss BRL 935m (USD 401m) total damage
22.11.–1.12.	Panama, Costa Rica Bocas del Toro, Chiriqui, Colon, Veraguas, Darien	Floods caused by heavy rain; damage to banana plantation	13 dead, 19 missing 15 injured 11 670 homeless
9.12.–14.12.	Italy Calabria, Rome, Venice	Heavy rain, winds, snow; floods: river banks burst, damage to agriculture sector	3 dead EUR 200m (USD 278m) total damage
28.12.–12.1.	Mozambique Maputo, Inhambane	Floods caused by heavy rain	25 dead

Storms

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
4.1.–9.1.	United States CA, MO, NY, IL, WA, IN, OH, WI, OR, AR, KS, MI	Winter storm with winds up to 175 km/h, heavy rain, hail, ice, floods caused by snow, mudslides	6 dead, 6 missing USD 600m–1bn insured loss* USD 1bn total damage
26.1.–28.1.	Austria, Germany, Poland, Sweden Steiermark	Winter storm Paula with winds up to 155 km/h; damage to forestry, infrastructure	2 dead 9 injured EUR 100m (USD 139m) insured loss EUR 130m (USD 181m) total damage
29.1.–30.1.	United States AR, IL, IN, KY, MO, NY, OH, TN	Thunderstorms with winds up to 110 km/h, hail, tornadoes	4 dead USD 300–600m insured loss USD 600m total damage
31.1.–1.2.	United Kingdom, Germany, Denmark, Norway, Sweden	Winter storm Resi with winds up to 128 km/h; MV Riverdance runs aground	USD 50m insured loss
5.2.–6.2.	United States TN, KY, MS, TX, AR, OH, IN, AL	Tornadoes, winter storms, floods; explosion, fire at gas refinery in Tennessee	56 dead 150 injured USD 600m–1bn insured loss USD 1.3bn total damage
17.2.–19.2.	Madagascar	Tropical cyclone Ivan with winds up to 230 km/h, heavy rain; 47 300 hectares of rice fields, 134 000 hectares of crops flooded	84 dead, at least 177 missing 580 injured 190 000 homeless
29.2.–1.3.	Germany, Austria, Czech Republic, Poland, Belgium, Netherlands, Switzerland, UK, Slovakia	Winter storm Emma with winds up to 150 km/h; floods: damage to buildings	15 dead EUR 950m (USD 1.32bn) insured loss USD 2bn total damage
7.3.–14.3.	Mozambique Nampula	Tropical cyclone Jokwe with winds up to 200 km/h; over 10 000 homes destroyed	16 dead 55 000 homeless
8.3.–9.3.	United States NJ, PA, NY	Thunderstorms, wind, heavy rain, floods	USD 100–300m insured loss
10.3.–11.3.	United Kingdom, France, Spain, North Atlantic South England, Wales	Winter storm Johanna with winds up to 130 km/h, floods; power outages, traffic interruptions, marine: container ship Artemis runs aground	2 dead EUR 250m (USD 348m) insured loss
14.3.	United States GA, Atlanta	Tornadoes with winds up to 217 km/h, hail, floods; damage to buildings, among these Georgia World Congress Center, Georgia Dome, CNN Center, Omni Hotel	2 dead 27 injured USD 300–600m insured loss USD 450m total damage

*Loss ranges for natural catastrophes in the US in Table 6: defined by Property Claim Services (PCS)

15.3.–16.3.	United States GA, SC	Thunderstorms, tornadoes with winds up to 260 km/h, hail	2 dead 2 injured USD 300–600m insured loss
22.3.	Bangladesh	Tropical storm with winds up to 100 km/h; heavy rain, hail, floods	12 dead 200 injured
3.4.–5.4.	United States TX, MS, AR, LA	Storms with winds up to 115 km/h, hail, heavy rain, floods	USD 100–300m insured loss USD 450m total damage
7.4.–8.4.	China Hubei, Dangyang, Yuyang	Thunderstorm and hail	8 dead 66 injured CNY 210m (USD 31 m) total damage
9.4.–11.4.	United States AR, TX, OK	Storms with winds up to 113 km/h, hail, heavy rain, floods	USD 600m–1 bn insured loss USD 1.1 bn total damage
15.4.–19.4.	China, South China Sea Hainan, Guangdong, Wenchang, Yangjiang	Typhoon Neoguri/No 1 with winds up to 148 km/h; heavy rain, floods, landslides: industry and agriculture sector affected	3 dead, 22 missing CNY 337 m (USD 49 m) total damage
17.4.–18.4.	United States TX, Mineral Wells	Thunderstorms, hail	USD 300–600m insured loss
28.4.	United States VA, Suffolk	Thunderstorms, tornadoes with winds up to 240 km/h	200 injured USD 25–100m insured loss USD 110m total damage
1.5.–2.5.	United States OK, MO, KS, AR, TX	Thunderstorms with winds up to 105 km/h, tornadoes, hail	USD 100–300m insured loss
2.5.–12.5.	Myanmar (Burma), Bay of Bengal Yangon, Bago, Kayin, Mon, Haing Gyi island, Pathein	Tropical cyclone Nargis with winds up to 215km/h, massive wave at Irrawaddy Deltaregion; 450 000 houses, 168 ships, 10 704 boats destroyed, heavy rain, floods	84 537 dead, 53 836 missing 19 359 injured 1 500 000 homeless USD 10bn total damage
10.5.–12.5.	United States GA, NC, MD, MO, VA, OK, TX, AR, KS	Tornadoes with winds up to 280 km/h, hail; damage to homes and business	22 dead 150 injured USD 300–600m insured loss USD 700m total damage
14.5.	India Uttar Pradesh	Dust storms with winds up to 110 km/h, heavy rain, floods	111 dead 50 injured
14.5.–15.5.	United States TX, LA	Thunderstorms, hail; damage to oil centre manufacturing	USD 100–300m insured loss
17.5.–20.5.	Philippines Pangasinan, Iloilo	Tropical storm Halong with winds up to 100 km/h, floods and landslides caused by heavy rain	44 dead, 8 missing 24 injured PHP 3.74 bn (USD 79 m) total damage
20.5.	United States GA, SC, NC	Thunderstorms with winds up to 105 km/h, hail	USD 25–100m insured loss
22.5.–26.5.	United States MN, CO, IA, KS, NE, WY, OK, Hugo, Parkersburg, New Hartford, Dunkerton	Tornadoes, storms, winds up to 320 km/h, heavy rain, hail	7 dead 70 injured USD 1–3bn insured loss USD 1.6 bn total damage
29.5.–1.6.	United States MN, KS, IN, OK, IL, NE	Thunderstorms, winds up to 137 km/h, hail	USD 1–3bn insured loss USD 1.5 bn total damage
29.5.–2.6.	Germany, Belgium, UK France, Luxembourg, Italy Baden-Wuerttemberg, Krefeld, Liège, Limbourg	Storm Hilal, thunderstorms, hail; floods and landslides	4 dead 10 injured EUR 700m (USD 973m) insured loss USD 1.3bn total damage
2.6.–4.6.	United States VA, KS, MD, NE, IN, IA, IL, MO, OK, WV	Thunderstorms with winds up to 145 km/h, hail	1 dead USD 300–600m insured loss USD 570m total damage
5.6.–12.6.	United States MI, WI, Lake Delton, IN, IA, Cedar Rapids, Iowa City, Des Moines, NE, KS, IL, MN, OK, MO	Storms, hail, heavy rain, floods; houses, buildings, bridges, streets, rail tracks, area of Mississippi and Ohio Rivers flooded	16 dead 28 injured USD 600m–1 bn insured loss USD 1 bn total damage
10.6.–11.6.	United States NY, NJ, PA, CT	Storms with winds up to 177 km/h, hail	USD 25–100m insured loss

11.6.	United States KS, WI, IA	Tornadoes, storms with winds up to 110 km/h; damage to Kansas State University and Boy Scout camp	6 dead 40 injured USD 300–600m insured loss
15.6.–1.7.	United States NY, IN, OK, MO, IL, AR, MI	Thunderstorms, hail, heavy rain exacerbates existent flooding along the Mississippi	USD 100–300m insured loss
19.6.–25.6.	Philippines, China, South China Sea Luzon, Visayas, Romblon Island, Mindanao, Manila, Guangdong, Shenzhen	Typhoon Fengshen/No 6, winds up to 140 km/h, heavy rain, landslides, 93 000 houses destroyed; ferry MV Princess of Stars, 119 fishing vessels capsize	at least 770 dead, at least 643 missing 826 injured 1 000 000 homeless USD 45m insured loss USD 328m total damage
25.6.–28.6.	United States NE, IA, OH	Thunderstorms, heavy rain; floods in mid-Mississippi Valley	USD 100–300m insured loss
2.7.–3.7.	United States MI, IL, MO	Storms with winds up to 128 km/h, hail, heavy rain; flooding	USD 25–100m insured loss
10.7.–12.7.	United States MN, WI	Thunderstorms with winds up to 112 km/h, hail; flooding	USD 25–100m insured loss
15.7.–20.7.	Taiwan, China, East China Sea Taiwan Strait, Yilan, Hualien, Pingtung	Typhoon Kalmaegi/No 7 with winds up to 138 km/h, heavy rains, floods, landslides	20 dead, 6 missing 8 injured USD 10m insured loss USD 16m total damage
19.7.–22.7.	United States ND, IL, IA, IN, OH, NE	Thunderstorms with winds up to 128 km/h, hail; flooding	USD 100–300m insured loss USD 260m total damage
23.7.–27.7.	United States, Mexico, Gulf of Mexico TX, NM, South Padre Island	Hurricane Dolly with winds up to 160 km/h, heavy rain, flooding	2 dead, 3 missing USD 300–600m insured loss USD 1.2bn total damage
25.7.–4.8.	Taiwan, China, Philippines Nantou, Taipei, Taoyuan, Hsinchu, Yilan	Typhoon Fung-Wong/No 8 with winds up to 160 km/h, heavy rain; over 8 600 houses, 46 000 hectares of crops flooded	20 dead, 4 missing 6 injured USD 15m insured loss USD 500m total damage
26.7.	United States OH, Canton, Salem, Barberton, Cambridge	Storms, hail	USD 25–100m insured loss
3.8.–4.8.	France, Netherlands, Germany, Belgium Hautmont	Tornado with winds up to 215 km/h, heavy rain; floods	4 dead 13 injured EUR 56m (USD 78m) insured loss
4.8.–5.8.	United States IL, IN	Thunderstorms with winds up to 145 km/h, hail	USD 100–300m insured loss
8.8.–20.8.	Vietnam, China, Lao People's Democratic Republic, Thailand, Myanmar (Burma)	Typhoon Kammuri/No 9, winds up to 100 km/h, heavy rain, floods, landslides; 11 500 houses, 27 200 hectares of farmland destroyed, high water levels on Mekong River	170 dead, at least 38 missing 89 injured USD 200m total damage
16.8.–26.8.	United States, Haiti, Cuba, Dominican Republic, Jamaica, Gulf of Mexico	Tropical storm Fay with winds up to 120 km/h, heavy rain causes flooding and landslides	40 dead USD 100–300m insured loss
18.8.–23.8.	Philippines, China, South China Sea Babuyan, Luzon, Hong Kong, Guangdong, Fujian	Typhoon Nuri/No 12, winds up to 148 km/h; floods and landslides caused by heavy rain	12 dead, 17 missing 70 injured USD 10m insured loss PHP 519m (USD 11 m) total damage
26.8.–4.9.	United States, Gulf of Mexico, Haiti, Dominican Republic, Cuba, Jamaica, Cayman Islands LA, AR, MS, AL	Hurricane Gustav with winds up to 240 km/h, heavy rain; floods, landslides, 11 500 houses destroyed	135 dead 35 injured USD 4bn insured loss USD 17.5bn total damage
30.8.–3.9.	South Africa Kwa Zulu-Natal, Free State	Strong winds, bush fires; 35 000 hectares of grazing land, 13 000 hectares of forest burnt	34 dead 25 injured
1.9.–7.9.	Haiti, Turks and Caicos Islands, Bahamas, Dominican Republic, Puerto Rico, United States VA, NC, Mayaguana Island	Hurricane Hanna with winds up to 130 km/h, heavy rain; floods, mudslides, city of Gonaïves flooded	at least 500 dead 500 injured 800 000 homeless USD 25–100m insured loss USD 100m total damage

6.9.–15.9.	United States, Gulf of Mexico, Turks and Caicos Islands, Haiti, Cuba, Bahamas, Dominican Republic TX, OH, KY IN, IL, LA, PA, MO, AR	Hurricane Ike with winds up to 195 km/h, heavy rain; floods: 52 oil rigs destroyed, 62 damaged, 63 000 houses and 56 000 hectares of farmland destroyed	136 dead 7 injured 200 000 homeless USD 20bn insured loss USD 40bn total damage
8.9.–16.9.	Taiwan, Japan, China, East China Sea Kyushu, Okinawa and Amami Islands	Typhoon Sinlaku/No 13 with winds up to 175 km/h, heavy rain, landslides; 40 bridges damaged, over 2 000 hectares of farmland flooded	14 dead, 7 missing 20 injured USD 21m total damage
19.9.–25.9.	China, Vietnam, Taiwan, Philippines, Japan Guangdong, Zhanjiang, Yangjiang, Bac Giang	Typhoon Hagupit/No 14 with winds up to 167 km/h, heavy rain; floods	66 dead, 5 missing 74 injured USD 35m insured loss USD 925m total damage
24.9.–30.9.	Taiwan, China, Japan, Philippines, South China Sea Taiwan Strait, Zhejiang	Typhoon Jangmi/No 15 with winds up to 213 km/h, heavy rain, floods: 278 houses, 41 540 hectares of farmland destroyed	2 dead, 2 missing 61 injured USD 15m insured loss TWD 2.09bn (USD 64m) total damage
29.9.–1.10.	Vietnam Quang Binh, Ha Tinh	Typhoon Mekkhala/No 16, winds up to 102 km/h, heavy rain; fishing boats capsize, 800 hectares of crops destroyed	10 dead, at least 15 missing USD 7m total damage
27.10.	Bangladesh Barisal, Patuakhali	Cyclone Reshmi, winds up to 80 km/h; floods	15 dead 200 injured
8.11.–14.11.	Cuba, Cayman Islands Santa Cruz del Sur, Camaguey, Guayabal	Hurricane Paloma, winds up to 215 km/h; heavy rain, floods: 4 000 houses destroyed, damage to agriculture	1 dead USD 1.4bn total damage
15.11.–16.11.	Australia NSW, Queensland, Brisbane, Deception Bay, Morayfield	Thunderstorms, hail; heavy rain, floods	2 dead USD 380m insured loss USD 450m total damage
16.11.–20.11.	Vietnam Binh Dinh, Quang Ngai	Typhoon Noul/No 21, heavy rain, floods, landslides; 10 000 hectares of rice destroyed	21 dead VND 18bn (USD 1m) total damage
19.11.–20.11.	Australia NSW, Queensland, Brisbane, Toowoomba	Thunderstorms with winds up to 100 km/h, hail; heavy rain, floods	USD 205m insured loss USD 275m total damage
26.11.–30.11.	India, Sri Lanka Tamil Nadu, Chennai, Puducherry	Cylone Nisha, winds up to 80 km/h, heavy rain, floods; 550 000 hectares of farmland flooded	190 dead 2 680 000 homeless INR 4.99bn (USD 102m) total damage

Earthquakes

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
3.2.	Congo, Democratic Republic of (DRC), Rwanda	Earthquake (M_W 5.9)	40 dead 700 injured
12.5.	China Sichuan, Wenchuan, Beichuan, Deyang, Mianyang, Yingxiu, Mianzhu, Chengdu, Aba	Earthquake (M_W 7.9), severe aftershocks; 5 million houses, 18 500 schools collapsed, damage to dams, chemical plants	69 227 dead, 18 222 missing 374 638 injured 5 000 000–10 000 000 homeless CNY 2.5bn (USD 366m) insured loss CNY 850bn (USD 125bn) total damage
24.5.	Colombia Meta, Quetame	Earthquake (M_W 5.6), landslides	11 dead 54 injured 1 700 homeless USD 10m total damage
25.5.	China Sichuan, Qingzhou	Heavy aftershock (M_W 6); 70 000 homes destroyed	8 dead 1 000 injured
8.6.	Greece Kato Achaia, Ileia	Earthquake (M_W 6.3); over 70 buildings destroyed	2 dead 100 injured

14.6.	Japan Honshu, Iwate, Miyagi, Akita, Oshu, Kurihara	Iwate Miyagi Inland Earthquake (M_W 6.8), over 470 aftershocks; landslides, damage to roads and infrastructure	13 dead, 10 missing 448 injured JPY 5bn (USD 55m) insured loss JPY 15.1bn (USD 167m) total damage
24.7.	Japan Honshu, Iwate, Aomori	Earthquake (M_W 6.8), landslides	1 dead 211 injured JPY 10bn (USD 110m) total damage
30.8.	China Sichuan, Panzhihua, Huili, Chuxiong, Yunnana	Earthquake (M_W 5.7), over 300 aftershocks; 392 000 houses destroyed	38 dead, 1 missing 982 injured CNY 3.36bn (USD 492m) total damage
5.10.	Kyrgyzstan Bishkek, Nura	Earthquakes (M_W 6.6 and M_W 5.1); 128 homes destroyed	74 dead 60 injured
6.10.	China Tibet, Shannan, Yangyi, Damxung	Earthquake (M_W 6.4), over 1 000 aftershocks; 989 houses destroyed	10 dead 54 injured
29.10.	Pakistan Baluchistan, Ziarat, Pashin, Qila Saifullah	Earthquake (M_W 6.4), aftershock (M_W 6.2); landslides, over 3 000 houses destroyed	166 dead 370 injured 25 000 homeless
17.11.	Indonesia Sulawesi, Gorontalo, Buol	Earthquake (M_W 7.3), aftershocks; damage to 1 000 buildings	6 dead 60 injured

Drought, bush fires, heat waves

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
1.9.–5.9.	Mozambique	Bush fire, 722 houses, 16 000 hectares of agricultural land destroyed	32 dead 20 injured 2 800 homeless
13.11.–24.11.	United States CA, Los Angeles, Sylmar, Riverside, Orange, Santa Barbara	Three urban forest fires (Tea, Sayre, Triangle Complex fire) with Santa Ana winds up to 130 km/h; over 1 000 properties, 16 800 hectares of land destroyed	20 injured USD 500m insured loss USD 800m total damage

Cold, frost

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
1.1.–28.2.	Tajikistan Khatlon' Panj	Extreme cold weather, power outages; severe damage to agriculture	TJS 2.9bn (USD 840m) total damage
4.1.–12.2.	India Uttar Pradesh, Jammu and Kashmir, Gujarat	Cold wave with temperatures close to freezing	230 dead
5.1.–15.2.	Afghanistan Badghis, Herat, Ghor	Heavy snowfall, storms, avalanches; cold wave with temperatures of –24° Celsius	1 300 dead 182 injured
10.1.–10.2.	China Hunan, Guizhou, Jiangxi, Anhui, Hubei, Zhejiang, Sichuan, Guangxi	Snow storms, freezing rain; 223 000 houses collapsed, 1.08 million hectares of farmland destroyed, 17.3 million hectares of forest damaged, transport system disrupted, power outages	130 dead 22 510 injured USD 1.3bn insured loss USD 20bn total damage
17.4.–19.4.	China Xinjiang	Sand storm, temperatures drop below zero degrees, snow storm causes damage to crops and kills livestock	CNY 5bn (USD 733m) total damage
25.11.–8.1.	Poland, Ukraine	Cold wave with temperatures of –19° Celsius	87 dead
11.12.–13.12.	United States MA, NY, ME, NH, VT	Winter storm with winds up to 107 km/h, freezing rain; power outages	3 dead USD 100–300m insured loss

Hail

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
16.2.–18.2.	United States AL, TX	Hail and thunderstorms; damage to vehicles and homes	USD 100–300m insured loss
30.3.–1.4.	United States TX, AR, OK	Hail, storms and tornadoes; damage to cars, buildings	USD 100–300m insured loss
3.6.	China Henan, Zhoukou	Hail, storm with winds up to 84 km/h; damage to agriculture	10 dead 100 injured CNY 160m (USD 23m) total damage
22.6.–23.6.	Germany Emden, Lower Saxony	Hail, thunderstorms, heavy rain; damage to 30 000 new cars	insured loss ns
13.7.–14.7.	Slovenia Kamnik, Murska Sobota	Hail, storms; damage to houses, business, forestry, agriculture	EUR 40m (USD 56m) insured loss
15.8.	Slovenia Podravje	Hail, storms; damage to buildings, cars	EUR 70m (USD 97m) insured loss
4.9.–6.9.	Canada Saskatchewan	Hail storm; damage to agriculture	CAD 132m (USD 107m) insured loss

Other natural catastrophes

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
19.1.–20.1.	United States OR, Oakridge	Frazier slide disrupts Union Pacific Railroad	insured loss ns
30.4.	India Jammu and Kashmir	Landslide buries two trucks	7 dead, 16 missing
6.9.	Egypt Manshiyet Nasr	Rockslide at Mokattam mountain buries homes in shanty town	101 dead 57 injured

ns = not shown

Table 7
Chronological list of all man-made disasters 2008

Major fires, explosions

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
3.1.	United Kingdom London, Chelsea	Fire at historic Royal Marsden hospital	insured loss ns
5.1.	United States Dearborn	Gas explosion at steel plant	1 injured insured loss ns
7.1.	South Korea Seoul, Icheon	Explosion and fire at warehouse	40 dead 10 injured
8.1.	Bangladesh Dhaka	Fire at shanty town; 2 000 huts destroyed	12 missing 50 injured 10 000 homeless
23.1.	Germany Brehna	Fire at wholesale bakery	insured loss ns
25.1.	United States NV, Las Vegas	Fire at hotel-casino	insured loss ns
31.1.	Turkey Istanbul, Davutpasa	Explosion at five-storey business centre; cars, damage to neighboring buildings, cars	22 dead 60 injured
3.2.	Germany Ludwigshafen	Fire at apartment house	9 dead 60 injured
5.2.	Egypt Cairo	Fire at carpet factory	56 injured insured loss ns
7.2.	United States GA, Savannah, Port Wentworth	Explosion at sugar refinery	13 dead 30 injured insured loss ns USD 323m total damage
18.2.	United States TX, Dallas	Explosion of gas pipeline	5 injured insured loss ns USD 800 m total damage
19.2.	United States TX, Big Spring	Explosion at oil refinery	insured loss ns
24.2.	South Korea Ulsan	Fire at plastic plant	insured loss ns
3.3.	South Korea Cheongwon-gun	Fire at battery plant	insured loss ns
14.3.	Spain Polinya	Fire at plastic producer	insured loss ns
15.3.	Albania Tirana	Explosion at ammunition dump	19 dead 300 injured
26.3.	China Xinjiang, Turpan	Explosion at firework disposal site in the Gobi desert	24 dead, 5 missing 9 injured
26.3.	United Arab Emirates Dubai	Explosion and fire at firework factory; another 20 properties burnt down	2 dead 2 injured insured loss ns
4.4.	Finland Porvoo	Fire at oil refinery	insured loss ns
26.4.	Morocco Casablanca	Fire at a mattress factory	55 dead 12 injured
29.4.	Italy Fusina	Fire at aluminum plant	insured loss ns

ns = not shown

13.5.	Netherlands	Fire at Delft University of Technology; architecture faculty destroyed	insured loss ns
15.5.	Nigeria Lagos, Alimosho, Ijegun	Road construction tractor ruptures oil pipeline; fire and explosion cause stampede	100 dead 20 injured
17.5.	Russia Moscow	Fire of substation at Chagino power station	insured loss ns
30.5.	Germany Boeklund	Fire at sausage processing plant	insured loss ns
1.6.	United States CA, Los Angeles	Fire at Universal Studios	10 injured insured loss ns
3.6.	Australia WA, Varanus Island, Karratha	Explosion and fire at gas processing plant	insured loss ns AUD 2.4bn (USD 1.67bn) total damage
6.6.	India Raigad, Nagothane	Explosion at petrochemical plant	4 dead 50 injured
12.6.	United Kingdom Holyhead	Fire at aluminum plant	insured loss ns
12.7.	Kazakhstan Termirtau	Explosion at steel plant	insured loss ns
29.7.	Japan Hyogo, Takasago	Fire at glass plant	insured loss ns
31.7.	France Calais	Fire at telecommunications equipment supplier	insured loss ns
19.8.	Libyan Arab Jamahiriya Ras Lanuf	Fire at oil storage tank	insured loss ns
26.8.	China Guangxi, Yizhou	Gas explosion, fire at chemical plant; five story factory building collapses	20 dead 50 injured
26.8.	China Guangxi Zhuang	Explosion at chemical plant	20 dead 60 injured
28.8.	United States WV, Charleston	Explosion at chemical plant	1 dead 1 injured insured loss ns
11.9.–12.9.	France Coquelles	Fire in Eurotunnel; truck on freight train catches fire	insured loss ns
20.9.	China Longgang, Shenzhen	Fire at nightclub causes stampede	44 dead 88 injured
20.9.–21.9.	United Arab Emirates Sharjah Gulf	Fire at Port Khalid; damage to oil refiner depot and ice cream factory	insured loss ns
13.10.	Italy Priolo	Gas explosion at gasification plant	insured loss ns
22.10.	India Rajasthan, Deeg	Explosion at fireworks factory	25 dead 16 injured
26.10.	Belgium Ninove	Fire at wholesale bakery	insured loss ns
20.12.	Pakistan Rawalpindi	Fire and collapse of six-storey shopping centre Gakkar Plaza	12 dead 65 injured
24.12.	Ukraine Crimean peninsula, Yevpatoria	Explosion in five-storey apartment block	27 dead 5 injured

ns = not shown

Aviation disasters

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
17.1.	United Kingdom London Heathrow Airport	British Airways Boeing 777-236 lands short; touches down 300 meters before runway	16 injured insured loss ns
23.1.	Poland Miroslawiec	Polish CASA C-295M air force transport plane crashes into forest	20 dead
21.2.	Venezuela Llano del Hato	Santa Bárbara Airlines ATR 42-300 crashes into Andean mountainside	46 dead insured loss ns
14.3.	Space	Proton rocket results in AMC-14 satellite being placed short of planned geostationary transfer orbit	insured loss ns
15.4.	Congo, Democratic Republic of (DRC) Goma	Hewa Bora Airways DC-9 fails to take off and crashes into crowded market	40 dead 110 injured
17.4.	Space	Nigcomsat satellite; major partial loss of solar array	insured loss ns
28.4.	Ukraine	Mi-8 helicopter crashes while landing on drilling platform on the Black Sea	20 dead
2.5.	Sudan Rumbek	South Sudan Air Connection Beechcraft 1900 crashes while landing; catches fire	21 dead
30.5.	Honduras Tegucigalpa	TACA airbus 320 overruns runway, crosses street, crashes into embankment	5 dead 24 injured insured loss ns
8.6.	Space	KazSat-1 satellite: total in-orbit loss	insured loss ns
10.6.	Sudan Khartoum Airport	Sudan Airways A320 crashes on landing, catches fire and explodes	30 dead 22 injured insured loss ns
20.8.	Spain Madrid-Barajas Airport	Spanair MD-82 crashes on takeoff, catches fire	154 dead 19 injured insured loss ns
24.8.	Kyrgyzstan Bishkek	Itek Air Boeing 737 crashes shortly after takeoff	65 dead 25 injured
14.9.	Russia Perm	Aeroflot Boeing 737-500 crashes in a unpopulated area	88 dead insured loss ns
7.10.	Australia	Sudden drop in altitude of Qantas A330 due to turbulence	74 injured
10.11.	Italy Roma-Ciampino Airport	On approach Ryanair Boeing 737 suffers multiple bird strikes on the nose, wings and engines	insured loss ns
27.11.	Mediterranean Sea, France Saint-Cyprien, Perpignan	Air New Zealand Airbus Industries A320 crashes at sea during post-maintenance test flight	2 dead, 5 missing insured loss ns

ns = not shown

Maritime disasters

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
11.1.	South China Sea, China Macau	Two ferries collide in dense fog	133 injured
18.1.	Arabian Sea, Gulf of Aden, Yemen	Boat carrying illegal immigrants capsizes	at least 82 dead, at least 20 missing
20.1.	Arabian Sea, Gulf of Aden, Yemen	Overloaded boat carrying illegal immigrants capsizes	116 dead
25.1.	Congo, Democratic Republic of (DRC) Kalemie	Overloaded ferry capsizes on Lake Tanganyika	17 dead, 50 missing
3.2.	Mediterranean Sea, Spain Barcelona, Port Vell	4 yachts burn and sink	insured loss ns
6.2.	Mediterranean Sea, Croatia Adriatic Sea, Rovinj	Fire on board of container ship Und Adriyatik	insured loss ns
10.2.	Uganda Mukono, Mayuge	Two ships collide and sink on Lake Victoria	30 dead, 17 missing
16.2.	France Donges	Rupture in oil pipeline; 400 tons of oil spilled in Loire River	insured loss ns
18.2.	Black Sea	Cargoship Rezzak disappeared in bad weather	25 missing
21.2.	Brazil Itacoatiara	Two boats capsize on Amazon River; ferry Almirante Monteiro sinks	16 dead, 4 missing
28.2.	Bangladesh Taltala	Collision between ferry and freighter on Buriganga River	46 dead
29.2.	Peru Iquitos	Overloaded ferry sinks in the Tapiche River in bad weather	19 dead, 31 missing
1.4.	Nigeria	Overloaded boat capsizes on Lake Bagwai	30 dead 2 injured
14.4.	Mediterranean Sea, Libyan Arab Jamahiriya	Damage to extraction gas well	insured loss ns
18.4.	North Atlantic, Nigeria Gulf of Guinea	Fire on board vessel Atunera Sant Yago II; vessel sinks	insured loss ns
19.4.	Caribbean Sea, Bahamas	Boat carrying illegal immigrants sinks	15 dead, 10 missing
5.5.	Mediterranean Sea, Libyan Arab Jamahiriya	Boat carrying illegal immigrants disappears in rough weather	60 missing
10.5.	Caribbean Sea, Haiti Port-au-Prince	Overloaded ferry Dieu soit loué capsizes and sinks	20 dead
12.5.	Bangladesh Dhaka, Kishoreganj	Ferry capsized on Ghorautura River during storm	44 dead
25.5.	Mediterranean Sea, Libyan Arab Jamahiriya	Boats carrying illegal immigrants capsize	70 dead
7.6.	Mediterranean Sea, Libyan Arab Jamahiriya Zuwarah	Boat carrying illegal immigrants capsizes	at least 40 dead, at least 100 missing
1.7.	Myanmar (Burma) Irrawaddy	Ferry Myo Pa Pa Tun capsizes on Yway River	39 dead
23.7.	United States LA, New Orleans	Collision of oil barge and freighter Tintomara on the Mississippi; over 1 million liters of oil spilled	insured loss ns
23.7.	India Bihar, Purnia, Kanpghat	Overloaded boat capsizes on Kosi River	8 dead, 12 missing
1.8.	India Uttar Pradesh, Azamgarh	Boat capsizes on Tons River	at least 10 dead, 10 missing

ns = not shown

7.8.	Mediterranean Sea, Italy Trapani	Hydrofoil MV Ettore Morace slams into rock	81 injured
27.8.	Mediterranean Sea, Malta	Boat carrying illegal immigrants sinks	3 dead, 67 missing
30.8.	India Bihar, Patna, Medhepura	Overloaded boat capsizes on flood-swollen Kosi River	20 dead
11.9.	India Bihar, Sheikhpura	Overloaded boat capsizes on Harohar River	24 dead
14.9.	Mediterranean Sea, Turkey Sea of Marmara, Bandirma	Ferry Hayat N. sinks	1 dead, 4 missing 50 injured
23.9.	Sudan Shagarab	Overloaded boat carrying illegal immigrants capsizes on Altbara River	21 dead
8.10.	North Atlantic, Morocco Kenitra	Boat carrying illegal immigrants sinks	1 dead, 49 missing
10.10.–11.10.	Mediterranean Sea, Spain Strait of Gibraltar	Bulker Fedra runs aground in rough weather, breaks in two; spillage of crude oil	insured loss ns
22.10.	India Bihar, Khagaria	Overloaded boat capsizes on Ganges	24 dead
26.10.–27.10.	North Atlantic	Jack-up lift boat falls overboard from heavy lift vessel during rough weather	insured loss ns
2.11.	Arabian Sea, Gulf of Aden, Yemen	Overloaded passenger boat carrying illegal immigrants capsizes	23 dead
4.11.	Philippine Sea, Philippines Masbate, Dimasalang	MB Don Dexter Cathlyn capsizes in rough weather	43 dead 9 injured
9.11.	North Pacific Ocean Sea of Japan	Fire extinguishing system leaks gas on a nuclear submarine	20 dead 21 injured
9.11.	South Pacific Ocean, Kiribati	Burnt-out wreck of fishing boat Da Ching 21 found empty	29 missing
14.12.	Philippine Sea, Philippines Luzon, Calayan Islands	Overloaded passenger ferry MV Maejan capsizes in rough weather	47 dead, 6 missing
18.12.	Bay of Bengal, Myanmar (Burma)	Boats carrying illegal immigrants disappear	275 missing

Rail disasters (incl. cableways)

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
9.3.	Argentina Dolores	Train slams into passenger bus on level crossing	18 dead 50 injured
28.4.	China Shandong, Qingdao	High-speed train derails and crashes into passenger train	72 dead 416 injured
12.6.	Russia Amur	10 coaches of passenger train derail	60 injured
16.7.	Egypt Marsa Matruh	Truck fails to stop at level crossing, pushes waiting traffic into path of passenger train	44 dead 38 injured
8.8.	Czech Republic Studenka	Express train crashes into debris of collapsed road bridge	7 dead 67 injured
12.9.	United States LA, San Fernando Valley	Commuter train collides head-on with freight train	25 dead 135 injured

ns = not shown

Mining accidents

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
11.1.	Kazakhstan Karaganda Abay	Gas explosion at Abaiskaya coal mine	30 dead 14 injured insured loss ns
15.1.–31.1.	South Africa Mpumalanga	Coal mine collapses	insured loss ns
20.1.	China Shanxi, Linfen	Gas explosion at coal mine	20 dead
17.2.	China Hebei	Gas explosion at iron mine	24 dead 5 injured
24.2.	South Africa Kwazulu-Natal	Fire at gold mine	5 dead 4 injured insured loss ns
29.3.	Tanzania Arusha, Mto wa Mbu	Flooding of gemstone mine due to heavy rain	at least 23 dead, 50 missing
12.6.	China Shanxi, Luliang, Xiaoyi	Explosion at coal mine	34 dead
6.7.	China Shanxi, Datong	Gas explosion at Wujiu coal mine	21 dead
14.7.	China Hebei, Wei	Explosion at Lijiawa coal mine	35 dead 1 injured
21.7.	China Guangxi, Tiandong	Flooding of Nadu coal mine	30 dead
1.8.	China Shanxi, Loufan, Taiyuan	Landslide causes dam burst at iron mine; Sigou village buried	44 dead 1 injured
9.8.	Burkina Faso Boussoukoula	Floods and landslide; collapse of gold mine	31 dead
8.9.	China Shanxi, Linfen, Xiangfen	Mudslide causes collapse of dam at Tashan ore mine: three-storey office building, market, houses buried	271 dead 35 injured
20.9.	China Heilongjiang, Hegang	Fire at coal mine	19 dead, 12 missing
21.9.	China Henan, Dengfeng	Gas explosion at Xinfeng No 2 coal mine	37 dead

Collapse of buildings/bridges

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
17.1.	Bangladesh Churachandpur, Behiang	Collapse of wooden bridge; overloaded truck plunges into river	22 dead 25 injured
29.3.	Angola Luanda	Collapse of six-storey police headquarters building	30 dead 145 injured
13.8.	India Mumbai	Collapse of four-storey building due to heavy rain	20 dead 21 injured
7.11.	Haiti Port au Prince, Petion-ville	Collapse of three storey ramshackle church school	91 dead 162 injured
15.11.	China Zhejiang , Hangzhou	Subway tunnel under construction collapses	8 dead, 13 missing 11 injured
16.11.	India Jammu and Kashmir, Uri	Bridge over Jhelum River under construction collapses	at least 4 dead, 16 missing

ns = not shown

Miscellaneous

Date	Country Place	Event	No. of victims/amount of damage in original currency and (USD)
1.1.–6.1.	Mongolia Ulan Bator	Poisoning due to alcohol laced with methanol	14 dead 60 injured
14.1.	Peru Ancash	Machinery breakdown at Antamina copper mine	insured loss ns
9.2.	Pakistan Charasadda	Suicide bombing during election rally	25 dead
10.2.	Switzerland Zurich	Art robbery; paintings stolen from the Emil Georg Buehrle Collection	insured loss ns
16.2.	Pakistan Parachinar	Suicide bombing during rally	37 dead 93 injured
29.2.	Pakistan Swat, Mingora	Suicide bombing during funeral	40 dead
2.3.	Pakistan Darra Adam Kheil	Suicide bomb attack at traditional tribal meeting	39 dead 30 injured
10.3.	Pakistan Lahore	Suicide bombings at federal police headquarters and residential district	25 dead 120 injured
12.3.	Spain Aviles	Damage to plant due to melted glass leakage from furnace	insured loss ns
14.3.–28.3.	Indonesia Jambi	Poisoning due to fermented pineapple juice	23 dead
14.3.	China Tibet Autonomous Region, Lhasa	Riots and protests by Buddhist monks and other residents against Chinese rule	19 dead 600 injured
1.5.–18.5.	India Tamil Nadu, Karnataka, Bangalore	Poisoning due to alcohol laced with methanol	168 dead 150 injured
13.5.	India Jaipur	Eight bombs explode in busy market areas	64 dead 216 injured
23.5.–26.5.	India Rajasthan	Clashes between police and demonstrators	37 dead
28.6.	China Guizhou, Wenig'an	Riots, attacks on government buildings	150 injured
18.7.	Germany Bamberg	Poisonous fumes escape at automotive parts supplier	81 injured
26.7.	India Gujarat	22 bomb explosions in Ahmedabad city; amongst these attacks on two hospitals	53 dead 200 injured
27.7.–29.7.	Indonesia Papua, Merauke	Poisoning due to alcohol laced with methanol	15 dead 93 injured
3.8.	India Himachal Pradesh	Stampede among pilgrims during festival	148 dead 50 injured
19.8.	Pakistan Dera Ismail Khan	Suicide bombing at hospital	23 dead
21.8.	Pakistan Wah Cantt	Two suicide bombings at gates of ordnance factory	59 dead 67 injured
3.9.–21.9.	Arabian Sea, Gulf of Aden, Yemen	Illegal immigrants die during journey	52 dead 72 injured
6.9.	Pakistan North West Frontier, Peshawar	Suicide bombing at security checkpoint	35 dead
9.9.	Arabian Sea, Gulf of Aden, Yemen	Smugglers force illegal immigrants to jump overboard	29 dead

ns = not shown

13.9.	India Delhi	Bombs explode in busy market places and streets	22 dead 90 injured
15.9.–15.8.	Indonesia East Java, Pasuran	Stampede in front of house; crowd was pushed against a fence	23 dead 8 injured
20.9.	Pakistan Islamabad	Suicide bombing at Marriott Hotel; explosion destroys gas pipe, fire	53 dead 270 injured
30.9.	India Rajasthan, Jodhpur	Stampede at Navaratri festival	224 dead 57 injured
1.10.	India Tripura, Agartala	Bomb explosions at bus station and Maharajganj Bazar	75 injured
6.10.	Arabian Sea, Gulf of Aden, Yemen	Smugglers force illegal immigrants to jump overboard	30 dead, 61 missing
7.10.	Thailand Bangkok	Clashes between anti-government protesters and police	2 dead 500 injured
10.10.	Pakistan Orakzai, Ghaljoo Tehsil	Suicide bombing at tribal assembly	30 dead 100 injured
30.10.	India Assam, Ganeshguri	11 near-simultaneous bomb explosions in main city of Guwahati and two other towns	89 dead 300 injured
2.11.	Arabian Sea, Gulf of Aden, Yemen	Smugglers force illegal immigrants to jump overboard	12 dead, 28 missing
5.11.	Spain Pamplona	Gas leakage at University of Navarra during repair work	94 injured
18.11.–19.11.	China Gansu, Longnan	Clashes between security forces and local residents protesting against government plan; 22 vehicles, 110 rooms destroyed	71 injured CNY 5m (USD 1m) total damage
26.11.–29.11.	India Mumbai	Attack on luxury hotels Taj-Mahal, Oberoi, popular café, major railway station, hospital and Jewish centre; terrorists take hostages	172 dead 300 injured insured loss ns
28.11.–29.11.	Nigeria Plateau, Jos	Clashes over disputed election results	300 dead 300 injured
30.11.	Thailand Bangkok	Bomb explosion inside Government house	50 injured
1.12.	Arabian Sea, Gulf of Aden, Yemen	Smugglers force illegal immigrants to jump overboard	20 dead, 2 missing
4.12.	France Paris	Robbery at luxury Harry Winston jewellery boutique	insured loss ns
7.12.–17.12.	Greece Athens, Thessaloniki, Patras, Zefyri	Riots; cars and over 700 buildings set on fire	1 dead 70 injured insured loss ns EUR 1bn (USD 1.39bn) total
22.12.	India Maharashtra, Raigad	Poisoning due to alcohol laced with methanol	4 dead 80 injured
28.12.	Pakistan North West Frontier, Buner	Suicide bomb attack outside polling station; school building destroyed, several nearby buildings collapse	36 dead 15 injured

ns = not shown

Table 8
The 40 most costly insurance losses 1970–2008

Insured loss[14] (in USD m, indexed to 2008)	**Victims**[15]	**Date** (start)	**Event**	**Country**
71 300	1 836	25.08.2005	Hurricane Katrina; floods, dams burst, damage to oil rigs	US, Gulf of Mexico, Bahamas, North Atlantic
24 552	43	23.08.1992	Hurricane Andrew; floods	US, Bahamas
22 835	2 982	11.09.2001	Terror attack on WTC, Pentagon and other buildings	US
20 337	61	17.01.1994	Northridge earthquake (M 6.6)	US
20 000	136	06.09.2008	Hurricane Ike; floods, offshore damage	US, Caribbean: Gulf of Mexico et al
14 680	124	02.09.2004	Hurricane Ivan; damage to oil rigs	US, Caribbean; Barbados et al
13 847	35	19.10.2005	Hurricane Wilma; torrential rain, floods	US, Mexico, Jamaica, Haiti et al
11 122	34	20.09.2005	Hurricane Rita; floods, damage to oil rigs	US, Gulf of Mexico, Cuba
9 176	24	11.08.2004	Hurricane Charley; floods	US, Cuba, Jamaica et al
8 926	51	27.09.1991	Typhoon Mireille/No 19	Japan
7 940	71	15.09.1989	Hurricane Hugo	US, Puerto Rico et al
7 695	95	25.01.1990	Winter storm Daria	France, UK, Belgium, NL et al
7 497	110	25.12.1999	Winter storm Lothar	Switzerland, UK, France et al
6 328	54	18.01.2007	Winter storm Kyrill; floods	Germany, UK, NL, Belgium et al
5 875	22	15.10.1987	Storm and floods in Europe	France, UK, Netherlands et al
5 866	38	26.08.2004	Hurricane Frances	US, Bahamas
5 258	64	25.02.1990	Winter storm Vivian	Europe
5 222	26	22.09.1999	Typhoon Bart/No 18	Japan
4 663	600	20.09.1998	Hurricane Georges; floods	US, Caribbean
4 382	41	05.06.2001	Tropical storm Allison; heavy rain, floods	US
4 334	3 034	13.09.2004	Hurricane Jeanne; floods, landslides	US, Caribbean: Haiti et al
4 087	45	06.09.2004	Typhoon Songda/No 18	Japan, South Korea
4 000	135	26.08.2008	Hurricane Gustav; floods, offshore damage	US, Caribbean: Gulf of Mexico et al
3 752	45	02.05.2003	Thunderstorms, tornadoes, hail	US
3 648	70	10.09.1999	Hurricane Floyd; heavy rain, floods	US, Bahamas, Columbia
3 642	167	06.07.1988	Explosion on platform Piper Alpha	UK
3 540	59	01.10.1995	Hurricane Opal; floods	US, Mexico, Gulf of Mexico
3 493	6 425	17.01.1995	Great Hanshin earthquake (M 7.2) in Kobe	Japan
3 102	45	27.12.1999	Winter storm Martin	Spain, France, Switzerland
2 925	246	10.03.1993	Blizzard, tornadoes, floods	US, Canada, Mexico, Cuba
2 763	38	06.08.2002	Severe floods	UK, Spain, Germany, Austria et al
2 688	26	20.10.1991	Forest fires which spread to urban areas, drought	US
2 675	–	06.04.2001	Hail, floods and tornadoes	US
2 583	4	25.06.2007	Heavy rainfall, floods	UK
2 548	30	18.09.2003	Hurricane Isabel	US, Canada
2 495	39	05.09.1996	Hurricane Fran	US
2 462	20	03.12.1999	Winter storm Anatol	Denmark, Sweden, UK et al
2 455	4	11.09.1992	Hurricane Iniki	US, North Pacific Ocean
2 369	–	29.08.1979	Hurricane Frederic	US
2 340	49	19.08.2005	Heavy rainfall, floods and landslides	Switzerland, Germany et al

[14] Property and business interruption, excluding liability and life insurance losses
US natural catastrophe figures: with the permission of Property Claim Services (PCS)/incl. NFIP flood losses (see page 39 "Terms and selection criteria")
[15] Dead and missing

Table 9
The 40 worst catastrophes in terms of victims 1970–2008

Victims[16]	Insured loss (in USD m, indexed to 2008)[17]	Date (start)	Event	Country
300 000	–	14.11.1970	Storm and flood catastrophe	Bangladesh, Bay of Bengal
255 000	–	28.07.1976	Earthquake (M_W 7.5)	China
220 000	2 280	26.12.2004	Earthquake (M_W 9), tsunami in Indian Ocean	Indonesia, Thailand et al
138 373	–	02.05.2008	Tropical cyclone Nargis; Irrawaddy Delta flooded	Myanmar (Burma), Bay of Bengal
138 000	3	29.04.1991	Tropical cyclone Gorky	Bangladesh
87 449	366	12.05.2008	Earthquake (M_W 7.9) in Shichuan, aftershocks	China
73 300	–	08.10.2005	Earthquake (M_W 7.6); aftershocks, landslides	Pakistan, India, Afghanistan
66 000	–	31.05.1970	Earthquake (M 7.7); rock slides	Peru
40 000	190	21.06.1990	Earthquake (M 7.7); landslides	Iran
35 000	–	01.06.2003	Heat wave and drought in Europe	France, Italy, Germany et al
26 271	–	26.12.2003	Earthquake (M 6.5) destroys 85% of Bam	Iran
25 000	–	07.12.1988	Earthquake (M 6.9)	Armenia, ex-USSR
25 000	–	16.09.1978	Earthquake (M 7.7) in Tabas	Iran
23 000	–	13.11.1985	Volcanic eruption on Nevado del Ruiz	Colombia
22 084	284	04.02.1976	Earthquake (M 7.5)	Guatemala
19 737	122	26.01.2001	Earthquake (M_W 7.6) in Gujarat	India, Pakistan, Nepal et al
19 118	1 293	17.08.1999	Earthquake (M_L 7) in Izmit	Turkey
15 000	–	11.08.1979	Macchu dam burst in Morvi	India
15 000	–	01.09.1978	Floods following monsoon rains	India, Bangladesh
15 000	129	29.10.1999	Cyclone 05B devastates Orissa state	India, Bangladesh
11 069	–	25.05.1985	Tropical cyclone in Bay of Bengal	Bangladesh
10 800	–	31.10.1971	Floods in Bay of Bengal and Orissa state	India
10 000	284	12.12.1999	Floods, mudflows and landslides	Venezuela, Colombia
10 000	–	20.11.1977	Tropical cyclone in Andrah Pradesh	India, Bay of Bengal
9 500	645	19.09.1985	Earthquake (M 8.1)	Mexico
9 475	–	30.09.1993	Earthquake (M 6.4) in Maharashtra	India
9 000	660	22.10.1998	Hurricane Mitch in Central America	Honduras, Nicaragua et al
6 425	3 493	17.01.1995	Great Hanshin earthquake (M 7.2) in Kobe	Japan
6 304	–	05.11.1991	Typhoons Thelma and Uring	Philippines
6 000	–	02.12.1984	Accident in chemical plant in Bhopal	India
6 000	–	01.06.1976	Heat wave, drought	France
5 778	43	27.05.2006	Earthquake (M_L 6.3); Bantul nearly completely destroyed	Indonesia
5 422	–	26.06.1976	Earthquake (M 7.1)	Papua New Guinea, Indonesia et al
5 374	–	10.04.1972	Earthquake (M 6.9) in Fars	Iran
5 300	–	28.12.1974	Earthquake (M 6.3)	Pakistan
5 112	–	15.11.2001	Floods and landslides caused by heavy rain	Brazil
5 000	1 270	05.03.1987	Earthquake; oil pipeline damaged	Ecuador
5 000	669	23.12.1972	Earthquake (M 6.3) in Managua	Nicaragua
5 000	–	30.06.1976	Earthquake in West Irian	Indonesia
4 500	–	10.10.1980	Earthquake in El Asnam	Algeria

[16] Dead and missing
[17] Property and business interruption, excluding liability and life insurance losses

Natural catastrophes

The term "natural catastrophe" refers to an event caused by natural forces. Such an event generally results in a large number of individual losses involving many insurance policies. The scale of the losses resulting from a catastrophe depends not only on the severity of the natural forces concerned, but also on man-made factors, such as building design or the efficiency of disaster control in the afflicted region. In this sigma study, natural catastrophes are subdivided into the following categories: floods, storms, earthquakes, droughts/forest fires/heat waves, cold waves/frost, hail, tsunami and other natural catastrophes.

Man-made disasters

Major events associated with human activities are categorised as "man-made" or "technical" disasters in this study. Generally, a large object in a very limited space is affected, which is covered by a small number of insurance policies. War, civil war and war-like events are excluded. sigma subdivides man-made disasters into the following categories: major fires and explosions, aviation and space disasters, maritime disasters, rail disasters, mining accidents, collapse of buildings/bridges and miscellaneous (including terrorism). Tables 6 and 7 on pages 21 and 29 list all major natural catastrophes and man-made disasters and the associated losses.

Total losses

Losses also refer to property damage and business interruptions directly attributable to a catastrophe.

For the purposes of the present sigma study, total losses are all the financial losses directly attributable to a major event, ie damage to buildings, infrastructure, vehicles etc. The term also includes losses due to business interruption as a direct consequence of the property damage. A figure identified as "total damage" or "economic loss" includes all damage, insured and uninsured. Total loss figures do not include indirect financial losses – ie loss of earnings by suppliers due to disabled businesses, estimated shortfalls in gross domestic product, and non-economic losses, such as loss of reputation or impaired quality of life.

The amount of the total losses is a general indication only.

Generally, total (or economic) losses are estimated and communicated in very different ways. As a result, they are not directly comparable and should be seen only as an indication of the general order of magnitude.

Insured losses

Insured losses

"Losses" refer to all insured losses except liability. On the one hand, leaving aside the liability losses allows a relatively swift assessment of the insurance year; on the other hand, however, it tends to understate the cost of man-made disasters. Life insurance losses are also not included.

NFIP flood damage in the US

NFIP flood damage in the US

The *sigma* catastrophe database also includes flood damage covered by the National Flood Insurance Program (NFIP) in the US, provided that it fulfils the *sigma* selection criteria.

Selection criteria

sigma has been publishing tables listing major losses since 1970. Thresholds with respect to casualties – the number of dead, missing, severely injured, homeless – also make it possible to tabulate events in regions where the insurance penetration is below average.

Thresholds in 2008

For the 2008 reporting year, the lower loss thresholds were set as follows:

Insured losses:

Maritime disasters	USD 17.2m
Aviation	USD 34.4m
Other losses	USD 42.7m

or Total losses: USD 85.4m

or Casualties:

Dead or missing	20
Injured	50
Homeless	2 000

US consumer price index used to adjust for inflation

Adjustment for inflation, changes to published data, information

sigma converts all losses for the occurrence year not given in USD into USD using the end-of-year exchange rate. To account for inflation, these USD values are extrapolated using the US consumer price index to give current (2008) values. This can be illustrated by examining the insured property losses arising from the floods which occurred in the UK between 29 October and 10 November 2000:

Insured loss at 2000 prices: USD 1 045.7m
Insured loss at 2008 prices: USD 1 307.6m

Alternatively, were one to adjust the losses in the original currency (GBP) for inflation and then convert them to USD using the current exchange rate, one would end up with an insured loss at 2008 prices of USD 1 624.2m, 24% more than with the standard sigma method. The reason for the difference is that the value of the GBP rose by 33% against the USD in the period 2000–2008, ie more than the difference in inflation between the US (25%) and the UK (16.6%) over the same period.

Figure 8
Alternative methods of adjusting for inflation, by comparison

Floods UK
29 October–10 November 2000

		Exchange rate		US inflation
	GBPm	**USD/GBP**	**USDm**	**USDm**
Original loss	700.0	1.4939	1 045.7	1 045.7
Level of consumer price index 2000	93.1			172.2
Level of consumer price index 2008	108.5			215.3
Inflation factor	1.166			1.250
Adjusted for inflation to 2008	815.9	1.9906	1 624.2	1 307.6
Comparison			124%	100%

If changes to the loss amounts of previously published events become known, *sigma* takes these into account in its database. However, these changes only become evident when an event appears in the table of the 40 costliest insured losses or the 40 disasters with the most fatalities since 1970 (Tables 8 and 9, pages 37 – 38).

sigma does not provide information on individual events.

In the chronological lists of all man-made disasters, the insured losses are given by *sigma* as "not shown" (ns) for data protection reasons. However the total of these insured losses is included in the list of major losses in 2008 according to loss category. *sigma* does not provide further information on individual insured losses or about updates made to published data.

Sources

Information is collected from newspapers, direct insurance and reinsurance periodicals, specialist publications (in printed or electronic form) and reports from insurers and reinsurers.[18] In no event shall Swiss Re be liable for any loss or damage arising in connection with the use of this information (see the copyright information on page 2).

Table 10
Exchange rates used when converting total damage and/or insured losses

Exchange rate used[19], National currency per USD		
Country	**Currency**	**Exchange rate, end 2008**
Australia	AUD	1.4343
Brazil	BRL	2.3320
Canada	CAD	1.2346
China, PRC	CNY	6.8230
Egypt	EGP	5.5113
Europe	EUR	0.7194
India	INR	48.7200
Japan	JPY	90.6500
Kazakhstan	KZT	120.8750
Namibia	NAD	9.2675
New Zealand	NZD	1.7112
Philippines	PHP	47.5500
South Africa	ZAR	9.2450
South Korea	KRW	1259.5500
Switzerland	CHF	1.0644
Tadjikistan	TJS	3.4519
Taiwan, RC	TWD	32.8180
Thailand	THB	34.7800
USA	USD	1.0000
Ukraine	UAH	7.6750
United Kingdom	GPB	0.6955
Vietnam	VND	17483.0000

[18] Natural catastrophes in the US: Those *sigma* figures which are based exclusively on estimates of Property Claim Services (PCS), a unit of the Insurance Services Office, Inc (ISO), are given for each individual event in ranges defined by PCS. The estimates are the property of ISO and may not be reprinted or used for any purpose, including use as a component in any financial instruments, without the express consent of ISO.

[19] The losses for 2008 were converted to USD using these exchange rates. No losses in any other currencies were reported.

Recent *sigma* publications

No 2/2009	Natural catastrophes and man-made disasters in 2008: North America and Asia suffer heavy losses
No 1/2009	Scenario analysis in insurance
No 5/2008	Insurance in the emerging markets: overview and prospects for Islamic insurance
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