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Volume IV Issue 1 - Spring / Summer 2007

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Editorial

Nature and Culture – a customary symbiotic relationship but disintegrating relevance in a rapidly urbanising form and architecture today, is the focus of this issue.

The first section presents an inquiry into spaces for women in public architecture, emphasising the need to understand the socio-cultural beliefs that define the boundaries within architectural form. Be it religious, as in spaces within a *masjid*, or the camp and pleasure resorts of the Mughals – documented here by Basrai and Rotzer respectively, the meaning of historic architecture can only be comprehended when the architectural drawings are supported by parallel socio-cultural queries.

The 'Methods and Approaches' section looks at natural resources like forests through sacred groves, indigenous lifestyles and festivals, historic monuments vis a vis increasing urbanisation, urban space and the need for conservation and continuity .

'Sustainable Solutions' includes two articles – the first one presents a wide perspective from the philosophical roots of India to the present day planning dilemma in the Indian cities. To an extent, it helps us understand why our cities and educational curriculum are in the present state of confusion. The second article in this section addresses the issues and concerns raised in the earlier articles and provides solutions for better management of indigenous resources, transparency in decision making and an integrated approach to planning and conservation.

Since its inception, our journal has published articles from experts in varied disciplines to provide examples of a holistic approach to development. While we have received an encouraging response, some of our readers have suggested that the publication should focus on a particular discipline or have more thematic issues. We would like to reiterate that the aim of our journal is to break the 'professional cocoons' and encourage interdisciplinary perspectives, hence the diverse selection of articles.

Shikha Jain

Compiling Records

Evolution of the Bohra Masjid in Gujarat AD 1650-1950

Zameer Basrai pg.7

A graduate in Architecture from CEPT University, Ahmedabad, Zameer Basrai is currently practicing as an associate architect at 'The Busride', an environment design studio based in Mumbai.

Kalyadeh and Sadalpur

Klaus Rotzer pg.17

Klaus Rotzer is a freelance archaeologist who has lived in South Asia for 35 years and undertaken significant documentation of the historic water structures and defence architecture of India.



Interviewees during the documentation process

Evolution of the Bohra Masjid in Gujarat AD 1650-1950

Women's space in the masjid

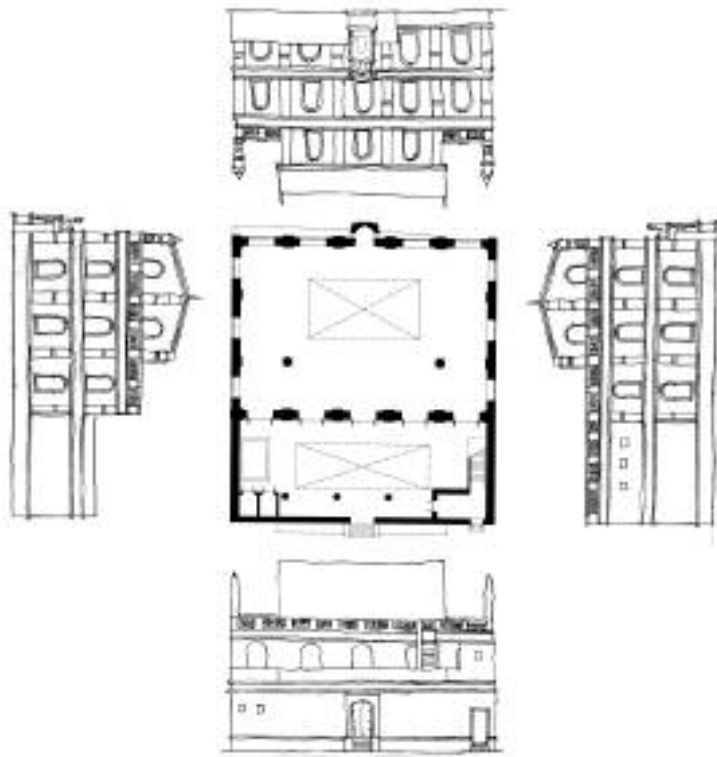
ZAMEER BASRAI



The Bohras are petty traders who thrived along trading routes and ports in Gujarat and neighbouring states

This paper studies the Bohras of Gujarat and their masjid in an attempt to document, record and understand community behavior, socio-cultural ethos as well as material and construction technology.

Research in history, social studies and anthropology has probed deep into the study of 'sects and sub-sects' of Islam as well as the specific socio-political contexts that were instrumental in their formation. It is essential for research in Islamic architecture to be informed of these sectarian differences to achieve a comprehensive understanding of context and address the peculiarities of the Islamic sects and its manifestations in the architecture of their institutions.



Sketch elevations, Najmi Masjid



Sketch of the three storeyed structure of the Najmi Masjid in Surat

The Documentation Process

Divided at its very inception, the roots of Islam can be traced to Mecca in Arabia, where its philosophy was revealed to the prophet Mohammed in the early 7th century. However, the prophet left no successor in writing and on his death, the question of who would succeed his caliphate caused the first schism in the religion.

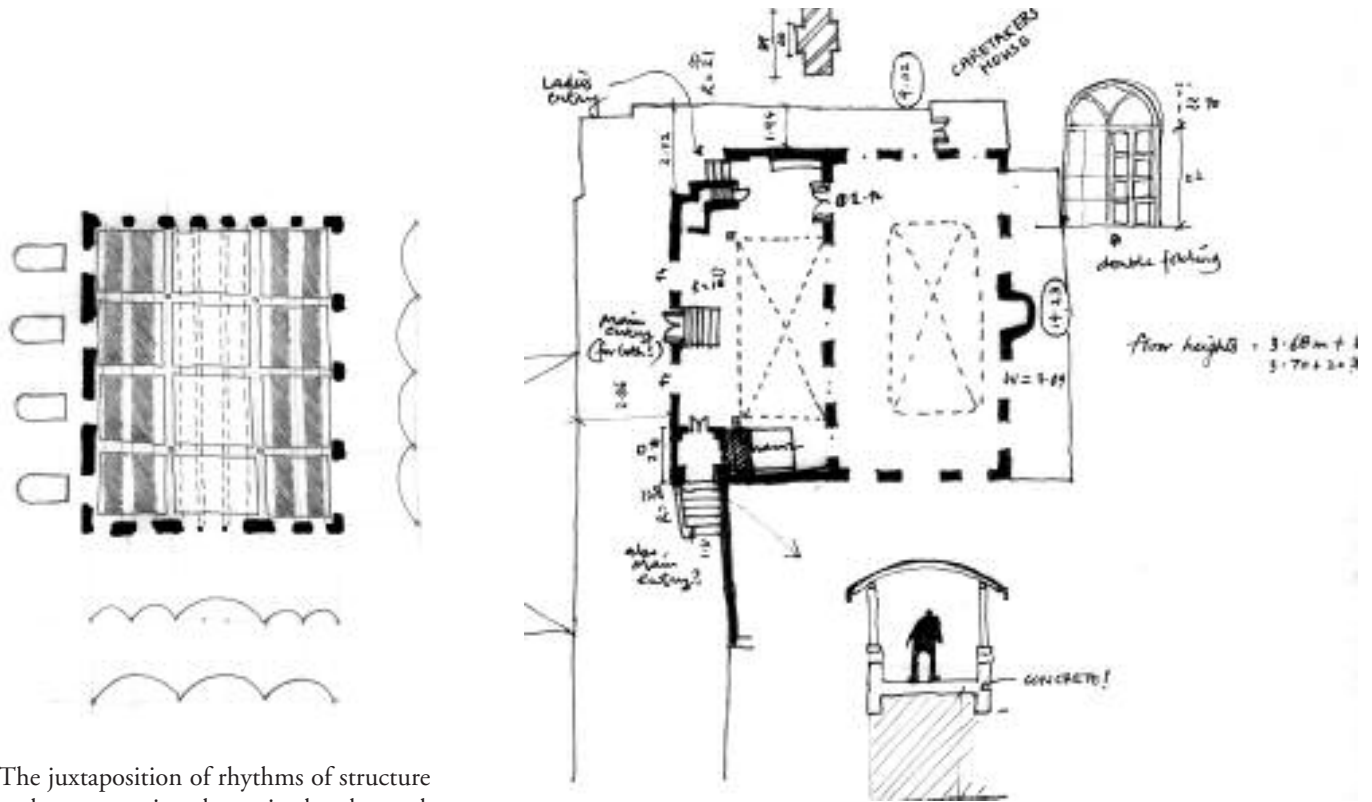
The Sunnis, one of the two main branches of Islam, commonly described as orthodox (origin Arabic; literally 'custom, normative rule') accepted the leadership of Abu Bakr, a revered leader at the time, and constituted the majority.

The Shias (Also Shi'a), the other branch of Islam, constituted a minority. They rejected the first three caliphs and regarded Ali, the fourth caliph, as Mohammed's true successor (origin Arabic S'-a' which denotes 'Of Ali')

The sentiments of the schism are expressed as: 'The Sunnis resent Shiite attacks on their first three caliphs; the Shias can never forgive the Sunnis for their supposed betrayal of Ali.'

As the Islamic empire spread outside the Arabian Peninsula, a series of internal rifts caused a further divide in the religion. Each group fought the other to establish its seat of power. The Bohras too, have been part of a peculiar history of Islam in the Indian sub-continent. The Bohras are Shia muslims of the Ismaili Mustaali sect. They mainly constitute local Brahmin and Vania converts in the state of Gujarat at the beginning of the 11th century.

This research investigated the evolution of the Bohra Masjid in Gujarat from A.D. 1650 (when they suffered greatly due to religious persecution by Sunni rulers in the state) to A.D. 1950 (when they prospered at the height of British rule in the country). It was during the colonial rule in the country, when the British adopted repressive measures against the Sunni masses, that the Bohras stepped out of their past to reconcile with their changing context. The masjid spontaneously evolved with the rapid changes after the decline of the Mughals and the rise of colonial power in the country to manifest itself as a symbol of the economic prosperity and socio-political security of the community.



The juxtaposition of rhythms of structure and ornamentation shown in the plan and reflected in the facade

Sketch plan Husaini Masjid

Since the study explores the relationship between the socio-political context of the city and women's space in the masjid; the masjids selected for the study are representative of these different stages in the history of the Bohras in Gujarat. These were documented through observation, interviews, measured drawings and photographs.

This direct participation in the documentation process elucidated certain concepts, both spatial and religious-cultural, that are not apparent only through analytical studies.

The inquiry into the development of women's space in the Bohra Masjid is an example of research that is mainly based on the collection of data from primary sources.

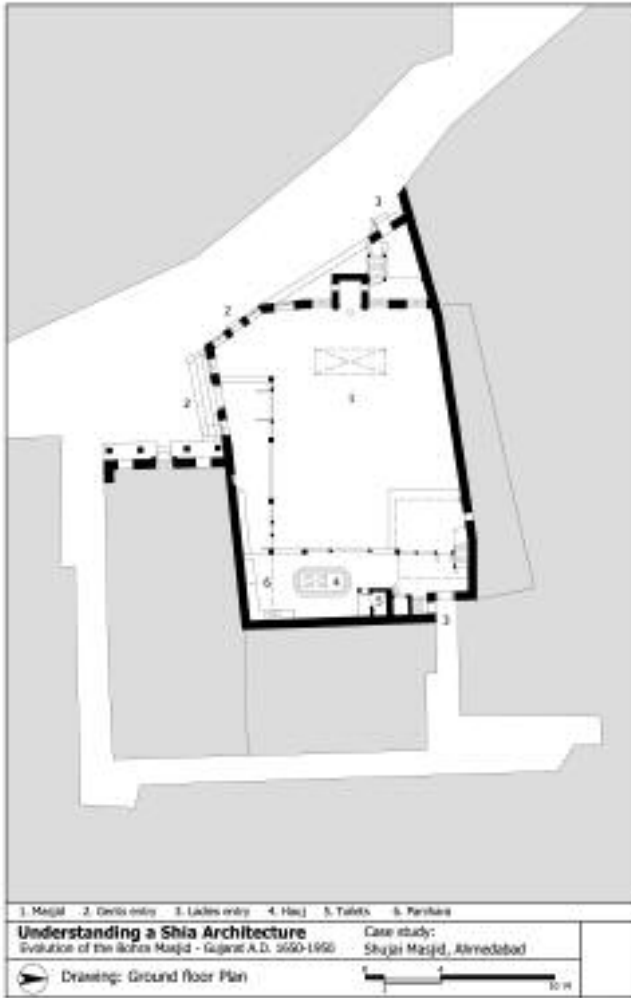
Research revealed that historically, the concept of the harem dates back to the warring times in Arabia. The jenana space in the house developed as an instrument for the seclusion of women in the community as did the religious belief of *purdah* (or visual separation of men and women). Women have historically been

prohibited from entering the courtyard of the masjid; when allowed into the masjid premises, they have often had disproportionately small enclosures in the form of galleries or visually partitioned areas. The common understanding of the position and role of women in Islamic communities is often expressed as: 'Women are not found in the same rows as men and no prayer is obligatory for them. Menstruating women are according to Islamic tradition ritually impure and are not allowed in the mosque at all. This is the reason for the tolerance in the question of prayer obligation and prescribed ritual purity.'

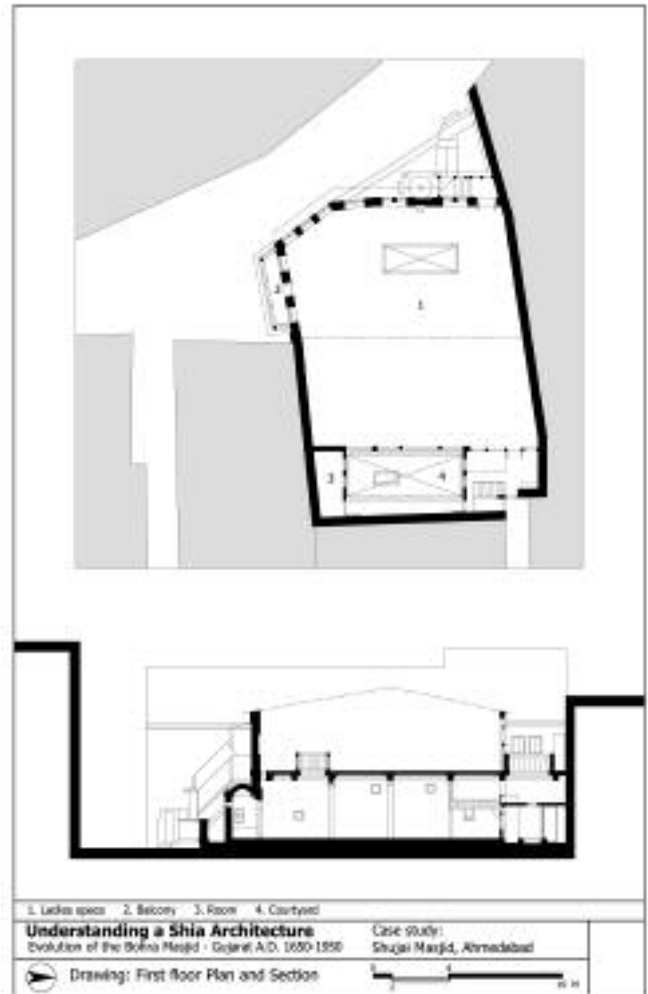
The Bohras stand apart as an Islamic sub-sect due to their distinctive attitudes towards the community and individual; their institutions bear witness to these differences.

The Bohra masjid, developed over a span of three hundred years, expresses a special importance for women within its spatial hierarchies. The jenana or ladies' enclosure is integrated into the masjid form as an upper storey, exclusively used by women for prayers during the month of Ramadan and during large

Shujai Masjid Documentation



Shujai Masjid, Ahmedabad, ground floor plan

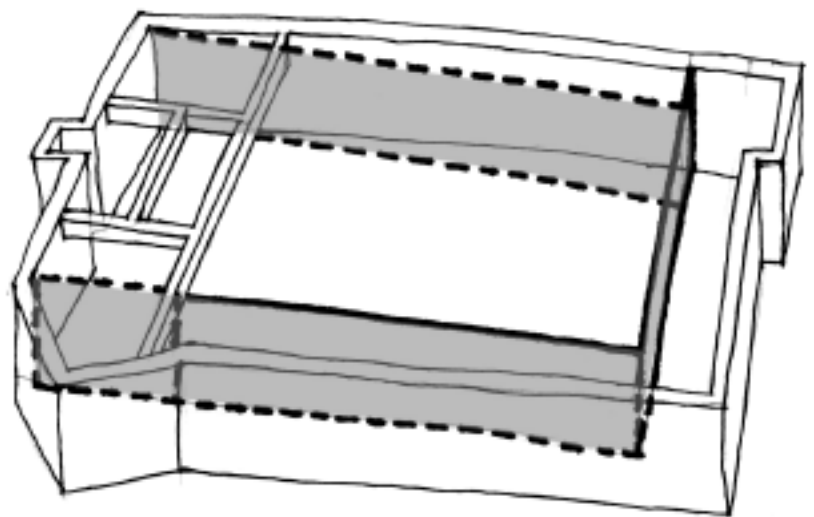


Shujai Masjid, Ahmedabad, first floor plan and section

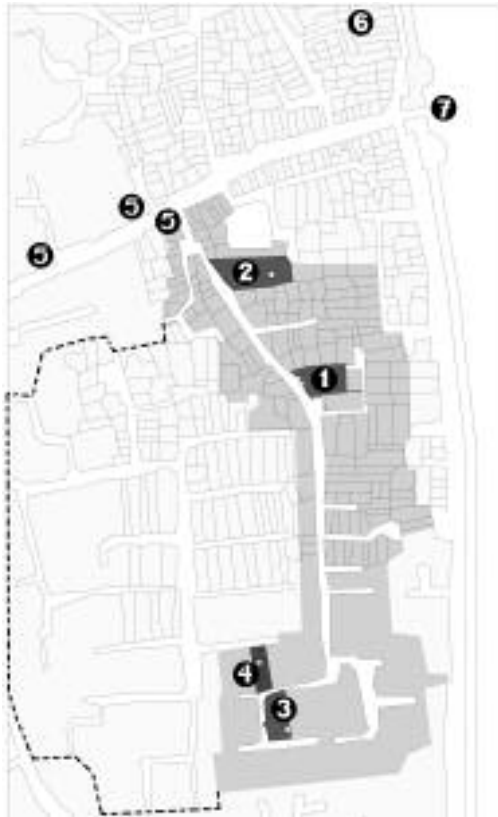
The 'hadd vagar no bhag' on the ground floor



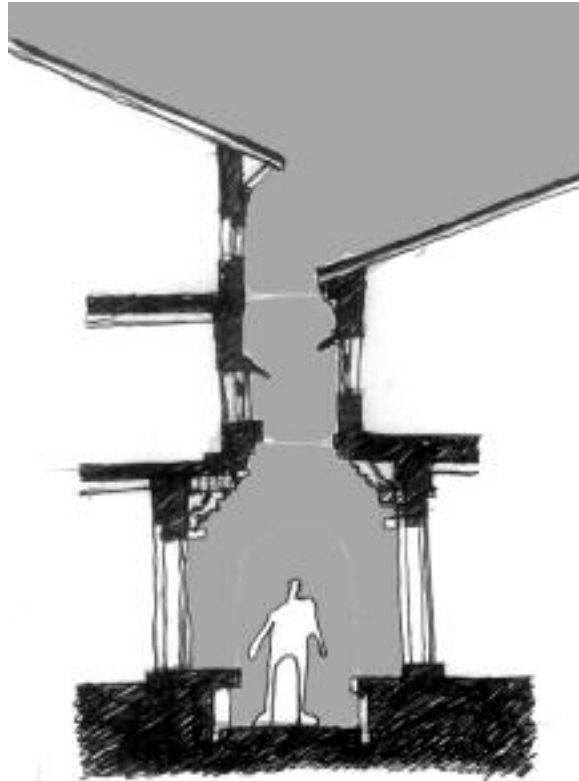
The 'hadd vagar no bhag' on the first floor



Shujai Masjid, the projected rectangular masjid hall with the 'hadd vagar no bhag' spaces



The Shujai Masjid (1) is located within the Vohrawad, a residential colony of the Bohras



The residential scale of the masjid exterior

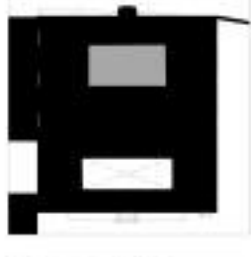
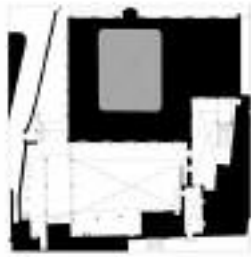


The women's space on the first floor

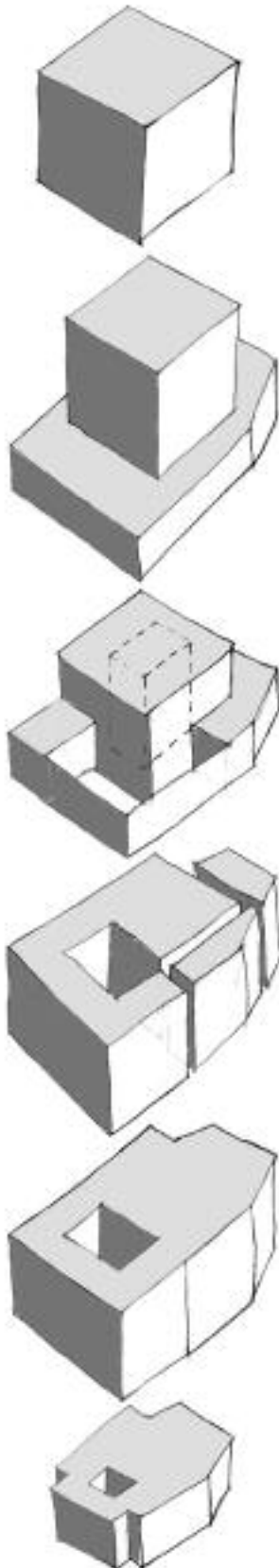
gatherings for the sermon delivered by the head priest. On other occasions, a part of the prayer space on the ground floor was appropriated for women through the use of a curtain.

In the masjids built around the 17th - 18th century (such as the Shujai Masjid, Ahmedabad c.1730), the first floor was conceived as an attachment to the main hall below.

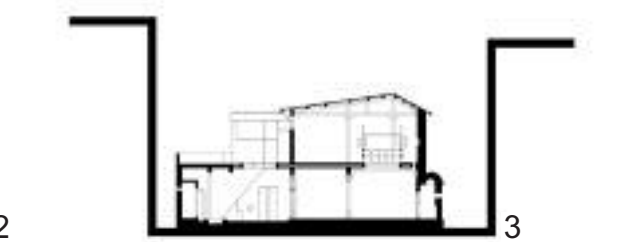
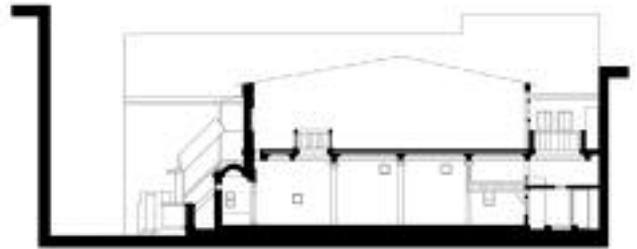
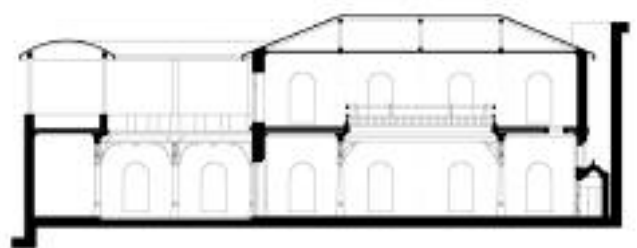
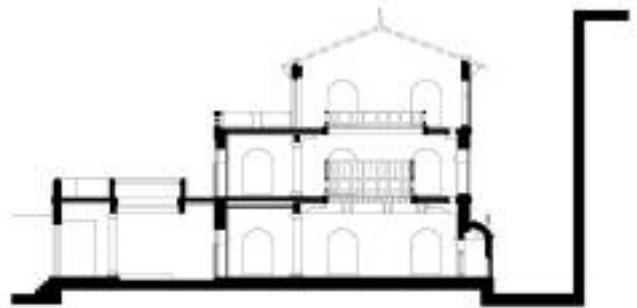
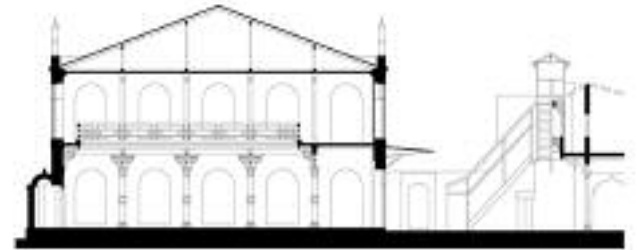
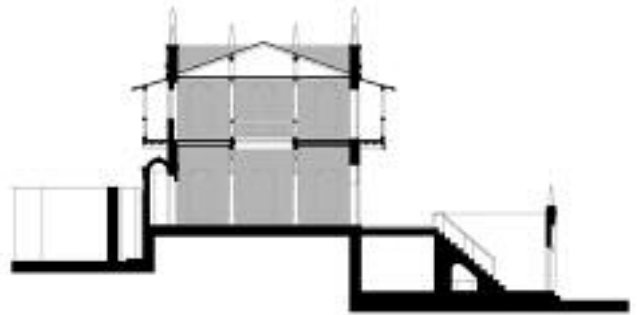
The double height void was only gestural towards a connection. The lack of ornament, the dung floors, the empty volume of the pitched roof and the uninspiring directionality of the space was indicative of the Bohra attitude towards collective space. The women's enclosure on the upper floor did not partake in the experience of the masjid space.



1



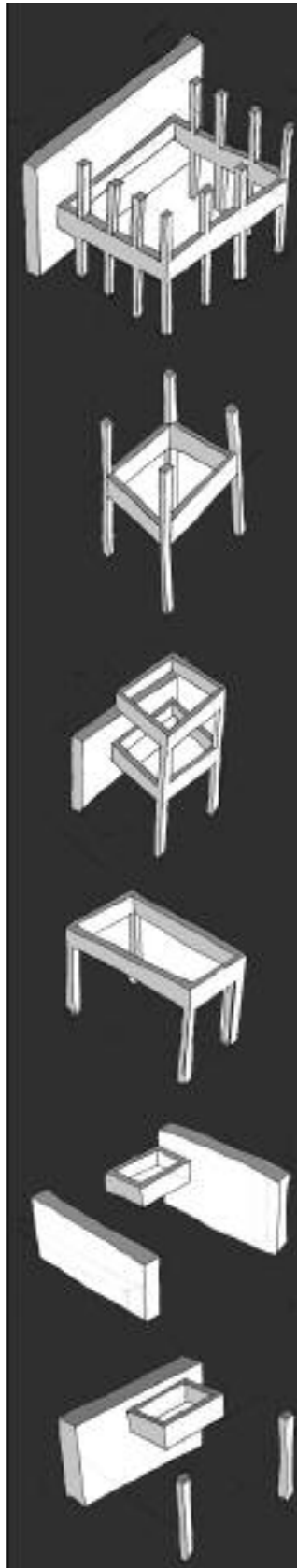
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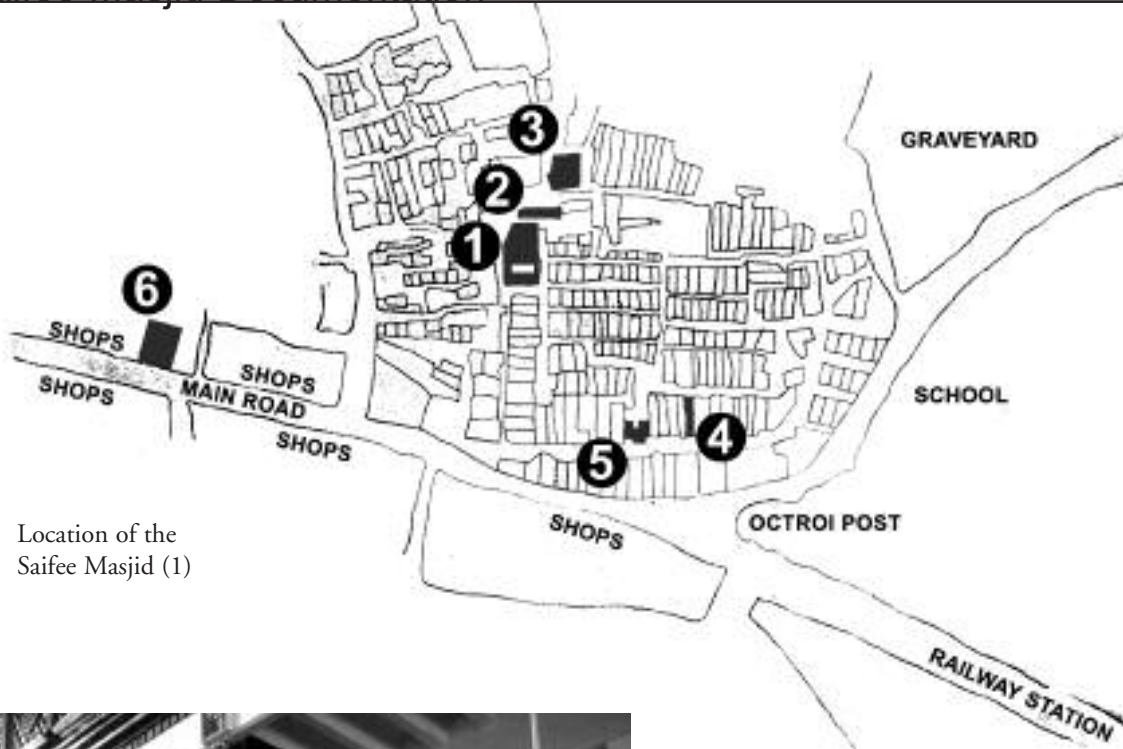


5

Evolution of the Architectural Form

1. The internal volume of the masjid assumed the nature of the courtyard.
2. The negotiations of the masjid hall with respect to the irregularity of boundary conditions achieved certainty through the adoption of the colonial facade and the consequent geometricization of the internal volume. The effective residual spaces were assigned a special name – *badd vagar no bhag* or space outside the boundary. This space was used by menstruating women during congregational prayer. This space was gradually formalized into a balcony.
3. The emphasis on women's space in the masjid became an important determinant of its form and profile; as the galleries achieved a greater integration into the overall experience of the community space.
4. The institution was revealed from within the residential context. The clock tower, a predominantly colonial urban element, was incorporated into the masjid as a minaret.
5. The structure evolved to formalize the experience of the double height in the masjid.

Saifee Masjid Documentation



Location of the Saifee Masjid (1)

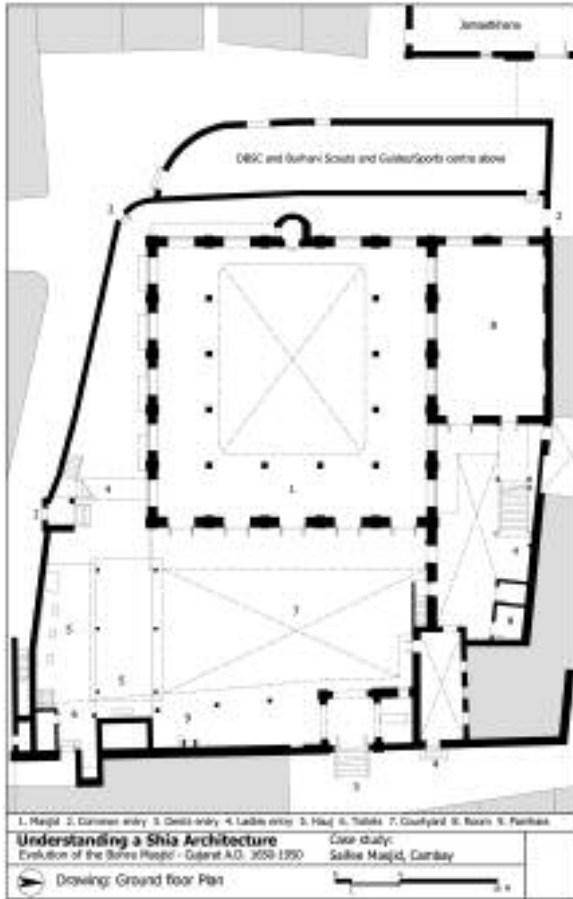


The structure of the double height void is ornate

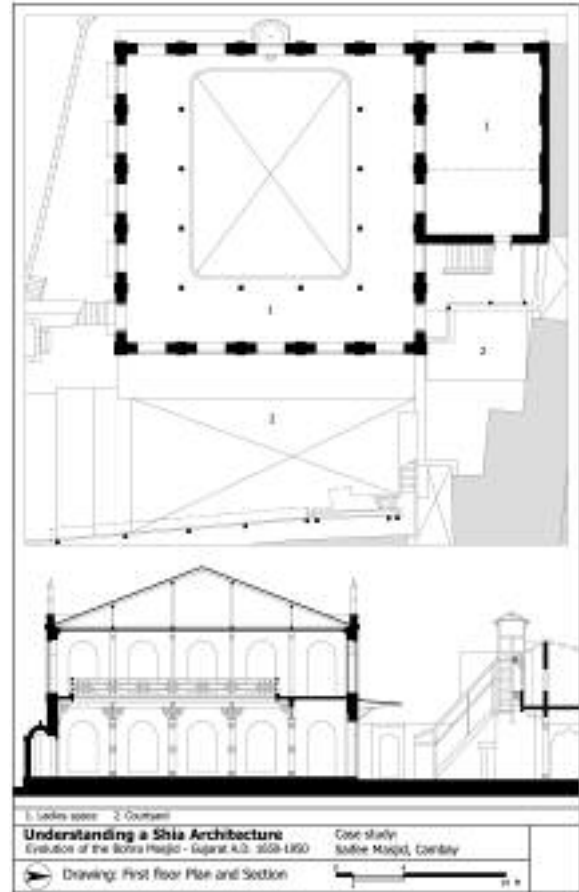
In the masjids built during the colonial period (such as the Moti Masjid in Kapadvanj, datable to c. 1880 and the Saifee Masjid, Cambay of AD 1931), the upper storey or gallery became a significant aspect of the volumetric experience of the prayer hall. The increased size of the double height void, now adorned by chandeliers, expresses an integration of the double storeyed structure (and in some cases a three-storeyed structure with two floors assigned to women).

An attempt at creating equal space for men and women can be seen in the planning of the Saifee Masjid, Cambay.

A significant spatial concept that emerged during interviews was the *hadd vagar no bhag* which translates as 'the space outside of the boundary' in Gujarati. It is in this space that menstruating women are allowed to attend the *namaz* in the masjid premises. However, the *namaz* prayed in this area is considered of lesser value than that prayed within its boundaries. This space was initially a resultant of boundary conditions (a wedge-like space as in the Shujai Masjid) but assumed a more formal character (a defined room as in the Saifee Masjid) in the masjids built in the later periods.



Saifee Masjid, Cambay, ground floor plan



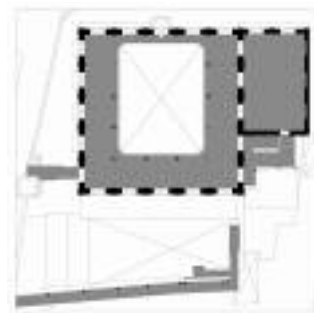
Saifee Masjid, Cambay, first floor plan and section



The courtyard of the masjid is also surrounded by a women's gallery



The provision of a courtyard on the ground floor



Women's space on the first floor of the Saifee Masjid

The Shujai Masjid, Ahmedabad thus introduces this space in the making of the prayer hall. The *hadd* or boundary of the masjid hall is a notional (projected) rectangle that has one edge coinciding with the Qibla Wall and the others maximizing available space within the masonry wall enclosure of the hall. The irregularities of boundary, common in traditional environments, caused the formation of these residual spaces that were assigned the function of *hadd vagar no bhag*. Before the masjid is declared open to the public, the head priest is invited to sanctify its precinct. It is he who in the final instance defines the boundaries of the masjid.

The Bohra masjid presents a unique case for studying the development of women's space in a masjid. The process of the formalization of the *hadd vagar no bhag* is one that paralleled the growing importance of women in the Bohra community and the changing conception of women's space in the masjid. The Bohras are petty traders by profession and the men often leave their homes on business. Women thus take greater part in the activities of the masjid; this unusual phenomenon is partly due to the fact that distinguishing between men and women would have reduced the numbers of the Bohras, already a minority

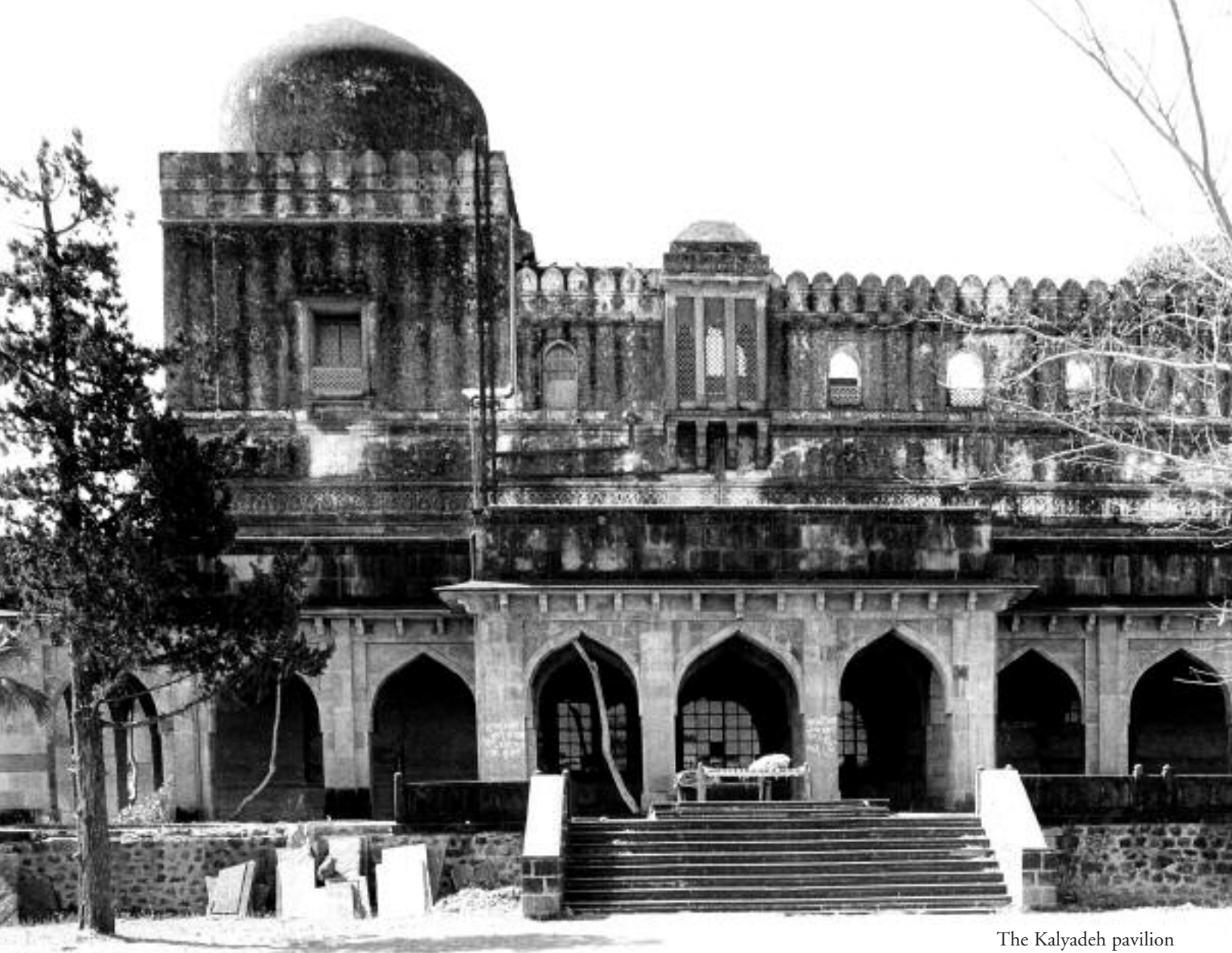
community, to half. Further research into the socio-cultural aspects of the Bohras reveals that their attitude towards women is a continuation of their culture prior to their conversion.

The visual image and identity of Islam and its development through the years has undoubtedly been defined by its religious institutions. The creation of women's space in the masjid can be understood as a response to a stable socio-political context in the city. Shia communities assumed largely a political stance to religion. With their incapacity for political conflict, the Shias also became very religious. Though more dogmatic regarding the issues of leadership and religion, they were open to social reform. The comparatively better status that women held in Shia society thus became characteristic of their community.

Since the concepts presented in this article further are unique to the case study, it expresses the need for further research in Islamic architecture that acknowledges the subtleties of each sub-sect and creates a comparative framework to document physically the diversity and richness of the Islamic world.

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The Kalyadeh pavilion

Kalyadeh and Sadalpur:

The Camps cum Pleasure Resorts of the Malwa Sultans in the 15th Century

KLAUS ROTZER

The unique positioning of the ruins at the two historic sites of Kalyadeh and Sadalpur provide an interesting insight into the water architecture of the Malwa Sultans. Both sites are located between two old bridges with rectangular pavilions built on the riverbank and porticos with diverse water features in the riverbed itself. The best time for using these luxurious bathing sites was between October and April, after the water had subsided, but before it had altogether evaporated because of the heat. During the monsoons, only the pavilions were used as the rooftops of the porticos would be submerged in the riverbeds. When the water subsided, these features had to be cleaned.

The water features of Kalyadeh and Sadalpur reflect an asymmetric and organic architecture. The architectural features situated upstream are reservoirs where water was stored and decanted. Other features, with steps, were for bathing. Those features that were particularly shallow were made to refresh the air and add to the architectural ambience, thereby creating an unreal, paradisiacal space. The still water of these basins contrasted with the flowing water of other features, especially that of the channels of different undulating and spiral (both inward and outward flowing) designs.

During the hot days, the porticos offered shade and coolness and in the evening. The rooftop terraces of these porticos offered an ideal pleasure site – open to the sky, with fresh water flowing below and the green riverbanks on either side. Unlike the pavilions on the riverbanks which could be closed off, the porticos in the riverbed were mostly open structures reflecting a collective lifestyle.



The Sadalpur pavilion



The old bridge at Sadalpur



The Kalyadeh riverbed pool (B in Plan on page 23)

KALYADEH

Kalyadeh, legendary for Lord Krishna's conquest over the monstrous cobra Kaliya, is located about 10 km. from Ujjain on the Sipra River. A legend of the Bhagoria Bhils relates that it was at this place that their hero Gadakhar trapped the blood-thirsty goddesses and evicted them from Ujjain. This is also the site for the battle of 1418 AD between the Sultans of Malwa and Gujarat. According to inscriptions, a few buildings at this site were erected in 1458 by Sultan Mahmud Khalji of Malwa (r. 1436-69). However, the accounts of the Mughal Emperor Jahangir suggest that the site dates from the reign of Sultan Nasiruddin Khalji (r. 1500-10). Emperor Akbar also visited Kalyadeh in 1599 and 1600, while enroute to the Deccan and his son Jahangir, rested here in 1616 and 1621 during his journey.



The geometric and serpentine patterns of the water channels leading from the riverbed at Kalyadeh



The Kalyadeh riverbed and its porticos

From the north to the south, the site of Kalyadeh comprises an island, a branch of the Sipra River, and its southern bank. It is limited on the east by a dam-bridge (A) that gives access to the island and the pavilion that stands there. The western limit is no longer visible.

The pavilion is built on a basement to protect it from flooding. It consists of two levels. The ground level has two rooms separated by a central hall. A gallery with a central projection enlarges the hall towards the south. At the upper level is a room roofed with a dome on the western end; the remainder is occupied by a roof terrace. The terrace is surrounded by a high crenulated parapet with openings filled with *jali* screens that offer ventilation and views of the



Another view of the Kalyadeh riverbed and its porticos

landscape and activities below. While this upper level was both a private space and a lookout, the lower space was largely open and could have served as an audience hall.

At Kalyadeh, the constructed space in the river constitutes the heart of the complex. It is linked to the bank to the south by two staircases, and to the riverbed by two staircases that descend to the water. A fifth staircase leads up to the island on which stands the pavilion. The space is limited on the south by a long gallery, which backs onto the riverbank and has a central, irregular projection. Certain pillars of this projection have prow-shaped projections to resist the force of the water during flooding. The purpose of this gallery was to offer shade while the water basins

within the gallery provided coolness, pleasurable reflection and opportunities to sport in the water. The gallery forms a single covered space. The only room that could be closed by doors was situated at the eastern end.

The bed of the river between the gallery and the island is covered by a platform of mortared masonry. Here stand two pavilions (E and F) and 16 pools of different dimensions and depths, distributed without order. The two biggest pools, located on the east, create a void between the platform and the dam bridge. Their function is to decant/clean the water and feed the other pools. The other pools follow a hierarchy of sorts. The most important pools (B and C) have steps descending to the water. The disposition of pool B is the most



Views through sequential Islamic arches in the corridor

interesting because it reveals both symmetry and surprise. It is a square basin with an octagonal island in the centre and steps all around, their rise broken by a balcony centrally positioned on each side. This regular scheme prefigures the Mughal aesthetic. Indeed, the octagonal pavilion on the island was added by Jahangir in 1621. The basin is fed by three channels that are disposed in an irregular fashion. The first channel imitates a small river with an island (Figure 1a, G); the second has a regular geometrical design (Figure 1a, H and J); the third is straight but passes through a small octagonal basin.

At the northern part of the platform there are eight rectangular pools disposed around pavilion F. Pool D and the channels that lead into and out from it together constitute an asymmetrical axis between the southern and northern parts of the platform. It seems evident that the pools B and C, located in the southern part of the platform, were reserved for the use of elites while those in the northern

part of the platform were used by those of inferior rank. The southern bank of the river was a park with trees at the same level as the roof terrace of the gallery.

Sadalpur is isolated in the middle of the countryside, 15 km. from Dhar, beside the Mhowa-Nimach road, on an intermittent stream. There are no extant inscriptions carrying the date of its foundation. The existing architectural evidence on site indicates that it may be dated to AD 1500. Accounts of the Jahangiri era attributed the construction of Sadalpur to Sultan Nasiruddin.

Being more isolated than Kalyadeh, and for a long time abandoned, Sadalpur has preserved two bridges that constitute the northern and southern limits of the site. Again, the pylons of these bridges have prow-shaped projections on the upstream faces to reduce water pressure in times of flood. A gigantic baobab tree is the last remnant of the park that was created on both sides of the

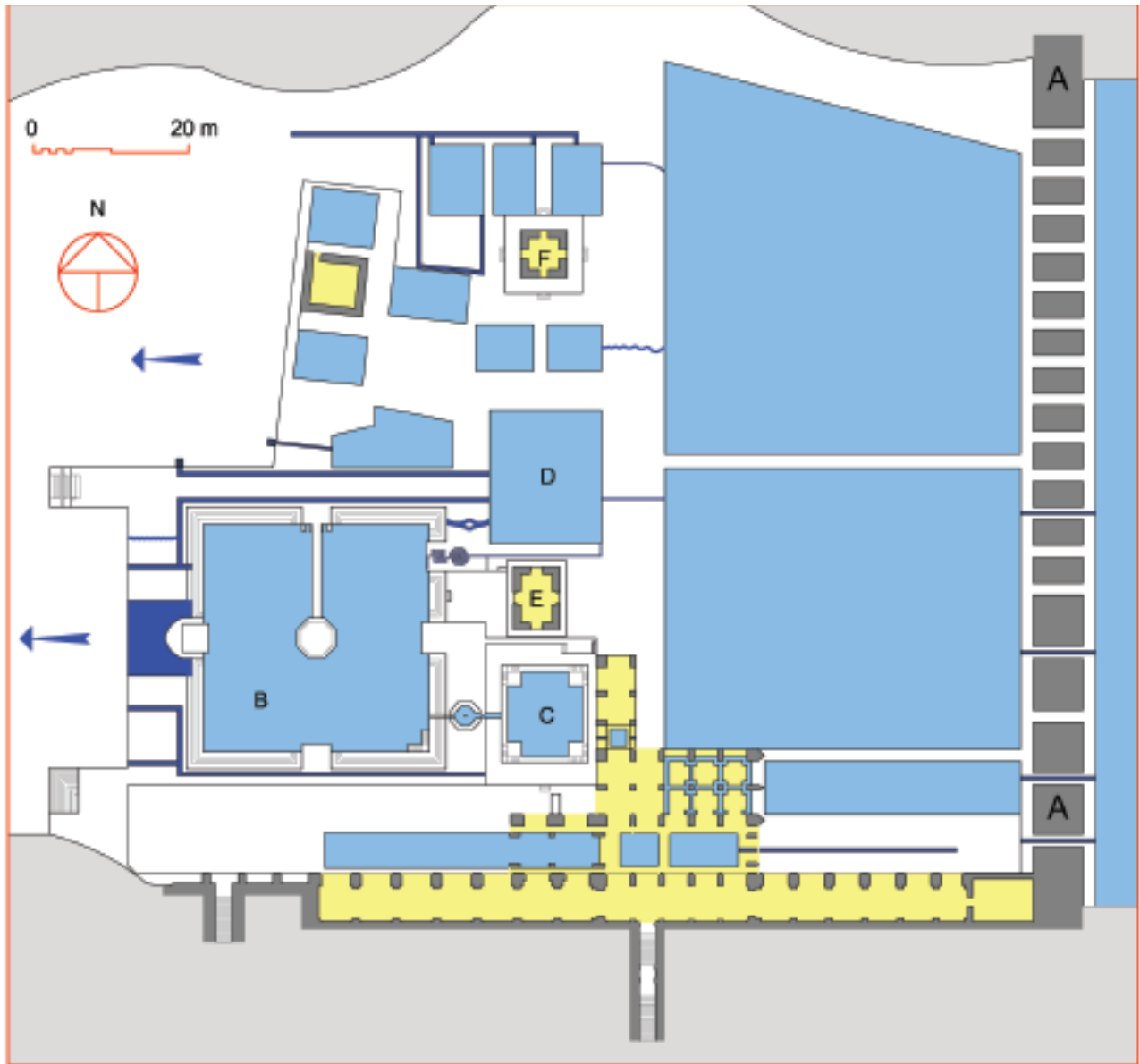


Fig.1

- Covered Space
- Running Water
- Still Water

Kalyadeh, District Ujjain (Madhya Pradesh)
 Royal leisure space Built on the bed of Sipra River
 attributed to the sultanate of Malwa, about 1458
 AD

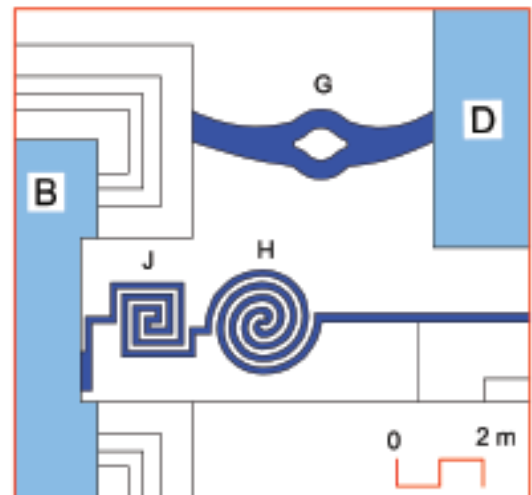


Fig.1A

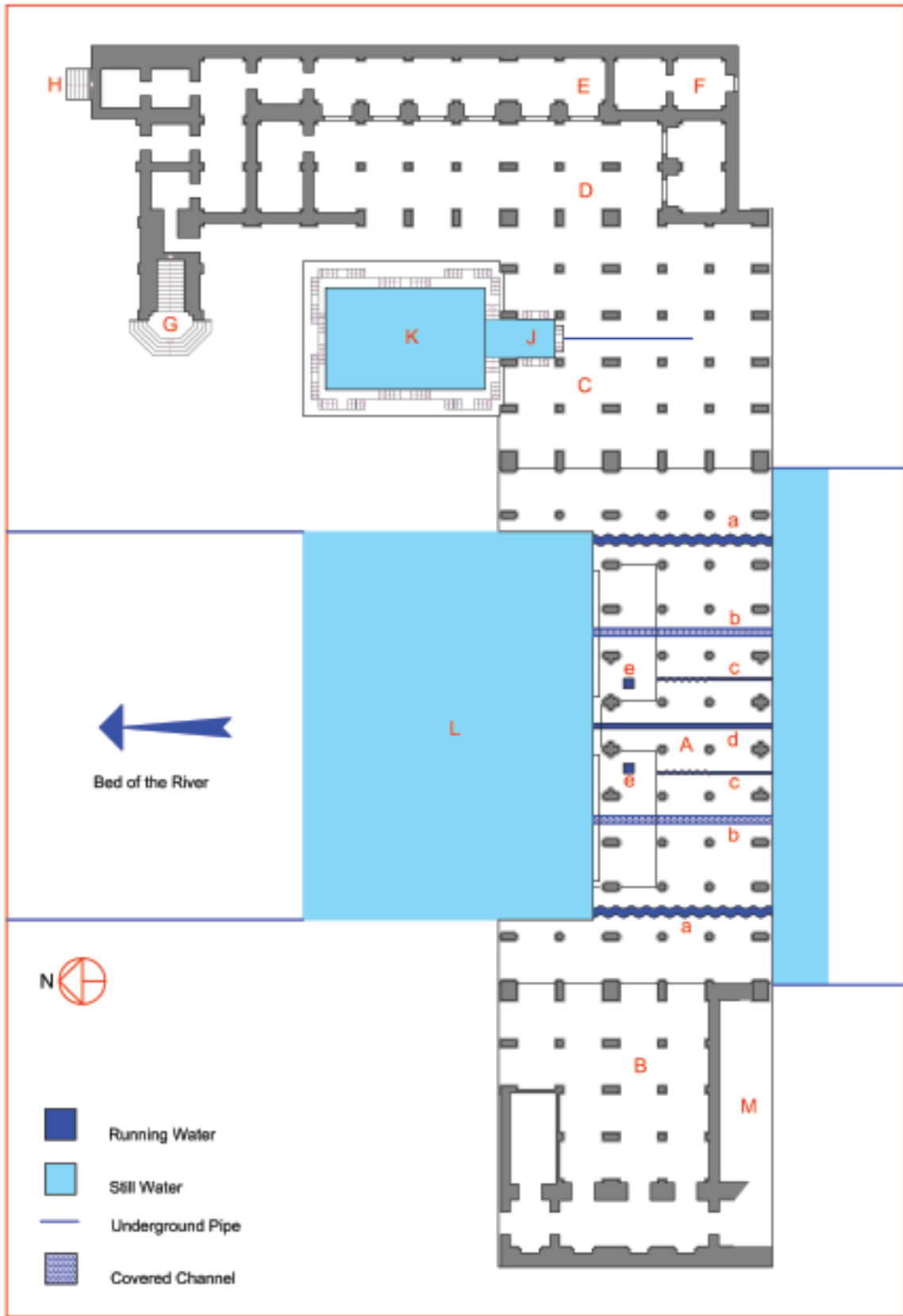


Fig. 2. Sadalpur, District Dhar (Madhya Pradesh)
 Jal Mahal or Water Palace
 Sultanate of Malwa, circa 1500 AD
 Ground Plan

0 20 m

river. (This species was introduced by African slaves brought to Mandu in the 15th century.)

Two buildings disposed in an ‘L’ formation constitute the centre of Sadalpur: a pavilion on the eastern bank, and a large portico across the riverbed (Figure 3).

The pavilion is rectangular, with its main facade on the west looking towards the river. There are three doorways with arched bays above. Brackets support an angled eave which provides shade. On the other three facades, the eaves are replaced by regularly spaced holes for pigeons. An apse-like projection marks the southern facade. A dome rises from the middle of the roof terrace, which is surrounded by a crenulated parapet. The pavilion is divided internally into three spaces.

The portico across the riverbed is ‘L’ shaped in plan (Figure 2). The central part (A), with octagonal pillars, is situated between two water bodies on the north and south; it was entirely submerged during the rainy season. If the water was not too deep, spaces B and C could have been used to view the river flowing between the ‘forest’ of octagonal pillars. These pillars are octagonal in shape to better resist the water pressure. At the end of the rainy season, the floor of

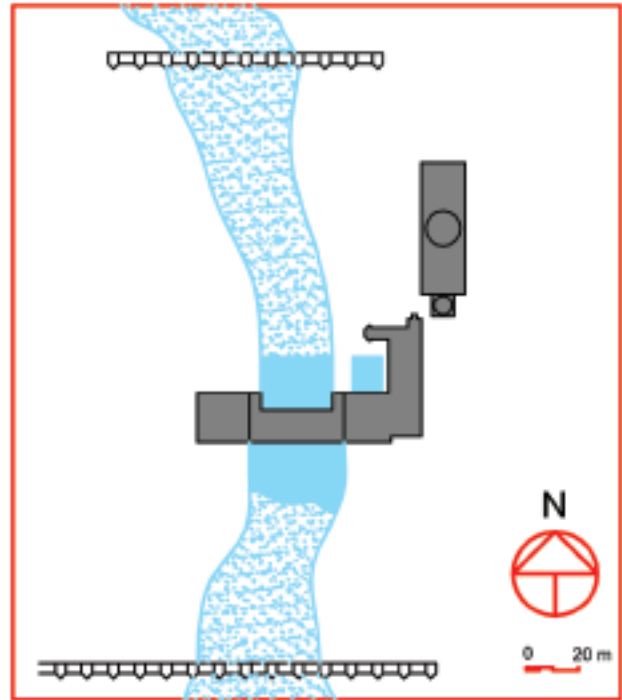


Fig. 3. Sadalpur, District Dhar (Madhya Pradesh)
Jal Mahal or Water Palace



The Sadalpur baobab



The square still-water pond (Fig. 2, Part J)

section A would emerge. Cut into the floor were miniature water channels in rectilinear and undulating patterns (a, c and d); water sprung up from four holes (e). Two underground channels (b) fed pool L when the upstream reservoir was at its lowest level. Clearly, space A was the most architecturally sophisticated part of the portico in terms of the water channels cut into the floor, the octagonal pillars with moulded bases, the elegant profiles of the arches that they support, and the dome above carried on kite-shape pendentives. A further point is that space A has a north-south axis of symmetry, which is materialized by channel (d), the only one which is perfectly rectilinear. Space C of the portico also has a north-south axis marked by a channel, which feeds the



Sadalpur, distant view of the water systems

covered part of pool K. The other rooms and galleries of the portico (B, D, E, F and M) are disposed without any symmetry. Two staircases give access to the roof terrace. Staircase H is straight and is never under water. It serves as a link between the pavilion and the roof terrace. Staircase G is more complex: the bottom steps, in part-octagonal formation, lead to a landing from where a straight flight ascends between two walls to the terrace. This serves as a link between the portico and the terrace. The terrace itself constitutes one large space which was used as a meeting place beneath the stars during the evening. This contrasted with the portico beneath, which was used primarily during the daytime as it was protected from the sun.

COMPARISON WITH OTHER SITES

The essential trait of the monuments at Kalyadeh and Sadalpur is their unique situation on the beds of rivers. Other similar sites also exist in Central India.

In Khandesh, 21 km. from Burhanpur, on the river Badi Utaoli, the site of Mahalgura presents some similarities. Two small dams, 90 m. apart, traverse the river. The first dam, 4 m. high, serves as a reservoir. It is hidden by a cascade of water during the rainy season. The bed of the river between the two dams has been surfaced with mortar. Two pavilions stand on the banks on either side. It is said that in the 16th century the royal family of Khandesh came here for picnics. Mandu has striking similarities with these structures. The palace of the Malwa Sultans, largely built between 1401 and 1526 with the last remodeling done in 1616 for the reception of Jahangir, is laid out on two sides of Munj Talab, an approximately square artificial lake. A number of pools, water basins and *baodis* lined the

banks of the lake and an island. The southern bank of the island of Munj Talab is lined with pavilions open to the north, facing an open space where there are different pools and water basins disposed without any obvious order. Ramps and steps facilitate access to the water of the lake. In contrast with the still water of the lake and the pools and basins, flowing water was carried by an aqueduct raised on cylindrical pillars. This running water fed various channels and fountains.

The third similar site in the region is a military camp of the Malwa Sultans, near the village of Nalcha, 6 km. from Mandu, the ruins of which are of some interest (Figure 4, page 28). In Nalcha, a large water body of the 10th-11th-century Paramara period was reused later by the Malwa Sultans. In the south-west corner there are buildings distributed in an L-shaped formation. There was a garden to the south with four domed pavilions. An island in the middle of the *talab* was reached by a bridge from the southern bank. To the north, there was a mosque and a tomb of a saint. The historian Ferishta tells us that it was at Nalcha that the Malwa Sultans organized the army before every military campaign. It was also here that on their return from these campaigns the army and the Sultan waited for the auspicious moment, decided by the court astrologers, to triumphantly enter the capital city of Mandu. It was at Nalcha that Jahangir based his camp when he visited Malwa. The most important element of the Nalcha complex is the *talab*, and its *ghats* and ramps for the bathing of elephants. This is hardly a surprise for in Nalcha's hot climate water was an essential element needed by all. There is no trace of swimming pools at Nalcha, but the *ghat* itself could have served this purpose. The existence of a garden with pavilions is certain, while the broad earthen banks



Water resurgence (Fig. 2, Part E)



Rectangular still-water pool (Fig. 2, Part K)

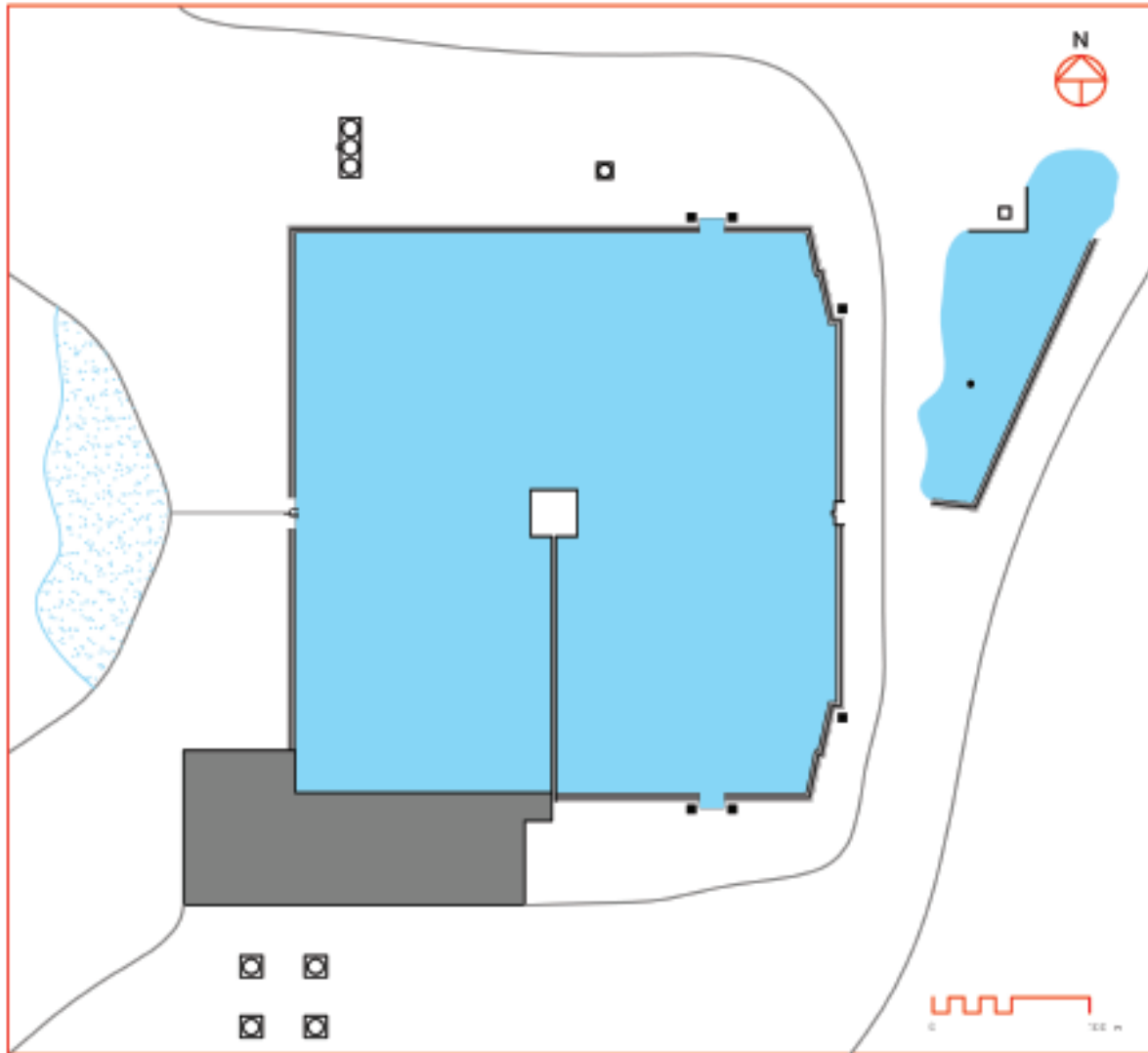


Fig. 4. Nalcha, District Dhar (M.P.), The Royal Talab

of the *talab* offered a surface suitable for the tents of the royal camp. The presence of a religious zone with a mosque and tomb suggests that the site was not merely a transitory camp but a terminus where the Sultan, his courtiers and army could spend some time. In addition, 1 km. north-west of the *talab* there is a small dam, on which there is a building known as 'Malcolm' Kothi, near which it is still possible to recognize several pools.

CONCLUSION

The camps cum pleasure resorts of the Malwa Sultans of the 15th century merit a thorough study through the methodical excavation of the listed sites. The surface

survey of the sites presented here and the writings of Ferishta and Jahangir permit us to advance the following seven conjectures:

1. In the 15th century and beginning of the 16th century, the Malwa Sultans lived in tented camps for a part of the year. In this regard they followed the customs of their Turkish ancestors as well as those of the other tribes of Central Asia. For military campaigns and tours of inspection, the Sultans were accompanied by the army, court and harem. In case of defeat, the harem could be captured by the enemy, as happened to Mahmud Khalji on his unfortunate expedition to the Deccan. Kalyadeh and Sadalpur were sites where the royal camp frequently halted for longer stays.



Royal enclosure and the aqueduct at Mandu

The evidence for this are the stone structures with which these sites were furnished. A century later, when Akbar and Jahangir crossed Malwa, they too camped here.

2. These sites were hierarchically organised. Nalcha was a terminus not far away from the capital of Mandu. The departure and return of the Sultan and his retinue was organized here during various campaigns, expeditions and activities in a manner that demanded an almost theatrical production. Sadalpur was a simple halt in the countryside. As evidenced by the small audience hall in the pavilion at Kalyadeh, the Sultan also had to meet the notables of Ujjain for the administration of the region.
3. The sites are always chosen with respect to water. They are located near either reservoirs or rivers.

This is not surprising when we consider the hot climate and the large numbers of people and animals on the move. The elephants, in particular had to be bathed daily.

4. In times of war, soldiers, horses and elephants were an essential part of this moving crowd, but they were accompanied by servants and women as well as heavy luggage. The Sultan also took part of his harem on these expeditions. During times of peace, the moving crowd was not much different. However, the court and the harem were more important than the army and the pools of Kalyadeh and Sadalpur were used for leisure. The same site could be a military camp or a leisure resort depending on the political circumstances.
5. The harem of the Sultan was constituted by ladies of very different origin. In the time of Sultan Ghiyathuddin Khalji (r. 1469-1500) there are supposed to have been 15,000 women, of which 500 were Turkish and 500 African. There were also Indian women of different castes and tribes, including Bhil and Gond princesses of Malwa. That this female world of the Malwa Sultans was hierarchically organized is suggested by the water features of Kalyadeh. However, the society of the harem did not reflect the caste society of the Hindu world; it was much more cosmopolitan. Every lady was to some extent the ambassador of a particular culture whose social origins were extremely diverse. The Turkish and African women, for example, had been captured by slave merchants and sold at specialized markets. But their slave status was no handicap in their rise to positions of power.

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Cultural Significance of Indigenous Institutions and Forest Management in Himachal Pradesh

HEMANT K. GUPTA

ABSTRACT

Sustainable management of the rich forest resources in the ecologically sensitive Himalayan State of Himachal Pradesh contributes significantly towards the environmental stability and economic development of the state, region and the country. Forests are crucial to the livelihoods of a majority of local people who are dependent on them for fuel wood, fodder, grazing, timber and non-timber forest produce. The conservation and management of forest resources have been undertaken with the active participation of local people. The existence of local institutions of cooperative labour, sacred groves, informal village councils and village deity systems present a strong evidence of survival of commons in the Himalayan cultural landscape. This paper focuses on the management of commercially important forest products by indigenous institutions and the conservation practices followed for the maintenance of sacred/temple groves in the villages. The analysis of indigenous systems of management through local institutions reveals a strong positive relationship between social capital and natural resource management techniques at grassroots level. Traditional initiatives and participatory systems in indigenous communities thus have a potentially significant role in policy support and the creation of sustainable livelihoods.

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The Himalayas

INTRODUCTION

There is a widespread recognition throughout the globe that regions of ecological prudence exhibit a symbiotic relationship between habitats and culture (Arizpe, 1996). This explicates that culture and the environment are complimentary in various stages of their evolution. Traditional societies have evolved with their environment, modifying nature but actively maintaining it in a diverse and productive state based on their indigenous knowledge, socio-cultural practices and/ or religious beliefs (Gadgil and Berkes, 1991, Ramakrishnan, 1998). India stands at the end of a very long and illustrious tradition in which the importance of nature is recognized, celebrated and valued. In the cultural history of India nature has been admitted, respected, feared and loved both for its instrumental and intrinsic value (James, 2000).

Traditionally, mountain societies have had many natural resources-linked institutions. The concepts of sacred species, sacred groves and sacred landscapes belong to this category. However, the guiding principles that regulate the use of natural resources are

embedded in the codified and often non-codified institutions that they have evolved. Modern economic and scientific rationality, however, precludes these socio-cultural practices, sometimes even amongst traditional societies. An integrated approach to natural resource management, which uses cultural, economic and ecological principles to redress developmental issues in a more holistic way is therefore required. These societies are no longer immune to the changes occurring in the world. The predominant culture of over-exploiting natural resources is making a dent in these societies, resulting in the erosion of their time-tested and valued institutions. At present, when social fragmentation has almost reached the family level and individual interests get priority, community functions take a backseat. Gadgil and Guha (1992) argue that the emergence of sacred institutions were intended to boost social solidarity rather than to create environmental consciousness per se, thus contradicting arguments supportive of ecological prudence on the basis that traditional societies have always operated from a resource-rich environment in the past. Yet, while such religious norms explicitly foster social solidarity, the conservation values are fulfilled ipso-facto.

The social institutions linked to biological resource management are often suspected to be religious myths. However, a concept such as that of the 'sacred grove' often has spatial dimensions and specificities. One should conceptualise a broader hierarchy of social institutions or sacred entities, i.e. spatially diffused landscapes spatially defined sacred landscapes or sacred groves and sacred species. The topmost in this hierarchy have institutions that have the least specificity but the greatest zone of influence. Least specificity means a lower number of prescriptions and prohibitions in terms of practicing cultural norms. Next in this hierarchy would be spatially defined landscapes with well-defined institutional norms. The concept of sacred groves falls into this category. Sacred species stand as a class apart, though there may be restrictions on their usage (Sinha B. et al 2000, Rama Krishnan, 1996).

Sustainable forest management of pristine forest resources in the ecologically sensitive Himalayas contributes significantly towards the environmental stability and economical development of the area. Examples of traditional systems of managing commercially important forest products like edible pine nuts, cumin, morels, medicinal plants, grasses and willow are common. Local institutions play an important role in the regulated collection and distribution of such forest products (Gupta, 2005). Some of the successfully functioning examples of such traditional systems are very old and even the locals who remained active participants in their practice do not know the period when these were initiated and matured to their present status. Cases in which committees of local deities, with nominated and/or elected members, plan and organize their functioning without written procedures, are widespread. Participatory approaches vary from case to case but people have great faith in the decision-making and conflict resolving capacity of these committees, as they are neither political nor administrative (Dhiman, 2005).

Messerschmidt (1995) further argues that "the perception, control and management of common property and natural resources are best understood in the context of culture as it is through their acquired knowledge that people interpret experiences to generate social behaviour." Moench also found that the success of informal forest management in the hills of Uttaranchal in India was due to their homogeneity and the higher proportion of culturally rich groups in the society. When discussing forest management, it seems

appropriate to view the existence of local institutions first, as these are the basis of collective action. Forest management is not an individual enterprise as it concerns all potential users (Speth, 1990).

Social scientists argue that the theological and cultural aspects of the forest have to be considered in planning and managing such resources; many forestry projects have failed where these were not considered.

THE STUDY AREA

The people of Himachal Pradesh are bound by the ties of common religion, though religious observances differ. By and large they have maintained their original form of worship. The large majority of people are Hindu by faith and devoted to traditional gods. The people have a firm, almost blind, belief in village deities, whether it be a divinity, a hero or *deota*. The deity is a protector and a source of inspiration for all villagers. It is considered the *ishth* of the population inhabiting a village. Almost every village has a temple where they congregate for common worship (Mian 1999; Thakur, 1998).



A village deity



The Study Area: Himachal Pradesh, Land of Deities and Sacred Groves

The deities are carried on palanquins during important religious occasions fairs and festivals. The deities are propitiated to obtain timely rain, a good harvest or other favours. People believe that their gods are generally well disposed towards the worshippers, and confer their blessings on them. If, however, they are not appropriately appeased, they become angry and in their wrath, allow the evil spirits to prey on people in the form of epidemics and natural calamities.

Often associated with such deities is a rich body of folklore which illuminates the history of the human groups that worship them. Such folklore can be particularly fascinating when it appears to have its origin in the conflict of interests amongst those different human groups (Gadgil, 2001). The understanding of the institution of *deota* (the village god) is important in the local context with respect to natural resource management. The village gods are believed to effectively control the socio-religious system of that particular settlement. The institution of the village gods is the main custodian of most activities in a village society and the village god

becomes a symbol of its culture. This institution influences marriages and deaths and directs the followers to allow or disallow a new visitor to the village. With this cultural phenomenon as a context, the village society has grown like a family in perfect harmony (Sharma, 2005). The village deities in Himachal Pradesh are not simply objects of worship but also govern the social, cultural, moral, economic, religious and political life of the village. The local deity is not just a remote being represented by idols in designated village temples for those seeking spiritual solace. Instead, they are more like Greek or Roman immortals, possessing all the emotions and feelings of mortal men.

THE VILLAGE GODS

Shuttleworth (1917), Rosser (1960) stated that in the village of Malana in Kullu, the power and influence of the local deity Jamlu formed an integral part of social control generally and of the political and judicial machinery in particular. There are three permanent members holding hereditary office. In hierarchical

order, they are the *karmishth* (god's "manager"), the *pujari* (the priest) and the *gur* ("the mouthpiece" of the god). The *pujari* and *gur* are powerful figures in the village society due largely to the fact that they possess a virtual monopoly in interpreting the "will of god" – a vital consideration to a local community, particularly when a dispute arises. At certain ceremonies the *gur* goes into a state of possession in which he becomes the vehicle of communication between the god and villagers. Then there is a group of musicians (*chhatadi*) who lead the ceremonial processions and inform the villagers about significant occasions and the dates of rituals and functions. The musicians are lower caste men except for them, all other members of a deity committee belong to the upper castes. Men of the most powerful households within the village often hold positions on the deity's committee. Only the higher caste (that of the Rajput) has the right to carry the palanquin of the deity. Harijans are not supposed to touch the *deota* idol and are not allowed to enter Rajput households during the deity's visit. Rajputs can visit Harijan households but may accept only milk; they cannot have water or any other food. The collective social gathering is held in a large open space and not under any common roof.

Although from a modern perspective, there may seem to be serious issues regarding lack of gender and caste equity in these institutions, for generations the decisions of the *deota* committee on the management of the deity's affairs – including the management of *devbans* – have been accepted and endorsed by the entire community.

The *deota* office bearers do not hold any political post. The village committee is responsible for coordinating all religious and social functions in the village (Rosser, 1960; Singh and Sikka, 1992). The institution of *deota* in Kullu has been compared to the scenario commonly found in the village communities of North Thailand as studied by Potter (1976). The village shrine was built for the guardian spirit known as Phi Sua Ban for the protection against evil spirits. It was believed that efforts by individual villagers or by households were not enough to resist the spirits. Once the territory protected by the village guardian spirit is blended with the village's collective obligations, the residents of that territory also come to recognize standards of behaviour that have to be maintained so that no one in the village would act in a way that could anger the guardian spirit, for should it no longer protect the village, all the villagers would be in jeopardy. Therefore, one villager's irreverent act is not just the problem of that

individual; it is the problem of the whole village. Within this sphere of belief, the villages in northern Thailand can be recognized as territorial organizations in which the villagers have a feeling of attachment and obligation to their own village (Potter, 1976). For the above reason, membership of the villagers has to be clearly defined in order to identify who belongs to which village and who does not. Similarly, each village in Kullu has its own *deota* who has a shrine and is comparable to the guardian spirit described by Potter.



Above and below: Worship in the village republics of Himachal Pradesh.

SACRED GROVES: INTERSECTION OF COMMON RESOURCE MANAGEMENT AND BELIEFS



Sacred Forest Groves

Sacred groves form a major component of environmental protection in the Himalayas. They are believed to be a part of traditional societies since pre-Vedic times. The Aryans assimilated this value system and later attached sacredness to various species. In Himachal Pradesh, the tradition of sacred groves is generally known as *devban*. They are a unique natural resource in this region. The tradition is common in parts of Shimla, Mandi, Kullu and the Lahaul-Spiti districts. All these districts have dense forest cover as per the Forest Survey of India except Lahaul and Spiti where groves are useful in maintaining the perennial sources of water in harsh climatic conditions (Chatter et al, 1998). The groves range in size from clumps of a few trees to forest tracts spread over hectares. However, controlled resource use of large groves by local people is a common occurrence. There are about 10,000 temples in the state with well-defined management committees and *biradari panchyats* (caste councils). Almost all the major deities in the state have their own groves. In fact, in the Western Himalayas, where the penetration of the State Forest Department is more than a century old, sacred groves constitute the only ecosystems whose management is still vested with local communities. They are considered significant for their ecological value as well as the social sustainability of the institutions that support them. Institutions that are a centre of significant power

and influence in rural society are crucial for local forest management (Vasan, 2002). Shipin, about 12 kms from Shimla, is believed to be the biggest cedar grove in this district and is home to trees that are hundreds of years old. Villagers who pass through the grove dust their clothes to make sure that they do not carry away anything belonging to the grove. Trees in the area cannot be cut or felled and all dead wood found in the forest is used in the temple located inside the grove.

Devbans are managed and used on the basis of rules which are specific to each. In all, however, a significant distinction is made between using the forest for the deity's own needs (such as in temple repairs and in communal cooking during fairs) and for the use of common folk (as fuel wood, fodder, timber etc). Human use is believed to be determined in accordance with the deity's wishes. There is no single set of rules which is operative for all *devbans* or for all times.

General Rules and Sanctions for access and usage of a Sacred Grove

- 1) Total or partial ban on removal of forest produce from the grove.
- 2) Usage of axes or any such tools in the grove is strictly prohibited. If a person knowingly or unknowingly does so, the transgressor has to offer an animal sacrifice.
- 3) If any bushes are to be removed, only authorised persons can do so, and that too only with their bare hands.
- 4) Leather shoes or goods are not allowed inside the grove.
- 5) Persons of all castes, including children, can go inside the *nagauni* or the protected area but they are prohibited from entering the *saur* or the sacred water body.
- 6) Women have restricted entry; menstruating women are prohibited from entry at all times.
- 7) Only the local people those who are ill (skin disease) or want a wish granted are allowed to bathe in the *saur*. Separate arrangements exist for lower castes.
- 8) Night halts inside the grove are generally prohibited but shepherds are granted special permission and may be allowed to collect wood and twigs manually.
- 9) Hunting of wild animals and consumption of narcotics are strictly prohibited inside the grove.
- 10) Domestic cattle are allowed to graze inside the grove.

- 11) All expenditure related to the protection and management of the sacred grove, including that undertaken for celebrations and other rituals, is borne collectively by the whole village.

Belief about the sanctity of groves

There are many beliefs held by the local people about the sanctity of sacred groves. For example:

- 1) There are no reported incidents of attack by wild animals upon domestic cattle while grazing inside the grove. It is believed that the behaviour of wild animals towards cattle is modified due to the sanctity of the grove.
- 2) The grove offers a legitimate place for adjudication of intractable disputes between two parties. The *deota* committee decides the punishment to be meted out to the loser; it then must be followed both in letter and spirit.
- 3) It is also believed that excessive rain or drought may be caused locally due to desecration of the grove e.g. due to bone/ meat that is accidentally brought into the grove by crows, jackals etc. A ceremony is performed to consecrate the area and to appease the deity who would eventually help resolve the problem.
- 4) These beliefs and faith in the supernatural powers of the deity together with fear of punishment for the erring individuals means that rules and sanctions must be obeyed by the local community.

Relevance for Policy and Joint Forest Management

Sacred groves and deity worship are a part of local faith. Formed as a religious system of forest classification, they came to represent an institutionalized expression of criteria which defines social behaviour in a particular area. They symbolize the needs that people believe forests satisfy. This classification embodies values, motives, capacities and manifests institutions that govern the behaviour of local people. They co-exist on land that has also been classified in legal, economic or ecological terms. For example, the groves in Kullu are classified as 'unprotected forests'. The religious classifications of patches of forest and trees have a pervasive and powerful effect on how people perceive, allocate and use forests and differentiate land on its merits and purposes.

Although these religious classifications are not recognized by the forest policy and state laws in India, their role in the conservation of forests are obvious



Dense forestation

when seen in the light of the simultaneous decimation of the nation's forests and the preservation of local forests with religious value, often in the same place by the same people. However, the secular states do not recognize the religious association of traditional institutions and ignore a possibly significant factor in the development of forest policy. The religious codes for forests in India are deeply entrenched in the nation's history, landscape and culture, as is evident from the presence of sacred forests and trees. They are supported by an oral record of prescription, evidence and judgment that extends across several thousands of years (Chandrakanth and Romm, 1991). They appear to command more compliance in daily social life than the state's forest laws and regulations (Gadgil and Guha, 1992).

The success of Joint Forest Management (JFM) in terms of ensuring sustainable forest management depends upon increasing the recognition, the scope and the support for choices that religious values encourage and inculcate among people to generate self-regulating conservation practices.

The JFM programmes in Himachal Pradesh are focused on the development of co-operative plantations involving the state Forest Department and village institutions such as the Village Forest Development Committee or other existing

organizations. The success of JFM depends entirely upon the local group's willingness and ability to maintain new plantations and protect existing forests by regulating access and use. These are precisely the choices that are important in maintaining the sacred forest groves on which villagers are most likely to draw upon for the motivation necessary for JFM.

CONCLUSION

Religious order effects human interests and actions. Any conservation programme should be free to incorporate whatever rituals local groups may want to associate with for an effective decision mechanism. As described before, the resilience of sacred groves and the influence of the deity committee can be successfully used to enhance projects such as JFM. Rules of management of *devbans* are often based on local conditions and beliefs and are locale specific rather than general. This diversity is a critical social and ecological characteristic that needs to be emphasized in the creation of joint management institutions.

Community based management is crucially dependent on the availability of livelihood alternatives. Another advantage of this model is that the enforcement of rules is based on the membership of the individual in a particular community with collective beliefs. Thus there is little expenditure entailed in the enforcement of rules. JFM can learn from this model by relying on social fencing rather than establishing additional guards. Also, the deity committee is a strong traditional power centre that can and should be harnessed for joint management. Although equity concerns persist, such indigenous institutions tend to be more resilient in the long term compared to external initiatives.

Joint Forest Management, Sanjhi Van Yojna and Forest Development Agencies are new experiments in Himachal Pradesh. A comparison of the characteristics of each of these institutions highlights their relative strengths. The negative aspects of traditional institutions are equity concerns. Landless and lower caste villagers, immigrants and women are excluded for the most part. In contrast, the new forest management practices are more broad-based and give importance to equity at least in membership. They are more universal models that can be applied to the whole state. However, they are less participatory since the Forest Department retains control over many aspects of management and merely provides villagers with recommendatory powers. In the case of the *devbans* that are an integral part of rural Himachal, their management by villagers and their prospects of their future sustainability are functions of their social context. Changing social parameters such as beliefs, understanding of the common good, the influence of private property in rural mountainous society and the government forest policy have all impacted this institution in dynamic ways.

In the context of the 'sacred', decisions regarding the conservation and sustainable use of resources have always been determined by traditional institutions in the past. Realising that institutions incorporate changes as societies evolve, indigenous institutions too have to undergo changes and adapt to present day demands and changing societal value systems. Understanding the dynamics of institutional arrangement in a historical and cultural context will enable us to adapt them to present day needs. Indigenous institutions available for natural resource management must be harmonized with modern interventions introduced by various governmental agencies in order to synthesize culture and conservation.

A Capital in the Making: Sustainable Development in Dehradun

MEGHNA KHANNA

ABSTRACT

In addition to fulfilling the functional requirements of a town, capital cities are expected to have organised spaces glorifying the government's temporal seat of power; namely the judiciary, executive and legislative, an efficient transport network and infrastructural development. Building a new capital is a time-consuming process and needs huge investments. Declaring existing towns as the capital saves investments made in the initial stages but the pressure on housing, chaos in transportation, unemployment, inadequate utility and service infrastructure eventually become issues of major concern. (Bansal Arjita, 2002).

Due to its size and better linkage to Delhi and other towns in the region, Dehradun was declared the capital of the Uttarakhand region without any extension of its existing urban area. After becoming a provisional state capital of Uttarakhand, its commercial as well as institutional importance has increased manifold. The tremendous increase in the state government activities and budgetary outlay and the consequent concentration of banks, financial institutions, offices, retail shops and showrooms, has placed a lot of pressure on building activities, increased the need for built-up space and caused a hike in local land value. This paper discusses the urban issues pertaining to Dehradun based on indicators for basic urban services, traffic and transportation and the potential of the city.

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SOCIO-ECONOMIC CHARACTER

One of the main objectives of preparing a development strategy for Dehradun was to achieve a better quality of life for the city. To this end, a study of the socio-economic characteristics of Dehradun city was undertaken. This discussion includes the demographic profile of the city, its economic base and the socio-economic issues that were identified in the study.

The growth rate of income for 2000-2001 was 9.5% higher than the state average of 9.2%, thus clearly indicating higher levels of economic growth. Economic analysis show a dependency ratio of 1.9. The city's economy is dominated by the tertiary sector, which constitutes about 76.44 % and consists mainly of governmental activity.

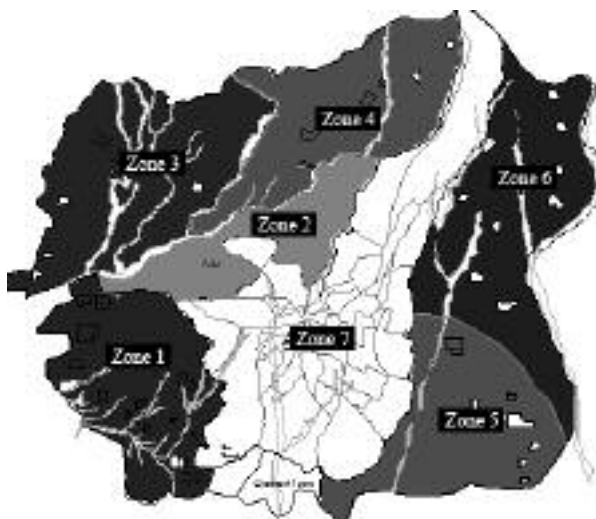
Trade and commerce are the second most important areas of activity, primarily due to the city's function as the capital and as a commercial hub for the region.

Table 1. Population trend: Notified area

Name	Area in Sq.kms	1981	1991	2001
Pop. City	65	2,11,838	2,70,159	4,47,808
Outside	167	7,536	8,208	13,007
Name	232	219,37	278,367	460,815

Demographic characteristics

- Total population 4,47,808 in 2001
- Population Density 6551 persons per sq.km
- Sex ratio 893 females per 1000 males
- Total Number of Wards 45



The study has been carried out by dividing the area into seven zones; the Municipal area has been identified as one zone

The secondary sector is the second most important economic base of the city. It generates an employment of 20.11%. The prime industries are textile based and engineering. The primary agricultural activity is very nominal, with wheat and sugarcane cultivation forming the main components.

LAND USE

To conceive and develop an integrated and functional city structure for Dehradun it is necessary to understand the existing land use pattern or disposition of various activities in all its intent, growth trends and physical limitations.

The physical expansion of Dehradun has been strictly governed by its physiography. The existence of a number of seasonal rivers, dissected topography, and the hills in the north, east and northwest have resulted in a sporadic growth, especially in the northern parts. This topography has not only influenced the direction of the city's growth but also conditioned its shape. The main city growth is restricted to the area between the Bindal river and Rispana Rao, spreading around the Clock Tower. Restricted ribbon growth has resulted along the Rajpur and Sahastradhara roads.

REVIEW OF MASTER PLAN

The Dehradun master plan 1982-2001 was made with the objective of achieving the planned growth of Dehradun and its environs. It was prepared by the U.P.

Table 2. Change of Landuse Pattern: Urbanisable Area

Land use	1989		1999	
	Area in ha	%	Area in ha	%
Residential	1589	41.78	2769	42.60
Commercial	81	2.14	267.8	4.12
Industrial	113	2.98	323	4.97
Public ans Semi- public	802	21.00	768	11.82
Govt. and Semi-govt.offices	267	7.00	289	4.45
Recreational areas, Parks and open spaces	156	4.10	209	3.22
Orchards and gardens	206	5.40	230.75	3.55
Circulation	203	5.35	369	5.68
Water bodies	332	8.74	1195	8.39
Undefined uses	55	1.45	78	1.20
Land for future development	2697	41.4	-	-
Total	6500		6500	

Source: Master Plan for Dehradun, MDDA

Town & Country Planning Department and was reviewed by the Ministry of Environment and Forests, Government of India and subsequently enforced by M.D.D.A after its notification by Uttar Pradesh Government in 1985. The master plan for Dehradun (1982-2001) was designed for a population of 6.00 lakh spread over an area of 6500 hectare.

The slow, restrictive and indirect implementation process of the master plan and the lack of a strategy for infrastructure development has been a major hindrance. There is no established mechanism to mobilize sufficient financial resources for infrastructure development. There are problems related to illegal construction, sub-division of land in violation of the Master Plan, encroachments on public land, roads, natural ravines and the riverbeds, which have led to the unmanageable growth of squatters and slums. The enforcement has not been very effective and demolitions are not a regular exercise. Above all, the lack of coordination among various agencies related to urban development activities is the main cause of the master plan's failure.

After becoming the interim capital of Uttaranchal, Dehradun faced a tremendous pressure on the existing urban infrastructure and suffered from traffic and congestion. In the changed scenario, MDDA has taken up various planning proposals – both short term & long term – to tackle the existing problems of the city and cope with its future requirements. The Dehradun master plan 2001 has to be revised. In order to prepare a master plan that may extend to 2021, the MDDA is already carrying out a physical survey to prepare the base map and identify potential areas for urban expansion and future planning.

The demand for residential area has increased over a period of time. The percentage of area under transportation is just 6 percent, a relatively low figure as compared to the UDPI guidelines, which stipulate 10-15 percent. In contrast, the percentage of land under various uses such as residential, public, semi-public, government and semi-government etc. has decreased owing to the approximately twofold increase in the total urbanisable area. The percentage of industrial and commercial use has, however, increased by 2 and 1.98 percent respectively. This shows the increasing requirement and strengthening of the economic base of the city.

URBAN SERVICES

The availability and adequacy of urban services are important indicators to assess the quality of life of a city. An attempt has been made here to assess the status of urban services in the city of Dehradun. For the purpose of the study, urban services have been limited to the core. The details of each of them are listed as under.

Climate and Infrastructure

- Water supply
- Storm water drainage
- Sewerage and sanitation
- Solid waste management
- Roads and street lights

In assessing the level of infrastructure services, there must be some way of measuring the infrastructure level quantitatively. The infrastructure indicators are used for this purpose. Indicators are models that merge or simplify a complex subject or number of variables into a single number or numbers, which can be easily understood by decision makers. The indicators are user generated, so that differences in the values of indicators are more important than their absolute values. In their indicators program, 'Monitoring the City', Volume.2, (1995) UNCHS defined indicators as follows: "An indicator is a tool for monitoring and reviewing the condition of cities, providing a benchmark for the development of urban conditions and urban policy over space and time. A good indicator should be simple, reliable, sensitive to change, and should be expressed quantitatively."

Indicators are often valuable not as an absolute measure of a particular phenomena, but rather in the context of change over time, distribution over space or distribution over social groups. When compared to guidelines, the existing urban services show a major gap in the coverage of the water supply and sewerage network. Even for the solid waste management, the collection performance is only 50 percent which is relatively low as compared to the standards of 90 percent. The urban services studied for the five divisions of the municipal area indicated that the municipal area is already suffering from the lack of the urban services. These facilities therefore need to be upgraded not only to meet the present demand but also that of the future.

Table 3

Assesment	Issues
Residential No agency to take housing projects No group housing projects	Still noticeable increase in land for residential purpose.
Commercial Proposed district centers have not developed The Core area acts as an major commercial center	Commercial area is generally 2 to 5% of the total area but in Dehradun it is 4% Owing to the status of being declared a capital
Industrial Industrial sector has shown an increase	Industrial sector has increased 5% Inspite of Dehradun being declared as " Environmentally Fragile Zone" as per the Uttar Pradesh Act
Transport Area under transport sector is 5 % Bypass under completion	Low as compared to the Norm of 10 - 12% Led to passage of unwanted through traffic in the city core. Less land available for the capacity augmentation of overburdened roads
Growth Physiography conditions not suitable for development in North due to Mussorie- Dehradun Road being the major artery Migration due to the declaration of capital Land availability towards south and the Sahastradhara road	Future growth restricted towards south and south east Proliferation Of illegal slums and squatter settlements
Institutional Set-ups Additional land to be acquired for the capital setups Land availability towards south and the Sahastradhara road	Haphazard development of the offices
Master plan Statutory development though implemented partly Delay in full implementation of statutory development plan	Unable to address growing demand Development plan has become incompatible with declaration of Dehradun as capital

REGIONAL LINKAGES

Dehradun city is the administrative headquarter of the Dehradun District. Thus, it is the administrative hub of the district. The length of the railway line in the Dehradun district is 64.50 kms. A total length of 2383 kms of roads serve the district. Of the total road length, the State Public Works Department manages 1528 kms of which the State Highway accounts for 144 kms. The main district roads cover 265 km. In addition other district and village roads cover 1119 kms. While 501 kms of roads are managed by the local bodies, about 354 kms are managed by other state departments. With its concentrated economic base and its status as the administrative city of the district, Dehradun receives an average of 1,14,000 floating population daily. Dehradun is also connected through the rail network.

ROAD NETWORKS

Dehradun has a good road network of radial pattern wherein all the roads of the following city radiate from the city centre outwards. The area under roads is approximately 5 percent of the total area of the city, which is below the standard of 15-18 percent of the total area. Nearly 69 percent of the total road length is paved.

- Saharanpur road (with master plan right of way 4m and existing width less than 25m) connecting the city core to Saharanpur in the south.
- Rajpur road acts as the north-south corridor of the city (master plan right of way 30m in the city and 36m at the outskirts, but presently less than 20m).
- Haridwar road connecting Haridwar towards the southeast. (In the master plan right of way 30 m in the city and 45 m at the outskirts, but presently less than 25 m)
- Gandhi Road, connecting the Haridwar Road and the Rajpur road in the heart of the city.

Other important roads include the Kaulagarh Road, Chakrata Road, New Cantt Road and the EC Road. Irregular carriageway widths and narrow road widths at main entry points are the main problems. Furthermore, encroachments constrict the already limited right of way.

DEVELOPMENT ISSUES

The key development issues of Dehradun are:

a) *Basic Urban Services:*

- i. Water supply - The issues related to water supply as identified in the above analysis of urban services are augmentation of the treatment facility, extending supply networks and increasing the number of connections.
- ii. Storm water drainage - The issues identified in this case are poor coverage, poor maintenance and blockage of outlets.
- iii. Solid waste Management - There is no proper primary collection of waste and many collection sites are open.
- iv. Sewerage and sanitation - Non-existence of sewerage network in more than 50% of the area and treatment facilities and untreated waste disposed directly in soil.

b) *Urban environment Issues:*

Dehradun's population is increasing but the development of basic urban services is not being provided at the same pace as the increase in the function of the city. Although the source availability and treatment facilities is adequate, the city faces various problems in terms of supply facilities. The section of the city's population that does not receive adequate urban services faces problems such as:

- i. Environmental degradation
- ii. Unhygienic living condition
- iii. Forest covered has diminished over time, 365 cases of forestland having been appropriated by government for infrastructure purposes. The Horticultural Act has been misused for the decimation of Dehradun's lichee orchards.

The key development issue arising out of this is to provide adequate coverage of these services.

c) *Traffic:*

Dehradun city is served by a radial pattern of movement. Due to the absence of a bypass, the city has been experiencing intra-regional traffic problems. The city lacks:

- i. Traffic management system
- ii. Parking
- iii. Encroachment along major junctions
- iv. Signaling

d) *Spatial Development and Implementation:*

Spatial planning and implementation is an important component of a city's development strategy. Therefore, the issues related to the same are worth highlighting. The main role of the Mussorie-Dehradun Development authority is to prepare and implement the Development Plan. However, its co-ordination with other line Departments is weak. Furthermore, the MDDA depends on budgetary provision for the implementation of Development plan, but the funds are not released as per the requirement of the Development plan. It is evident from the review of the Statutory Development Plan that the above-mentioned reasons were responsible for the partial success of Physical Development. There are conflicts between the interests of futuristic planning and that of contemporary society, lack of integration between the development plan and the economic plan/five year plan and a lack of continuous revision.

CONCLUSION

Dehradun is envisaged as a strong vibrant economy. Considering its development potential and physical constraints for future growth, the physical growth has been envisaged on the southern side of the city. The reasons attributed include adequate land availability and a relatively better road network with the new transportation corridor coming in the area. With its new found status as a capital, the city requires a sustainable development strategy that addresses the urban issues outlined in this paper.

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Effect of Pollution and other Environmental Factors on Monuments

S.P. SINGH

ABSTRACT

Alteration is the continuous and inevitable response of a rock to a constantly changing environment. With the accelerated pace of advancement and industrialisation, the constituent minerals of the rock in monuments have started experiencing disturbances in their chemical composition. The various atmospheric pollutants which effect monuments are discussed in this article.

INTRODUCTION

The people of India are heirs to priceless cultural wealth in the form of monuments, archival materials, archaeological sites, artifacts and a vast variety of museum materials. To protect this cumulative heritage for posterity is indeed a challenging task. In a country the size of India, with a variety of geophysical features and climatic variations, the preservation of the thousands of monuments across the country is an uphill task. Our environment is changing fast. The degree of sulphur dioxide, oxygen, dust and water in the atmosphere this year are different from what they were last year. Since monuments are exposed directly to the atmosphere, they suffer chemical and physical alterations. The resultant problems are often complex and varied, making a single solution impossible.

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Table 1. A list of the world monuments affected by air pollution

Monuments	Country	Stone	Damage	References
Boboli's Garden, Florence	Italy	Sandstone / Marble	Pollution effected	Caetano & Curtius (1983), Fassina (1986), Keppens et al. (1987)
Bowling Green Custom House, N.Y.	U.S.A.	Marble Sandstone	Statues effected	Livingston (1981)
CA Granda Milan Building	Italy	Dolomatic Stone	Thick black crust solidity loss, efflorescence	Peruzzi et al. (1978)
Cathedral of Seville	Spain	Calcitic Stone	Carbonaceous matter gypsum formed between 1-17%	Alcaeda & Martin (1988)
Cteopatra's Needle, N.Y. City	U.S.A.	Limestone	Weathered upto 3mm	Bugess & Schaffer (1952)
Cologne Cathedral	Germany	Sandstone	Pollution effected	Efes & Lukat (1976) Malesani & Vannucci (1974)
Flanders Monument	Belgium	Sandy limestone	Gypsum layer formation of calcite matrix	Nijs (1985)
Florentine Architecture	Italy	Marble	Sulphate deposition	Frediani et al. (1976) Fassina et al. (1976)
Herten Castle	Germany	Sandstone	Complete destruction due to Pollution	Winkler (1975)
Lincon Cathedral	U.K.	Limestone	Blisters of stone, blackened crust	Butin et al. (1985) Winkler (1975, 1976)
	Italy	Sandstone / Limestone	Gypsum formation 70% black due to unburnt material deposition	Bertolaccini et al. (1975)
	Belgium	Limestone	Black crust of carbon material & sulphate formation	Leysen et al. (1987)
	Italy	Marble	Increase of layers of sulphation. Black carbonaceous matter	Fassina (1986b)

Environmental pollution may effect monuments through (i) degradation of atmosphere, (ii) land pollution by the public due to the increase of population and a general lack of awareness about the historic monuments, (iii) water pollution causing biodegradation of monuments and spoiling their aesthetic, and (iv) noise pollution due to loud speakers and aeroplanes flying over the monuments (which also damage stone structures physically).

Air pollution is more harmful than land pollution, water pollution and noise pollution etc. The latter's effects are yet to be studied with reference to Indian monuments whereas the effect of air pollution on monument has received considerable attention from various Indian experts. Some such studies are discussed in this article.

AIR POLLUTION

One major component of environmental change is the rise of air pollution levels. Since monuments are exposed to all sorts of air pollution caused by power houses, industries, and vehicular exhaust, the damage occurs in varied forms such as exfoliation, darkening of the painted surfaces in the monuments, soiling, abrasion as well as physical and chemical rupturing. Pollutants not only disfigure the aesthetic beauty of the monuments but also accelerate the rate of their decay. Due to an ever increasing global trend towards urbanisation and industrial revolution, there is near expansional rate of change of weathering of monuments (Winkler, 1975, 1976). During the present century, monuments situated in the developed cities of the world have suffered extensive deterioration (Table 1).

Table 2. Data on the effects of environmental conditions on Indian monuments

Monument	Type of	Meteorological conditions stone	Environmental effects	References
Ajanta	Volcanic traprock	Rain-fall 720 mm, heavy precipitation, dry weather for months, temperature 19°C to 36°C.	Paint affected by moist condition, free from pollution, microbiological damage noticed	Tilak et al. (1970)
Dwarkadish Temple (Gujarat)	Limestone, Shelly	Humid weather, saline atmosphere, temperature 15°C to 35°C	Salt affected growth of moss and lichen	Lal (1978, 1985)
Fatehpur Sikri, Agra	Sandstone, Marble	Dry climate, temperature 5°C to 45°C	Growth of moss and lichen, dust levels higher	Lal (1976)
Khajuraho Temples, (Madhya Pradesh)	Sandstone	Dry climate, extreme variation of temperature (10°C to 40°C) low humidity	Noise pollution, dusty blackened atmospheric conditions	Lal (1978, 1985)
Konark, Puri (Orissa)	Khandolite	Mainly humid weather due to sea, temperature 12°C to 35°C, saline conditions	Salt laden winds, moist conditions. Heavily salt affected mosses and lichens	Lal (1978, 1985)
Red Fort, Agra	Sandstone, Marble	Dry Climate, temperature 5°C to 45°C, humidity low	Higher SO ₂ levels than Taj	Lal (1978, 1985)
Red Fort, Delhi	Sandstone, Marble	Dry Climate, temperature 5°C to 45°C	Heavy pollution due to acidic particulates	Shri & Tandon (1994)
Shore Temple, Mahabalipuram, Madras	Granite and Chronokite	Humid weather, temperature 10°C, saline atmosphere	Salt affected	Bahadur (1994)
Taj Mahal, Agra	Marble, Sandstone	Mainly dry, NW winds, temperature 5°C to 40°C, humidity 20 to 75%	10 - 15ug/m ³ of sulphur dioxide levels, heavy dust fall SPM levels; peak SO ₂ levels upto 250 ug/m ³ during winters	Shri (1989)

Compared to the monuments in U.S.A., Italy, Germany and France, Indian monuments are still to fall prey to adverse environmental factors as most of them are situated in a rural atmosphere where the rate of weathering of stone is slow (Table 2). The exceptions are the Taj Mahal & Delhi's Red Fort.

Relative humidity plays a prominent role in the disfigurement of monuments. The monuments of Venice have gathered 1 mm to 3 mm of black scab (Fassina et al 1976) due to their proximity to the sea and the high level of air pollution caused by smoke and other tarry matter. It has been shown by Winkler (1975, 1976) that high relative humidity readily converts the oxides of sulphur into corrosive sulphuric acid droplets. 0.15 ppm (or 300mg/m³) of sulphuric acid can produce 10 ug/m³ of hydrogen sulphate at 15% humidity and twice as much in foggy condition at 100% relative humidity. Temporary packs of sulphate

emissions of 1ppm can produce as much as 500 ug/m³ of hydrogen sulphate in the atmosphere. This amount can have a catastrophic effect on stone and metals.

EFFECTS OF TARRY-POLLUTANTS

The blackening of stonework is caused by particulate air pollutants which consist of carbon and associated tarry matter. In particularly sheltered parts of limestone walls, the pollutants are cemented to the wall by gypsum, formed as a result of the chemical attack on the limestone by sulphur-based acids. As gypsum is slightly soluble in water, any dirt that adheres to rain-washed areas of limestone is regularly removed. However, in the semi-sheltered areas, a heavy black deposit accumulates. If this remains untouched for many years, the tarry matters build up in the pores of the stone to such an extent that any eventual removal of the sooty matter by artificial

washing leaves the stone with a tarry, light brown stain. The stain intensifies as the limestone dries out. On a stone that was originally pale in colour, this can be rather disfiguring.

Sandstone behaves differently. The particulate pollutants are very firmly held by sandstone even where the stone is washed by the rain. Artificial washing with water will not remove them. Tarry matter penetrates quite deeply into the pores of sandstone. Fortunately, the average sandstone is darker than the average limestone and the staining is less obvious and hence more readily accepted.

In Stockholm, the colour of the plaster finish of buildings appears rather dark. Holmstrom (personal communication) states that this condition is due to the settling of black dust from motor tyres and asphalt on the roughly rendered surfaces of the buildings and suggests that a smooth finish to the plaster would reduce this effect. In St. Paul's Cathedral, London (England), the dust was analysed and at least half of the material was found to be caused by human detritus (a by-product of the millions of tourists who visit the cathedral).

The particulate matter causes soiling and abrasion. It acts as an agent for bio-deterioration too. Another problem is that their repeated removal from the surface of the monuments causes an appreciable intervention in the condition of the monuments surface.

POLLUTANT INTERACTIONS

The major stones used for construction and sculpture are marble, limestone, granite and slate. Marble, a metamorphic product of limestone, is composed almost entirely of calcium carbonate in the form of calcite. Sandstone consists of grains of quartz and silicon dioxide, cemented together to form a solid rock. The cement can be either calcite or silicate based minerals.

The primary air pollutants causing damage to stone are sulphur compounds. These can be in gaseous form as sulphur dioxide, in particulates such as sulphate compounds or in precipitation as aqueous sulphates and sulphuric acid. They originate primarily from the combustion of sources such as burning coal or residual oil. A comparable series exists for nitrogen as nitrogen oxide or nitrogen dioxide in gaseous form, nitrate compounds in particulate form, and aqueous nitrates or nitric acid in precipitation. The nitrogen-based

pollutants also come from combustion sources but unlike sulphur compounds, they are largely derived from vehicular emissions. Another atmospheric constituent, carbon dioxide, must also be considered. Although it is generally regarded as an air pollutant, it acts as a major agent of stone weathering in the form of carbonic acid in precipitation and groundwater. Carbon dioxide is also created in the combustion process and can be found at elevated concentrations in urban areas.

EFFECTS ON STONE MONUMENTS

Limestone and Marbles

The particulate pollution makes buildings dirty and the tarry matter occasionally causes staining. The acidic pollutants greatly enhance the rate of acid-based decay of limestone. However, even if there were no man-made pollutants, the carbon dioxide present in the air and the sulphur based acids that are released during the decay of sea-weed would be sufficient to cause the decay of this type of building material.

The main aggressor in acid attack is sulphur dioxide. Highly soluble in water, it reacts with water to form sulphurous acid. Two reactions may follow:

1. Sulphurous acid + oxygen from the air could produce sulphuric acid, which would then attack the limestone to give calcium sulphate and water. The calcium sulphate then absorbs water and crystallises as the mineral gypsum.
2. Sulphurous acid can directly attack the limestone to give calcium sulphite, which then combines with oxygen from the air to produce calcium sulphate. This also crystallises as gypsum.

The first of these paths is probably more prevalent, particularly under damp, foggy conditions. The second can also apply where calcium sulphite is present in the gypsum coating of the exposed limestone surface. In any event, the gypsum coating slows the attack. Further action depends on how often the affected stone is washed by the rain.

The slightly soluble gypsum is steadily removed from those parts of limestone-faced buildings that are frequently washed by the rain along with any dirt that has been fixed to the limestone surface by the gypsum when it first crystallised. The external parts of a limestone-faced building that are sheltered from the rain behave very differently. When there is no rain-water to keep these areas clear, droplets of acid in the

polluted air continue to condense on them under foggy conditions. The acid will react with any unchanged limestone surface and bind to any available surface. Thus, these areas become darker and the skin on them becomes less and less permeable. In urban districts where the particulate pollution is high, the surfaces often become black. The fate of the impermeable skin depends on the resistance of the limestone to weathering. The most durable limestones appear to be able to retain a dirty, inert skin more or less indefinitely. Occasional blisters will gradually form. Sometimes the blisters are very flat and their limits are not easily discernible. More often, they have a clear form and develop until they burst. The stone immediately behind the skin of the blister decays to powder or a pack of lightly connected flakes. Much of this decayed stone will fall away in time, thus presenting a fresh limestone surface for further attack.

In rain-washed parts of a building faced with magnesium limestone, acids derived from the sulphur-based gases in the air will normally attack the stone surface and produce calcium sulphate and magnesium sulphate. The rate of attack varies from one type of magnesium limestone to another and is believed to be at a minimum when the ratio of magnesium limestone to calcium limestone approaches that of a true dolomite.

MARBLE

Because marbles consists essentially of calcium carbonate, these initially undergo the same chemical reactions as limestone when they are in moist air containing sulphur-based acids. A skin of gypsum is formed that can incorporate some dirt particles. As with limestones, further reaction depends on whether the marble is well washed by rain. In well-washed areas, the gypsum is dissolved, no dirt accumulates and the marble surface is gradually weathered away. But, since the surface is usually nearly free from pores, more crystallization of gypsum occurs. Thus, the rate of erosion is normally considerably less than with limestone in the same environment though polished marble will lose its smooth surface faster.

SANDSTONE, SLATES AND GRANITES

The majority of sandstones consist of grains of quartz (a crystalline form of silica), cemented together by silica in a less well-crystallized form. Iron oxides or hydroxides are sometimes accompanied by grains of

feldspars and micas. Quartz-based sandstones are very resistant to sulphur-based acids in the air but these can become very dirty. They tend to be dirtier in the rain-washed areas than in the sheltered parts of the building. In this sense their behaviour is quite different from that of limestones or marbles. Very occasionally, sulphur-based acids in the air will attack an iron compound in a sandstone and then convert it to a soluble form. This can then migrate to the surface of the stone, where lime, derived perhaps from mortar, reconverts it to a rusty-looking insoluble form. Such deposits can remain unnoticed beneath the soot layer until the sandstone is cleared by a mechanical or chemical process.

Some sandstones are cemented with dolomite. In general, these withstand the acid-polluted atmosphere better than calcareous sandstone, particularly when ample cementing material is present. This is probably because dolomite is far less readily attacked by acids than calcite. When a dolomitic sandstone seems to respond like a calcareous sandstone, the cement generally contains calcite as well as dolomite. It is usually the calcite that is attacked by the acid.

Closely allied to the attack by acidic gases on calcareous sandstone is the attack by such gases on certain roofing slates that contain up to 13% calcite. Sulphur-based acidic gases in the air dissolve in rain water and are held in the overlap between adjacent slates in a roof. They form acids which attack the calcite in slates, thus weakening the slates by crystallisation so that in time the surface of the slates between the lap can be easily scratched even by a fingernail. Eventually, the fixing holes become so enlarged that the slate slips from its position.

In contrast, acidic pollutants in the air are unlikely to cause any significant decay of the granites used for building. However, the natural decay of stones gets accelerated due to many reasons, including acid rain. This accelerates the leaching rate of soils and by extension, changes the growth rate of vegetation. Likens (1972) claimed that the average pH of rainwater in the Rhine-Ruhr industrial area of Germany dropped from about five to less than four between the years 1956 and 1966. The decrease of rainwater pH in the last 20 years in England and other areas of the world is due to the increase in the use of fuel oil and natural gas as well as the treating of soot by mandatory industrial dust precipitators.

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Ganapati Utsav in Pune: Sense of Place, Space and Pace

MUKTA LTKAR

ABSTRACT

Festivals form an integral part of the Indian way of life. The rituals associated with them are the expressions of one's culture and are reflected images of one's age-old heritage and habits. The physical forms of the celebration have been observed to change from time to time, yet the cultural identity, the conceptual ideologies and the celebrations are not seen to be compromised on any of the grounds.

INTRODUCTION

In the Indian context, place concerns more than a function and the utility attached to it. The conception and understanding of space is more a function of the circumstances and perception of activities than direct names and areas. The same places assume different meanings and references depending upon the contextual activities that the user comfortably performs there.

What is most interesting is that the socio-religious context still plays a very important role in moulding the Indian individual and this is aptly reflected in the handling of cultural activities in contemporary urbanscapes. Times have changed and so do concepts but dynamic space unfolds themselves in a charismatic manner and style with the passage of time. The best example that so perfectly and directly deals with this phenomenon of place, space and pace in contemporary times is the Ganapati Utsav celebrated publicly in the city of Pune. Ganesh *pandals*

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(stalls) are erected at various locations in the city to celebrate the arrival and departure of the Lord amongst his masses during a festival held over 10 long days.

These magical 10 days of the Lord Ganapati's existence amongst the people (and more importantly the immersion procession on the last day) completely transform all the city's, spaces and drastically effect the pace of life of the city dwellers. What is very significant is that all this is done with the same fervor, voluntarily and in good faith for hundreds of years now in the city of Pune. The same commercial zones and streets completely transform themselves as per the demands of the religious activities. The planning and the management of all the areas, the usage of various places and the performances of the built spaces metamorphose to suit the needs of the festival and quickly revert to their original form on the completion of the festival.

HISTORICAL BACKGROUND

The birth anniversary of Lord Ganapati is celebrated on the fourth day of the bright half of Bhadrapad (August/September). This festival is celebrated for 10 days, from the Ganashchaturthi or birthday of the deity to the Anantchaturdashi, the final tenth day of his immersion. Everyone loves Lord Ganapati with his curving trunk, pot-belly and floppy ears. He is the benevolent protector of the innocent and the ruthless destroyer of the evil.

Since the days of Chatrapati Shivaji Maharaj, the founder of the Maratha Empire, this Ganapati festival has been celebrated on a grand scale in Pune. Later, the Peshwas (the prime ministers) themselves

participated in this festival because Ganesh was their family deity. Today this festival is the most colourful and happy event in the religious, social and cultural life of India, especially that of Pune. With the end of the Peshwa regime this festival lost its glamour and came to be observed privately in the households only.

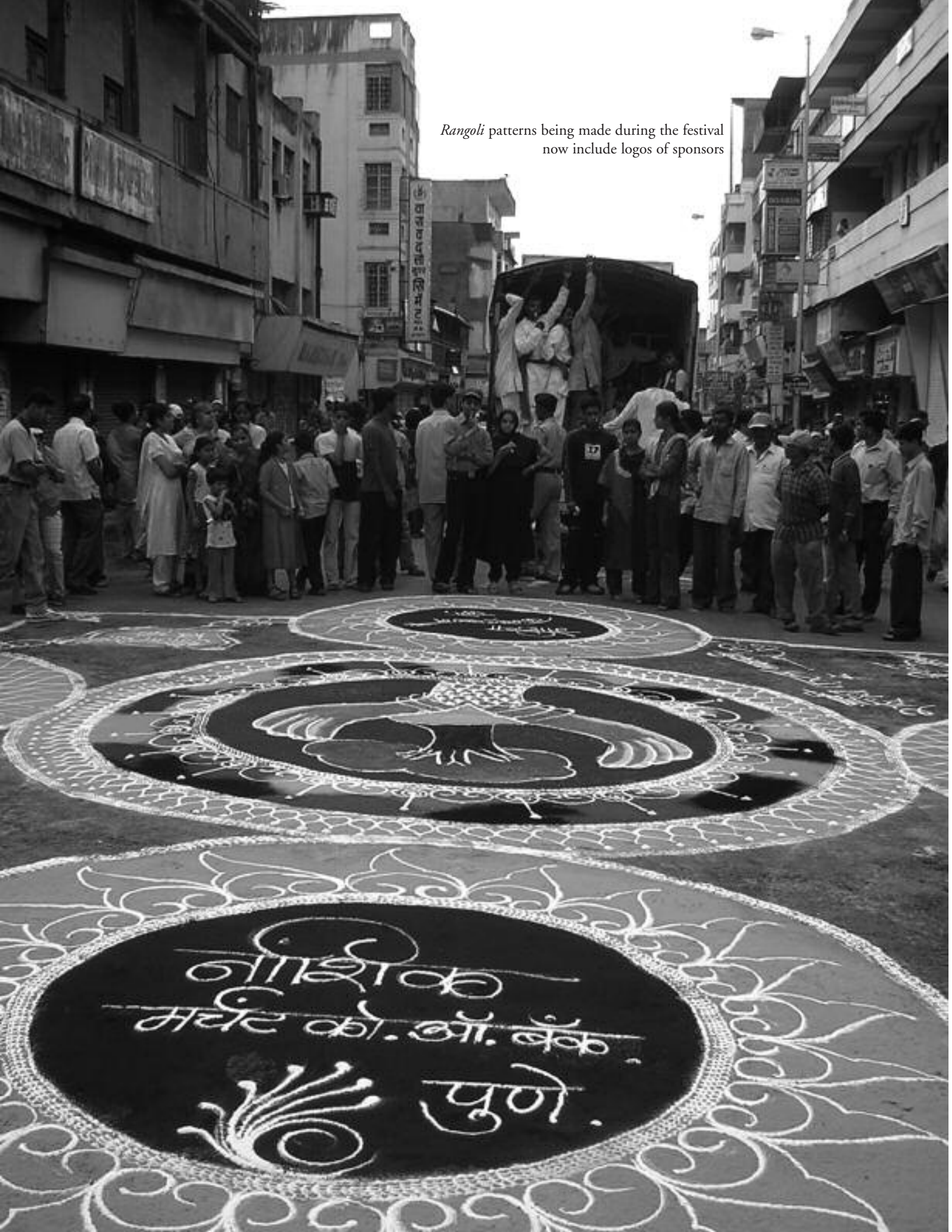
In 1893, a crucial juncture of India's history when the nation was under the yoke of British slavery, Lokmanya Tilak realised the importance and the massive popularity of this festival and initiated its nationwide celebrations. Tilak saw in the festival a way of uniting people in a common cause and a possible means of bringing about a political consciousness under the guise of religious celebrations, with freedom for India being the ultimate goal. It became a platform for a political awakening among people and aided in creating an uprising to gain freedom from British imperialism. Tilak's unique move ensured that the festival blossomed into its present popularity among the general public.

All the roads in the city are draped with rich, bright and colourful fabrics and the repetition of these temporary elements gives a homogenous character to the otherwise heterogeneous roads. The changes in the streetscapes completely transform the humanscapes and roadscape of the typical core areas. The conversion is reflected through the changing enclosures. These enclosures give an entirely different scale and proportion to the already existing commercial streets. Vehicular streets are converted into pedestrian walkways. The vehicular movement comes to a standstill. The continuous scaffoldings add to the the feeling of visual continuity throughout the areas.



Shopping areas become viewing galleries during the festival

Rangoli patterns being made during the festival now include logos of sponsors





In the aftermath of the festival, a quiet street

UNITY AMONG CITIZENS THROUGH ALL STAGES

The popularity of the festival not only associates itself with the deity or local beliefs but also merges with the changing forms and transforming urbanscapes by which the festival so comfortably accommodates itself within the local context. The last day of the immersion procession is the peak of the festival. Lord Ganapati is paraded through the streets with great pride and emotion before he is immersed in the waters.

The processional route taken over the last hundreds of years is neither natural nor designed but evolved. The otherwise commercial hub of the city, the Laxmi Road, transforms into the processional route with all the required changes. All the routine activities come to a standstill as the transactional areas are converted to

accommodate the festival celebrations. The shop steps, the parking areas and the mall entrances are adapted into spectator balconies once they are barricaded and converted into areas for people to stand and watch the spectacle unfolding before them.

The wholeness or the completion of the entire urban space is experienced in the 'temporary temples' crafted for the festival. Every enthusiastic face, every activity, every colour of the street drapery, every garment of the devotees, the peculiar aroma of the *gula* and the crackers add to the imageability of that space.

As expressed through the changing scales, scapes and colours, the festivities on the road solemnise the marriage of the new concepts of celebration with the traditional ceremonial rituals of importance. The immersion of the gods, more numerous now than in



Container for the *nirmalaya*, the floral offering

yesteryears, take a long time, often more than 30 hours at a stretch. The authorities and the organisers have made efforts to reduce this duration, but their efforts have been unsuccessful.

GRAND IMMERSION

The entire town gathers along the processional route to bid adieu to their favourite god. The activities in the town come to a standstill so that the public may wholeheartedly participate and enjoy the festival of the deity. People are completely forgetful of the places they stand in as they watch the deity being taken on procession, experiencing the spaces created by the changed scenarios and activities around them and unaware of the passage of time until Lord Ganapati leaves after having graced the town with his pious presence for all of 10 days.

The roads are decorated with beautiful *rangoli*, festive decorations drawn as symbols of sanctity and religious gaiety. The volunteers who walk back with their deity of honor render the entire processional road of about three to four kms with colourful *rangolis*. A colourful carpet of *rangoli* adorns the entire processional route. Hundreds of volunteers are engaged in laying these *payghadi* or red carpets for their favourite deity to walk upon. Great efforts are taken to receive him at every corner and at every junction along the route with large expanses of the *rangoli* carpet to ensure a glorious farewell to the deity. The changing times also see a commercial flavour to the festivities with many establishments sponsoring the effort.

Even today, history and mythology walk hand in hand in these processional celebrations. Traditional occupations are revived. Mythological stories are



Lok Manya Tilak, custodian of the festival

reenacted and historical events relived to remind all of the historical and cultural richness displayed.

Lokmanya Tilak would be a very proud man today if he could witness the scale and fervour of the festivities that he is credited with having initiated.

The commercial hub of the city of Pune, i.e. the Laxmi Road, Tilak Road and Jangli Maharaj Road, remain completely closed to vehicular traffic during the tenth day of the procession. The entire traffic is re-routed to facilitate the smooth flow of the crowds that through the procession to watch Lord Ganapati on his way back to the river. There are great restrictions on parking and on the movement of pedestrians in the central part of the city.

What is more, the parking ban is also applicable to the lanes and bylanes that join the main processional

routes. The busiest vehicular core of the city transforms into the most crowded pedestrian precinct.

A special barricade is constructed on the processional route to facilitate the pedestrians as they watch the Lord. The steps of the huge malls, otherwise guarded by the watchmen, turn into viewing balconies for the people of the city. The otherwise out-of-bound official areas are opened to the public so that they may follow the progress of the procession. People thoroughly enjoy their stay on the roads throughout the night, sitting on the shop steps, standing on the balconies, watching the series of idols pass by, completely oblivious to the world around them.

The narrowness of the roads and the magnificence of the procession completely transforms the scale and the ambience of the surroundings. A number of strategic viewpoints are specially crowded at to get that most coveted *darshan* of all the idols, especially at night when the important ones are carried, ablaze with their fantastic light decorations.

TRADITION: ENVIRONMENT FRIENDLY

Rituals demand that the idol of Lord Ganapati must be immersed in water. However, these days the idol is made of non-biodegradable plaster of Paris instead of the traditionally used *shadu* (a type of clay) which dissolves in the water. Consequently, the river water is being greatly polluted. Efforts have been initiated to keep the ritualistic concepts intact while modifying conventions to adapt to the changing problems. Off-late the festival have taken on an eco-friendly tinge with authorities and organisations getting together to ensure that the rivers and canals do not get polluted.

There are about four lakh idols which are immersed every year. As awareness regarding environmental issues increases, 60 to 70 percent of these get tank immersed rather than river-immersed, saving the ever increasing pollution of the river. Donation of the idols of Lord Ganapati is also encouraged. The Pune Municipal Corporation, the local authority managing the festival, puts up temporary immersion tanks at various places along the river. It also helps in transporting the donated idols to a nearby quarry.

The floral offerings or the *nirmalya* are collected in various traditionally shaped waste collection containers at major immersion *ghats*. 10 to 15 tons of *nirmalya* are collected in the city by the local authorities; these are then used for making manure.

This exercise is carried out by the garden department of the corporation. When composted manure is ready, it is distributed free to the citizens.

CONCLUSION

What could be better than this example of the city of Pune to demonstrate the power of positive transformation in traditions and human understandings of place, space and pace? *Utsavs* have become festivals, immersions have become eco-friendly, and Manache Ganapati (Ganapati's of precedent honour) changed routes to decrease the immersion hours. It is the people's festival celebrating the place of the Lord in the space of their urban hearts (core commercial areas) at the pace that the contemporary times demand.

With the passage of time, concepts have metamorphosised, their scales have been modified as commercialisation interferes, legalities dominate and environmental considerations enter the fray. The administration exercises controls but everyone still feels a part of the moment. A once household festival, the Ganapati celebrations have today found a place on the world tourism map. They represent the celebrations of human happiness and a glorification of god's existence amongst the masses.

Within a day, life in the city is back to normal, the chaotic traffic and the watch-driven public return and everybody looks forward to the arrival of the 'Bappa' (Lord Ganapati) the next year when he will be immersed with the same respect and gaiety yet again.

Sustainable Solutions

Understanding Sustainability

AKSHAY KAUL

ABSTRACT

Sustainability in the Indian context can be understood as a living practice rooted in the philosophical tradition of Unity as in the monistic traditions of Kashmir Shaivism. The present practice in the spatial disciplines are detached from the deeper cultural and philosophical basis of unity and coexistence, thus leading to a crisis in the planning of cities, architectural practice and architectural education.

INTRODUCTION

It is true that the word sustainability or sustainable development has become much maligned and clichéd. Often, it is used as a fashionable statement or a tag to appear progressive. Even the 1987 definition, used in the Brundtland Report at the World Commission on Environment and Development, falls short of expectation. "Sustainable development (is) that (which) meets the needs of the present (generation) without compromising the ability of future generations to meet their own needs."¹

When we look at our natural and cultural history and practices, it is possible to get deeper insights into our identity as a people with certain rooted values. People whose thinking and actions were largely guided by the principles of union, living in harmony with the self and the other as one. These values and philosophical traditions once brought prosperity and abundance to this culture. Today, we hesitate to talk and deliberate about such metaphysical terms. We lack direct experience and are ignorant of the real meaning of this philosophical tradition.

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Conflicting Indian and Western elements

In some enlightened corners of the world, including ours, knowledge of this philosophy and living principles is beginning to dawn. Trikha Shaivism or Kashmir Shaivism² is understood to most closely describe our existence. B N Pandit, Jaideva Singh, Paul M Ortega, William Mahoney, and many others are spending time to understand and interpret it in simpler terms after having studied under their masters.³

ADVAITA - NON DUALISM - MONISTIC PHILOSOPHY⁴

The thoughts "I am separate, I am different and I am the Doer,"⁵ also known as the three Anava mala,⁶ creates a world of fragmentation and discord. It is opposed to the thoughts of unity or union and all that exists is part of Nature or Consciousness. cursory reflections of this also forms the definition of the term ecology, as "the science that studies the interaction of organisms with other organisms and with their environment."

It is not in the scope of this article to understand the practices that lead to the direct experience and revelation of philosophy. It will suffice here to understand Trikha Shaivism or Kashmir Shaivism as an Advaita philosophy (not religion) of non-dualism

and non-anthropocentric thinking in which all life forms partake equally as consciousness.

Sustainability is about survival, Advaita philosophy is about '*ananda*'.⁷ It takes many a lifetime for such a philosophy to be formulated and become a living tradition while it only takes a few generations for it to be wiped out as a cultural practice. We see its manifestation in earlier form of arts, language, agriculture, landscape, clothing, food and health traditions. It has traveled through Tibet, Japan and China. It created a silent revolution in their cultures. Hu Shih, the former Chinese ambassador to the USA felt that, "India conquered and dominated China culturally for 20 centuries without ever having to send a single soldier across her border."⁸

Although today we are not conscious of this philosophy and its values, we are still reaping the benefits of it, if only through our genetic intelligence.

PICKING IT UP FROM WHERE WE LEFT

"I have traveled across the length and breadth of India and I have not seen one person who is a beggar, who is a thief. Such wealth I have seen in this country, such high moral values, people of such calibre, that I do not

think we would ever conquer this country, unless we break the very backbone of this nation, which is her heritage, spirituality and, therefore, I propose that we replace her old and ancient education system, her culture, for if the Indians think that all that is foreign and English is good and greater than their own, they will lose their self-esteem, their native culture and they will become what we want them, a truly dominated nation." 9

So said, Lord Macaulay in his speech at the British Parliament on Feb. 2, 1835. Although its attribution is still unconfirmed, this statement expresses a predominant attitude that was partly responsible for the downward spiral of this culture.

LOOKING WITHIN AND NOT OUTSIDE

We suffer as a culture because at all levels we are constantly accepting what is projected by economically more prosperous countries as acceptable ideas, codes, morals and cultural icons. We are regaining our foothold as an economic power. Our low purchasing power allows us only low budget ideas, technology, tools, materials, etc. This is uniquely expressed in our thinking and in our spatial disciplines.

The world's best planners don't make it here nor do the conscientious architects or landscape architects. It is the average one that lands up here and we hold them in high esteem. We believe that whatever is inside is not good and whatever is outside is acceptable. So the thousands of new townships and the buildings that are mushrooming across the country arise from 'concept design' provided in Singapore, Dubai or still farther from the reality of India.

OUR PLANNING AND DEVELOPMENT INSTITUTIONS

If we examine the structure and functioning of the state agencies responsible for the growth and development of our cities one gets a clearer understanding of our present state of affairs.

The typical structure is headed by a Town Planner with a background in architecture and in town planning. This planning structure often operates from an isolated cell and is detached from other parallel civic institutions. The planning and implementing institutions do not operate as a single entity. Civic bodies like the Municipal Corporation and planning

agencies have had little infusion of new blood over the years. They have both the paucity of good qualified human resources and the numbers required to carry on the daunting tasks of planning and maintaining healthy and vibrant cities.

The planning departments suffer from a lack of human resources and are burdened with much administrative work, including numerous meetings – *darbar* like unproductive sessions with ministers and various secretaries. Often, they are roped in to answer queries in the assembly sessions that leave them with little time to contribute meaningfully to their planning and administrative responsibilities.

This antiquated structure has two separate departments – engineering and town planning – with inadequate financial autonomy to seek professional assistance. Sixty years since Independence and the lowest quoted tender still takes precedence over quality across the country. The engineering departments with their hierarchy of superintendent, executive and assistant engineers take over the project once it is handed over by the planning team. With no composite team of allied professions for guidance, the projects result in



A Bungalow house in Gurgaon today

average design and workmanship that requires regular capital inflow.

Cities are living entities meant not only for survival but also for the celebration of life. They are as much a place to dream and cherish life as natural settings. With the availability of spatial data and through intermittent ground checks, it is possible to establish comprehensive maps for maintenance, development and growth. Maps on land-use, infrastructure, heritage (both natural and cultural) including water, forest character and cover, soils, agricultural landscape and types, building material resource and waste discharge need to be generated. These exist as bits of information in various departments scattered by distance and lacking qualified personnel to collate and make the data available as a planning tool. Planning that happens in vacuum results in projects like the Taj Corridor, Singur, Gurgaon Malls, DDA Hotels, Mall project at Vasant Kunj, the filling of Jamuna flood plains under the disguise of religion to create Akshardham and finally, the Commonwealth Games Village.

There exists a lot of room for an interdisciplinary approach and the systematic development of interest groups within the Planning Department. Citizens as well as qualified professionals should assist the city planning and execution team in this ongoing process.

The challenge is immense and so is the potential for creating new models and paradigms. The present Rajasthan Government's initiative, the State Urban Agenda for Rajasthan (SUARAJ) has created such an opening. Janaagrah,¹⁰ an NGO, is a forum that works relentlessly with the government, providing assistance at the policy level and despite its strengthening our institutions. The JNNURM provides incredible opportunities (despite its shortcomings) as funds roll in for urban development. Government institutions are forced to get their acts together. These are opportunities from where new paradigms and learnings could surface if an initiative is sustained. As my contribution to the civil society, I feel fortunate to advise and contribute to SUARAJ. This organisation gives hope for the future of governance, new ways of building bridges, bringing fresh ideas, information, working attitude and knowledge. I must say that it has not been easy for any of us but even the smallest contribution is of the greatest satisfaction in what is otherwise an inertia filled non-inclusive governance system.

PRACTICE OF THE SPATIAL DISCIPLINES

Can we imagine the challenges, opportunities and leadership we are bestowed upon as professionals who influence the destiny of others through the very act of creating habitats for the human mind and body?

The premise that cities are a living environment of natural processes and systems needs to gain awareness. Our training in the discipline of spatial planning and design, including that of architects, contractors, developers, builders, landscape architects, planners, project managers, vendors and laborers working on site, is detached from our sensitivity. The human body and the mind and its direct connection with the sun, moon, the air we breathe, the water we drink and many more simple phenomena is missing. The complexity and sensitivity needed to understand the needs of human beings is lost as people lose their own sensitivity and reason to exist.

With the rapid pace of growth, architectural practice is becoming increasingly based on ideas of expression, of materials and finishes with expensive natural or synthesized materials being wrapped around a box. Fortunately, additional training as a landscape architect allows a little more sensitivity towards natural systems and processes. Unless one is sensitive or trained it is difficult to understand the need for a synthesis of natural processes and systems with the other spatial disciplines.

The first *sutra* in Pratabhijna Hridayam, a text written by Sage Khemaraja on Kashmir Shavism, says, *चित्ति स्वतंत्रा विश्वा-सिद्धि-हेतु*, ie. 'consciousness in her freedom brings about the attainment of the universe.'¹¹ The most simplistic interpretation of this statement is that the very nature of consciousness to be free. When free it is in its expanded form and that is the very space from where creativity manifests. In a vacuum of individual grounding techniques and practices, the resulting practice of spatial disciplines drifts aimlessly.

Instead of being free, we constantly bind ourselves with the past, subconsciously bind ourselves to our role models or our clan and remain confined throughout life with our united knowledge as truths. Rarely are we free to think for ourselves apart from the acceptable style and predominant expressions that are part of the dominant or popular culture. Like Joseph Campbell once said "at some point the hero within needs to come out and become a man." For a



Faceless skylines with increasing urbanisation

long time after Independence, India saw buildings expressed with straight lines and rounder corners, with symbolic *jharokhas* and *chattris*, either emulated directly or stylised into straight lines. Where did this architectural expression come from and why? Were we still pleasing our hero Walter Gropius or following Corbusier's 'poetry in concrete' subconsciously?

Almost, 40 years after Independence, at the time of the Festival of India, came the exhibition 'Vistara'. It began to talk of who we are, albeit as an expression. Perhaps the traditional architecture section could have continued the search for placing the built expressions in the deeper ecological and spiritual context of this culture. It is time to take this dialogue further. The answer will stem from within, when like Swami Muktananda, says, 'Where are you going?'¹² becomes an ongoing quest for a seeker.

In our practice at professional for planning, architecture, and landscape we work under one roof to provide architectural, landscape, planning and interior design services. We are beginning to see its benefits as we work towards being close to natural process and systems. Our training as landscape architects gives us a greater leverage in this effort. It is a slow, conscious process but our buildings are beginning to grow more

harmonious with their surroundings and vice versa. We are able to work on more complex issues in planning and landscape, at scales varying from terrace gardens to city planning, from a single client to advising the State. There is still a long way to go for us. Yet, it is deeply gratifying that we have reached a point in our journey when people pause and experience inner silence and tranquility in our landscapes and acknowledge it.

ARCHITECTURAL EDUCATION

A standardised architectural curriculum across the 12 ecological zones in the country is the first step towards alienating ourselves from our immediate existence. Each ecological zone brings with its diversity and identity and with it a unique set of attributes, individuals, plants, soil, water, landform, settlements, buildings, festivals, traditions, hopes and aspirations. Current standardised pedagogy leaves very little room for nurturing this valuable diversity and individual excellence.

So how is the architectural education here any different from that in other cultures? Modeled directly on the Bauhaus school of thought and imported by an alien culture, its relevance, especially in small towns

where students and clients both struggle to express themselves in English, is questionable. It promotes people to look, behave, speak, think and dress alike, thus alienating them from their innate intelligence and self esteem.

This alienation is strengthened in the curriculum by having design exercises created in the vacuum of natural or human ecological context. The natural context is usually limited to the movement of the sun, wind and of course, maximising the view from the building. There exists very little horizontal coordination and learning within the different courses and in structuring the linear progression in the curriculum. Very few schools have any research programmes where the basis of learning is direct experience or documentation, that involves more than measuring buildings.

Finally, design studios alienate the individual completely from the society in which he has to serve. The design studio seems to reinforce the false identity

of the individual, "I am separate, I am different and I am the Doer," and in the process creates a prima donna in the society who is unfit to serve and function in it.

Some schools have tried to address these issues at undergraduate levels – the TVB School at Delhi was one such architectural programme. Building in the context with interesting studio programmes and horizontal integration formed part of the learning. Its strength was the summer and winter vacation programs where direct experience was encouraged through continuous documentation of buildings and settlements in different ecological zones of India. However, the program lost its vitality before attaining maturity due to a bid towards standardisation by the Council of Architecture.

I believe it is possible to sensitise students to begin to think about the existence of the natural and cultural landscape. It is possible to take a graduate student of landscape towards developing greater stewardship of the land, both urban and rural.

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Poverty Alleviation: The Need for Holistic Approach

VINNIE JAUHARI

ABSTRACT

Dwelling upon the issue of poverty and its manifestation, this paper addresses the growing population and increasing urbanisation which make it essential to target the needs of the urban poor. It also raises issues related to the provision of drinking water and sanitation, housing and infrastructure management. The paper concludes by emphasising the importance of better management of indigenous resources, pragmatic and transparent decision making, involving local communities and adopting an integrated approach. In various segments, some examples of success using indigenous interventions have been discussed.

INTRODUCTION

The Brundtland Report established the concept of sustainable development as that which meets the needs of the present generation without compromising the ability of future generations to meet their needs. The consideration of intergenerational justice and a concern for the poor in each generation gave the entire discourse an ethical force. With so many advancements in science and technology, different economics need to tackle the menace of poverty on a war footing.

The World Development Report 2000/2001 states that poverty is a pronounced deprivation in well-being. The voices of poor people bear eloquent testimony to its meaning. To be poor is to be hungry, to lack shelter and clothing, to be sick and not be cared for, to be illiterate and

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Increasing traffic and congestion

not schooled. The report accepts the now traditional view of poverty as encompassing not only material deprivation (measured by an appropriate concept of income or consumption) but also low achievements in education and health. The report also broadens the notion of poverty to include vulnerability and exposure to risk, voicelessness and powerlessness. All these forms of deprivation severely restrict what Amartya Sen calls the capabilities that a person has, i.e. the substantive freedom he or she enjoys to lead the kind of life he or she values. By giving a better characterisation of the experience of poverty, this broader approach to deprivation increases the understanding of its causes. This deeper understanding brings to the fore more areas of action and policy on the poverty reduction agenda.

The Human Development Report (1997) states, "The progress in human development and in eradicating poverty has often been won through uprisings and rebellions against states that have advanced the interests of the economically powerful while tolerating rigid class divisions, unbearable economic conditions and human suffering and poverty. History is marked by uprisings and rebellions sparked by poverty."

History provides enough evidence to deduce that any society should not be stretched to a point where only a revolution could bring about a change. Such a stage is accompanied by violence, turbulence and lot of social unrest. If the entire social fabric decays, then what good are scientific achievements and material wealth when the very survival of life becomes questionable?

To promote social progress and raise the standard of living within the wider concept of freedom, the international human rights laws (as enshrined in the UN Charter, the Universal Declaration of Human Rights and other treaties and declarations) recognise economic and social rights with the aim of attacking poverty and its consequences. Among these rights are an adequate standard of living, food, housing, education, health, work, social security and a share in the benefits of social progress (www.un.org/overview).

India's anti-poverty strategy comprises of a wide range of poverty alleviation and employment generation programmes, many of which have been in operation for several years. Some of the anti-poverty programmes operational in India are:

- Integrated Rural Development Programme (IRDP)
- Training of Rural Youth for Self Employment (TRSEM)
- The Programme of Development of Women and Children in Rural Areas (DWRCA)
- Jawahar Rozgar Yojana (JRY)
- Employment Assurance Scheme (EAS)
- Million Wells Scheme (MWS)
- National Social Assistance Programme
- Swarna Jayanti Shahari Rozgar Yojana (SJSRY)
- Prime Minister's Rozgar Yojana (PMRY)

The data drawn from the Ministry of Rural Areas and Employment and other concerned departments (Economic Survey 1998-99, Ministry of Industry, Govt. of India) indicates a large gap between the targets set for various schemes and their actual achievements. In many cases it is even less than 50 percent. In such a state of affairs, the desired objectives are difficult to achieve. Hence, there is a need for people to get involved in the poverty alleviation programmes.

To alleviate poverty in both urban and rural areas, there is a need for simultaneous interventions at the grass root levels such as education, provision of employment, housing, water, health and empowerment of people, specially women. The Barefoot College at the Social Work Research Center (SWRC) is an example of how a local, completely illiterate, community could be employed and educated to use local knowledge and technology for water and food, and manage itself as a sustainable unit. SEWA is another organisation which empowers the poor self-employed people and develops interventions that cut across different sectors such as shelter, employment, health, education, crèches, standing up for the cause of

self-employed workers and raising issues on their behalf. Initiatives such as SPARC focus on the use of local technology in the area of shelter and the empowerment of women. The Building Centre Movement also focuses on the provision of shelter to poor communities. The Barefoot College exemplifies the need for education to be rooted in the ground reality of working children who have to supplement their parents' livelihood. It runs night schools and empowers children by giving them responsibilities for various tasks. The interventions across various segments should be such that:

- they generate employment
- they involve people in the process
- they help fulfil basic minimum needs
- There is sufficient continuity and financial stability for them to sustain themselves independently.

POPULATION GROWTH AND THE URBAN POOR

According to OECD estimates, India would be the world's third largest economy by the year 2050. The population of India is expected to increase from 1029 million to 1400 million during the period 2001-2026, an increase of 36 percent in 25 years at the rate of 1.2 percent per annum (Census of India). This will put an additional load on the current infrastructure of these cities. On one hand, there is a growing movement towards investments in IT and education at the school level. On the other hand, the urban poor will also continue to grow in numbers.

By 2041, the urban population in India will surpass that of China (Chakrabarti, 2006). The number of metropolitan cities in the country has grown from one in 1901 to five in 1951 and 23 in 1991. There were seven mega cities in India by 2006. (See Table 1).

This growth process is accompanied by serious shortages in power, water, sewerage, developed land, housing, transportation, communication and other facilities (Chakrabarti, 2006). Imperfections in land and housing markets and exorbitant increases in land prices have left the urban poor with virtually no alternative but to seek housing in the mushrooming slums. About 1/3rd of urban dwellers live below the poverty line in sub-human conditions in such slums, without access to the basic minimum facilities such as drinking water, sanitation, medical care and public hygiene (CSO, 1997). These slums then become a potential cause of crime and civil unrest. Poor health conditions trigger various diseases. The financial loss

Table 1

	1981	1991	2001
No of Metro Cities (Population) (1 million +)	12	23	35
Population (million)	42	70	108
% Urban Population	26	32	37.8

Source: CPHEEO

in terms of productivity has been quantified at Rs. 360 billion (US\$ 9bn) annually (Ministry of Urban Development 2000 Annual Report 1999-2000 New Delhi.). There is a need for adopting innovative, low cost and environmentally sustainable technologies for solving some of India's pressing urban problems.

DRINKING WATER PROVISION

India has witnessed a phenomenal development of water resources and self-sufficiency in food grains and drinking water infrastructure for about 85 percent of India's urban and rural population. However, this achievement has been at the cost of ground water depletion, water logging, water quality degradation and pollution, and an increase in salinity levels in many areas. The primary responsibility for providing drinking water and sanitation facilities in the country rests with the State Governments and more specifically, with the local bodies in urban areas. The nodal agencies for rural and urban water supply and sanitation are the Rajiv Gandhi National Drinking Water Mission and the Ministry of Urban Development and Poverty Alleviation; in addition, a variety of other institutes play direct/indirect roles.

Between 91-93 percent of India's urban population derive their drinking water from protected sources, leaving an unserved population of between 7-9 percent. Water quality problems include fluoride (66 mn people across 17 states are estimated to be at risk), excess arsenic in ground water (nearly 13.8 mn people in 75 blocks are reported at risk), varying iron levels, presence of nitrates and heavy metals, bacteriological contamination and salinity.

On the sanitation front, only 18-19 percent of all rural households have a toilet. In 1990, it was merely 10 percent. At the same time, 75 to 81 percent of all urban households in India now have toilets, an increase from 1990 figures of around 64 percent. Sanitation beyond home toilets is a different story. Out of 300 Class-I cities, about 70 percent have partial sewage systems and sewage treatment facilities. Of the

Table 2
Total Population, Slum Population and their percentage in Municipal Corporation with
Population above one Million (2001)

SI.No.	Name of Million Plus Municipal Corporations	State/Union territory	Total population	Total slum population	Percentage of slum population to total population
1	2	3	4	5	6
	TOTAL		73,345,775	17,696,950	24.1
1	Greater Mumbai	Maharashtra	11,978,450	6,475,440	54.1
2	Delhi	Delhi	9,879,172	1,851,231	18.7
3	Kolkata	West Bengal	4,572,876	1,485,309	32.5
4	Chennai	Tamil Nadu	4,343,645	819,873	18.9
5	Bangalore	Karnataka	4,301,326	430,501	10.0
6	Hyderabad	Andhra Pradesh	3,637,483	626,849	17.2
7	Ahmadabad	Gujarat	3,520,085	473,662	13.5
8	Surat	Gujarat	2,433,835	508,485	20.9
9	Kanpur	Uttar Pradesh	2,551,337	367,980	14.4
10	Pune	Maharashtra	2,538,473	492,179	19.4
11	Jaipur	Rajasthan	2,322,575	368,570	15.9
12	Lucknow	Uttar Pradesh	2,185,927	179,176	8.2
13	Nagpur	Maharashtra	2,052,066	737,219	35.9
14	Indore	Madhya Pradesh	1,474,968	260,975	17.7
15	Bhopal	Madhya Pradesh	1,437,354	125,720	8.7
16	Ludhiana	Punjab	1,398,467	314,904	22.5
17	Patna	Bihar	1,366,444	3,592	0.3
18	Vadodara	Gujarat	1,306,227	186,020	14.2
19	Agra	Uttar Pradesh	1,275,134	121,761	9.5
20	Thane	Maharashtra	1,262,551	351,065	27.8
21	Kalyan-Dombivli	Maharashtra	1,193,512	34,860	2.9
22	Varanasi	Uttar Pradesh	1,091,918	137,977	12.6
23	Nashik	Maharashtra	1,077,236	138,797	12.9
24	Meerut	Uttar Pradesh	1,068,772	471,581	44.1
25	Faridabad	Haryana	1,055,938	490,981	46.5
26	Pimpri Chinchwad	Maharashtra	1,012,472	123,957	12.2
27	Haora	West Bengal	1,007,532	118,286	11.7

Table 2. Percentage of population in India in slums (Slum statistics, Census Report, Government of India)



Condition of water bodies in most Indian cities

total wastewater generated in the metropolitan cities, barely 30 percent is treated before disposal. The untreated water flows into rivers, lakes, ground-water and coastal water, thus causing serious water pollution. The Midnapur model has become one of the most sustainable alternate delivery systems for sanitation. At its heart is a network of private production centres and retail outlets for sanitation products, coupled with extensive publicity and social marketing.

Lack of water supply and sanitation has dangerous implications, especially for children. Children are most vulnerable to the preventable diseases which result from lack of water, dirty water and lack of sanitation. In India, 0.4 to 0.5 million children die every year from diarrhoeal diseases and dehydration and millions experience more than 15 attacks of serious diarrhoea before the age of five.

HOUSING

Housing is a basic necessity as well as an important economic activity which is a part of the construction industry. The Working Group on Housing for the Tenth Plan has observed that around 90 percent of housing shortages pertain to the weaker section. There is a need to increase the supply of affordable housing to the economically weaker sections and the low income category though a proper programme of allocation of land, extension of funding assistance and provision of support services. The problem of the urban shelter-less and pavement dwellers has not been given the consideration that is necessary in a pro-poor State, as seen from the lack of progress in the Night Shelter

Scheme. The Working Group on Housing has estimated the urban housing shortage at the beginning of the Tenth Plan at 8.89 million units. The total number of houses required cumulatively during the Tenth Plan period is assessed at 22.44 million. 54 percent of India's land area is vulnerable to earthquakes, 8-4 percent to cyclonic wind and storm surges, and 4.9 percent is vulnerable to flood damage. To deal with the problems of the urban poor, land must be provided at affordable prices. Class V towns (those with a population between 5000-10,000) register a high percentage of households not covered by toilets, electricity, and drinking water (61 percent, 41 percent and 28 percent respectively in 1991). The shortages are very serious for urban centres with populations of less than 50,000. There is a need for greater involvement of the State and the Central Government in upgrading the infrastructure of small towns.

As shelter is a basic need, cost-effective housing technologies become imperative. In the level of low income there is a need for appropriate and cost-effective technologies to combat the problems of:

- Rising costs
- Access to materials
- Lack of accessibility of innovations to the common man
- Lack of awareness of these innovations in professionals working in this sector
- Lack of exposure amongst the construction workers and artisans who are the main link in utilizing these options
- Lopsided impact on environment in terms of depletion of natural resources
- Lack of support through building regulatory media, codes and schedule of rates

The Building Centre Movement in India has emerged as a grass root level intervention with the objectives of:

- Transfer of technology
- Training of artisans
- Production of elements
- Construction and guidance

The building centre movement has taken long strides. From Nirmithi Kendra in Quilon in 1986 in Kerala to Jammu in 1995, there have been 385 building centers.

LESSONS LEARNT

Based on the above analysis, one can deduce the following.

Documentation of indigenous technologies

This points to the the importance of indigenous knowledge. Despite technological advances, the problems of drinking water and sanitation are still prevalent. In the olden days, they did not have trained doctors, architects or biologists. They did not depend on theory but applied the wisdom they had acquired over the centuries. Many communities are so fed up with the current state of affairs that they demand they be left alone to identify and solve their own problems (Roy 1999) with the aid of their indigenous knowledge. Greiner (1998) defines indigenous knowledge (IK) as the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area. Indigenous knowledge can provide insights into the issues of food security, health, education and natural ecological initiatives. The advantage of indigenous knowledge is that it is dynamic in character and has the capacity to evolve since people have been using it to survive through the centuries. It needs to be documented and stored in a systematic manner. The solution does not lie in inflicting western solutions on communities. Such interventions fail to induce people to participate in them because of the absence of instruments and mechanisms that enable them to use their own knowledge.

The use of traditional knowledge, skills and wisdom promotes active community involvement because people depend more on each other. The use of traditional knowledge demystifies the local technologies that will be the basis for sustainable solutions in the future. The more people who understand and try out a technology, the greater the chance of that technology being accepted. In 1997-98, through the use of ancient technologies, a total of 12 million litres of rainwater was collected in 100 schools attended by 3,000 children at the Barefoot Schools. The cost was a mere USD 0.10 a litre. The schools have teachers with no qualifications. Over 150 young people from nine states of India have been trained as barefoot solar engineers. They have equipped over 2,000 houses in the Himalayas with solar electricity. The practice could be transferred to other places and situations, but it is essential that several conditions be met:

- That they be sustainable
- That they be rooted in the ground realities.
- That they accommodate the huge numbers
- That they trap investments.

(www.unesco.org/most/bpik16.htm), 'The Barefoot

College: Promoting Productive Employment for Youth').

Solutions have to be built around the people through their involvement

Another important aspect is the total involvement of the people at the grass root levels. No external agent can bring about changes in a community. The solution for any community has to be a sustainable process. This can only happen if the use of local know-how is usefully channelised so that it can be sustained in the long run. The case of the Barefoot College at Tilonia as discussed in the paper is an example of the same. People need to be sensitised to the change. Acceptance of change is far easier when there is a suitable climate created for the same.

Dissemination of information to the poor

The government needs to communicate more information to the poor about available programmes and the implementation of the same. For example, the much hyped Swarna Jayanti Sahari Yojana and the Swarn Jayanti Swarojgar Yojana, which were launched in April 1999, have failed to benefit even 5 percent of their target in Orissa. Although meant to help people rise above the poverty line, not a single person received even a rupee as a loan in the last two years, since the scheme began (www.ndtv.com, Mar1, 2001; Pro-poor Policies let down by the lack of reform). In Khurda district, out of a total of 20,000 families living below the poverty line, only 4,500 of them were sponsored for loans by the government. The bank sanctioned 1273 loans out of which only 904 people have so far received the money.

Better Management of Resources

A recent news item reported in the press is an eye opener. The drought-effected people in 10 districts of Rajasthan went on protest to highlight the fact that though the Food Corporation of India godowns were bursting with food grains, people remain hungry. The FCI has nearly 410 lac tonnes of food grains in godowns in India. Nearly an estimated 139 lac tones is in excess. It costs the government Rs 4,20,000 lakhs just to store these food grains in Rajasthan (www.ndtv.com, May 17, 2001). The Food Corporation of India has in recent years been grappling with the problem of how to take care of the huge surplus food grain which is fattening an evergrowing army of rodents or simply rotting away in

its badly managed warehouses. (Times of India, May 11, 2001). It is evident that there is a pressing need for better management of resources.

Political will to take pragmatic decisions

The income and consumption patterns of the poor are changing. There has occurred a shift from coarse grains to wheat, paddy and oilseeds. Singh (2001) has analysed the dynamics of the cropping patterns. A drop of 50 percent in the cultivated area of sorghum, little millet and finger millet has occurred just in the past decade. It was in the 1980s that the Public Distribution System (PDS) became a welfare instrument to provide essential items at nearly half the market price. Neither crop loans nor crop insurance are available for these groups. There are no subsidies. The promised minimum support price of coarse grains is denied to farmers due to the lack of governmental non-intervention. The chemical composition of coarse grains is better than rice and wheat in many cases. Pearl millets have a higher concentration of protein, fat and minerals, particularly of calcium.

On December 3 2005, Prime Minister Manmohan Singh launched "the single largest initiative of the Government of India for a planned development of cities in India." The programme is the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). The Centre set aside Rs 50,000 crores under JNNURM, covering a period of seven years. Another Rs 50,000 crores were to be raised through private sector participation. Down to Earth (August 31, 2006 pg. 30) indicates that, "in a tearing hurry, JNNURM directorate had cleared over 23 infrastructure projects worth Rs 86,482.95 crore to meet the March 31 deadline. Only nine projects worth Rs 803.19 crore are for the urban poor under BSUP. An analysis of the projects cleared under UIG shows that water supply projects seem to be favoured with over 11 projects worth Rs 48,026 crore cleared by March 31, 2006. This is followed by drainage at five (Rs 19,901 crore), transport at four (Rs 14,756 crore) and sewerage at three (Rs 3,800 crore). All these projects are in the states of Andhra Pradesh, Gujarat, Madhya Pradesh and Maharashtra. Urban planners and environmentalists claim that this is nothing short of catastrophic since greater water supply means more waste water and sewage and none of the recipient cities are equipped to handle the increased sewage load. The present JNNURM funds will increase serious environmental problems. Contractors will build huge infrastructure which will effect the city's natural drainage system.

The fresh water situation in the world and India specifically is critical. UNDP assesses that by 2018, India will be a water-stressed country and by 2050, in irreversible crisis. JNNURM should mandate the protection of surface and ground water and the prevention of global warming as first principles and parameters around which to formulate City Development Plans.

TRANSPARENCY

Transparency in operations is required. A review of literature suggests that poverty has a relationship with political corruption. The Human Development Report (1997, page 95) mentions that poverty often serves the vested interests of the economically powerful, who may depend on the poverty stricken to ensure that their societies run smoothly. A mobile pool of low paid and unorganised workers is useful for doing the "dirty, dangerous and difficult" work that others refuse to do. Corruption in government increases poverty in many ways. Most directly, it diverts resources to the rich who can afford to pay bribes and away from the poor people who cannot (Transparency International, 1996). Corruption also skews decisions in favor of capital-intensive enterprise and away from labor-intensive activities more likely to benefit the poor. Furthermore, corruption weakens the government and lessens their ability to fight poverty. It reduces tax revenues and thus the sources for public services. More generally, corruption eats away at the fabric of public life, leading to increased lawlessness and the undermining of social and political stability.

It is important to bring information to the doorsteps of the poor. There is an urgent need to ensure access to modern information technology in rural areas or disadvantaged communities to disseminate simple, practical knowledge which will save their lives, increase awareness and stimulate development. Properly used, media can help reduce conflict and strengthen local organisation. It helps reduce poverty by providing information on how people elsewhere are handling similar situations. The poor have inadequate access to information, technology, expertise and resources.

LINKAGES BETWEEN DIFFERENT SECTORS

Interventions taken in one sector have an impact on others, and there are strong interlinkages between them. For example, improving health outcomes not

only improves wellbeing but also increases income earning potential. Increasing education not only improves wellbeing but also leads to better health outcomes and higher incomes. Providing protection for poor people not only makes them feel less vulnerable but also allows them to take advantage of higher risk-higher return opportunities. Increasing poor peoples voice and participation not only addresses their sense of exclusion, it also leads to better targeting of health and education services to their needs.

Survival within poverty includes many strategies; these must be combined in a process aimed not just at income in the broadest sense but also at assurance against the stresses and shocks to which poor people are particularly vulnerable. One such strategy is a

mixture of jobs, some temporary, some full time, some self-employed, some working for others. Technology could play a vital role in the elimination of illiteracy. For example, information technology could be utilised to ensure that education reaches the most distant locations. It could create a difference through the dissemination of information by various means in the rural areas. It could address concerns such as the problems faced by craftsmen, farmers or persons who run leather tanneries among others. Another important aspect that can be addressed by the use of IT could be the conversion of their entire literature in a language that the masses understand. But IT alone cannot be a solution. The solution has to be rooted in the reality of the situation.

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Book Review

LEGITIMATING THE BICYCLE SHED AS ARCHITECTURE



The Culture of Building, by Howard Davis. New York, Oxford: Oxford University Press, 1999, ISBN: 9780195305937 385 p. col. ill., plans, facsimils, 27 cm. Includes bibliographic references and index.

Someone once said that Edward Said's pathbreaking study of Orientalism in the late 1970s was something everybody anyway knew, but that it actually took a Said to quietly come along and articulate it well enough for us to appreciate the elegance and frightening enormity of its logic. Howard Davis's book, *The Culture of Building*, is that sort of book – clearly argued, beautifully illustrated in colour, impressively substantiated at every turn; and many of us will agree with his ideas. What's more, it's by a seasoned professor of architecture, a nuts-and-bolts practitioner who places all that history in relation to (what we used to think to be) humdrum office politics.

The author's credentials apart, however, this book should be required reading for all Indian students of architecture and urban design, for several compelling reasons.

First, it recalls, quite elegantly, Spiro Kostof's comparative historiography and interpretation of architecture in its very different social contexts (I am thinking, in particular, of Kostof's sweeping critiques of *The City Shaped* and *The City Assembled*), which presented the reader with a veritable smorgasbord of words and pictures, combining architectural and urban history for the eager undergraduate. And yet, while the similarity between Kostof and Davis's theses lies in their

common intent to establish connections between people, places and things (admittedly, at quite different scales of description), Davis starts rather more empirically with describing typologies of relationships between people involved in the world of construction alone – between the architect and her client, and everyone associated with a project in-between. The professional networks which characterize these relationships are what Davis calls very specific "cultures" of building, where the accent is not only on a building's function, meaning and appearance, but more significantly on the transactions and decisions which went into its making. In Davis's reckoning, cultures of building have come a long way since Nikolaus Pevsner famously suggested that "[a] bicycle shed is a building; Lincoln Cathedral is a piece of architecture." The book supports the argument that a bicycle shed is equally architectural, and amply illustrates this with terrific examples from round the world.

The book is divided into three parts. Part I considers buildings as 'cultural products,' drawing its examples from such varied contexts as informal settlements in Pune, medieval settlements and Renaissance Florence, to London in the 1700s and then modern-day New York. Part II considers 'rules and knowledge about building', examining how architects and builders have organized themselves institutionally over the centuries, how money flows in the building business, and how agreements, contracts and systems of regulation have come to shape unique building cultures. Part III considers the problem of craftsmanship in an age where craft is missing from the vocabulary of Big Development, arguing that it is perfectly reasonable (and, as he actually demonstrates, possible) to build houses of quality in quantity.

As a comment, specifically, on the politics of decision-making about the built environment, 'The Culture of Building' suggests that, instead of merely reductively dichotomizing architectural production (East versus West, colonizer versus colonized, digital technology versus so-called indigenous knowledge), it makes sense to look more critically at how people in the business of construction have dealt with one another, and then how their professional networks have drawn from, and in turn influenced, the larger societal cultures of which they are a part, with a view to promoting 'healthier' contemporary

building practices, more responsive to social needs and rapidly changing environments. This does not mean that Big Development is by definition a Bad Idea, but that "[i]t only means that the reality of the existing building culture, no matter how objectionable it may appear to be, must nevertheless be taken very seriously...as a system that includes, in and among its problems and dominant institutions, all the attempts at change and resistance — the cracks in the concrete pavement"; there are, the author says, "changes in the business world, with businesses becoming more client-and worker-centered and moving away from top-down management" which have to be considered by those who make a business out of building. As Davis colourfully puts it, there is still opportunity for "plain-speaking common sense instead of bureaucratic gobbledegook" — which should be a final, thought-provoking word for any young architect expecting to sign a public-private partnership contract, years from now.

Let me cut to the quick of my proposal, then, rather than dwelling on details and nuances. I vote that we make this book an urgent addition to architecture college libraries. Even as the Indian architectural academy responds grumpily to the juggernaut of bureaucratic educational policy, our schools and colleges in India have to produce architects mature enough to critically question aggressive 21st century trends in real-estate development, the suppositions and potential (ah, yes) behind the Jawaharlal Nehru National Urban Renewal Mission, and (oh, no) the 'Hafeez Contractorisation' of architectural patronage and function. Impressionable students must read this book if they want to think a bit more critically about the formation, practice, contracting and regulation of ideas in the world of building.

— by Azhar Tyabji

Events

HERITAGE AND THE ENVIROMENT 2007

Date: June 19 - June 22, 2007

Location: Scotland

Landscape and the environment are critical concepts and realities of contemporary culture and politics. To be better understood requires scrutiny of 'the past' incorporating multiple sources of evidence and deepening insights. What are these insights and how will they inform perceptions, decisions and actions of the present and the future? The conference aims to:

- Compare Gaelic concepts of heritage and the environment with other particular concepts;
- Locate the particular contexts of heritage and the environment within the universal;
- Encourage the community voice in the discussions; and
- Posit a way forward for future discussion and research.

This conference will examine the role of the environment and give fresh insights into the relationship of people and the environment. Interdisciplinary and multidisciplinary, and local and global conversations will occur across traditional subject areas and in a variety of contexts. Underlying these ideas will be the consideration of how Gaelic culture, both tangible and intangible, will add significantly to larger discourses of landscape and the environment. In a departure from conventional approaches we are keen to explore these issues from the widest possible perspective acknowledging both the particular and the universal.

Website: <http://www.smo.uhi.ac.uk/mce2007/index.php>

TRADITIONAL MEDITERRANEAN ARCHITECTURE: PRESENT AND FUTURE

Date: July 12, 2007 - July 15, 2007

Location: Barcelona

The fundamental aim of the Rehabimed project in the framework of the European Euromed Heritage programme is to promote the rehabilitation of traditional architecture in all Mediterranean countries. We consider this the way forward to sustainable development.

For more information on paper submission guidelines and for detailed conference information.

Website: <http://www.rehabimed.net/conferencia>

STUDIES ON HISTORICAL HERITAGE

Date: September 17, 2007 - September 21, 2007

The symposium aims to provide an international and multidisciplinary meeting for researchers and practitioners to present and discuss the past, present and future of historical art and architectural heritage and their environments. It will bring together historians, art historians, archaeologists, architects, engineers, scientists, building surveyors, urban planners, and other specialists to exchange their analytical, experimental, historical and constructional experiences and studies in preservation of historical heritage.

Symposium Topics:

- Historical Aspects, Architectural Aspects, Archaeological Aspects
- Information System - Documentation;
- Evaluation - Experimental Methods and Tests

- Structural Behavior – Static, Dynamic
- Numerical Analysis, Intervention, Restoration and Prevention Techniques, Preservation in Museum Exhibitions and Storage Areas
- Environmental Aspects, Planning the Future of Historic Urban Areas, Heritage Management, Case Studies.

Website: <http://www.shh07.yildiz.edu.tr/>

GREEN BUILDING CONGRESS

Date: September 19, 2007 - September 22, 2007

Location: Chennai

The objectives of the Green Building Congress 2007 are to create awareness, provide a platform for networking, promote business opportunities and facilitate market transformation of green products.

The achievements of the Green Building Congress 2006 include:

- Influenced several state Governments on policy issues;
- 25 ongoing green building projects with a total built-in area of 20 million sq.ft;
- Involvement of key stakeholders representing building industry;
- Introduction of new Green Building products in the country;
- Launch of LEED India - Green Building Rating System to suit Indian context;
- Focus Areas: Latest Architectural trends in Green Buildings International Experiences on Green Buildings;
- LEED Rating System, Green Building Materials;
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CALL FOR ARTICLES

The editors of the Vernacular Architecture Forum's scholarly refereed journal, *Buildings and Landscapes: Journal of the Vernacular Architecture Forum*, invite submissions of articles that explore the ways vernacular architecture constructs the everyday. Our subject matter includes all aspects of vernacular architecture and everyday urban and rural landscapes seen through interdisciplinary and multidisciplinary methods. We are particularly interested in articles that incorporate field work as a component of the research.

Buildings and Landscapes has recently changed from a bi-annual volume to an annual journal, and will become semi-annual in 2009. It is not necessary for articles to have been presented at VAF annual meetings. All scholars in the field are eligible to submit manuscripts.

Manuscripts should be prepared to conform to the Chicago Manual of Style. Contributors agree that manuscripts submitted to *Buildings and Landscapes* will not be submitted for publication elsewhere while under review by the journal. Two hard copies of the manuscript and photocopied reproductions of the illustrations should be sent directly to each of the two editors. Please feel free to direct any inquiries to either editor via email.

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CONTEXT: Built, Living and Natural records and evaluates documentation and conservation methods for built and natural heritage, relates people role in the process by recording community activities and involvement. The journal provides a specific platform for expression and exchange of ideas by architects, conservationists, environmentalists, NGOs, social scientists, historians, academicians, researchers and planners.

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Heritage Album

SUNDARBAN

The Sundarban forest of India and Bangladesh, the single largest mangrove cover in the world is located within the latitude 21 00 N-22 31 N and longitude between 88 10 E - 92 15 E at the estuarine phase of the Ganga-Brahmaputra river System in South Bengal. The Indian Sundarban is situated at the southern tip of the Gangetic West Bengal bordering the Bay of Bengal and consists of 104 islands with 56 islands of Mangroves under 15 forest blocks. The entire mangrove forest extends over an area of 4,262 sq. km, of which 2,320 sq. km is forest and the rest is water (Mukherjee, 1975). This area is called Sundarban owing to the dominance of the tree species *Heritiera fomes*, locally known as *Sundari* because of its elegance (Jain and Sastry, 1983).

Photo Credits:
AICTE R&D Project on Sundarban, Department of Architecture, Jadavpur University, Kolkata-32



Local construction workers



The unpolluted landscape of Manasa Dwip, Sagar Island

This region has acquired international status as the Sundarban Biosphere Reserve as well as a World Heritage Site (UNESCO & IUCN, 1989). It has also been declared a Ramsar Site in the year 2003.

The key characteristics of the Sundarban Biosphere Reserve are:

Botanical

It is the largest deltaic mangrove containing about 50 different mangroves and mangrove associated species, many of which are rare. It comprising of around 90% of the total mangrove species of Indian sub-continent.

Zoological

It contains a Tiger Reserve with the largest tiger population (2585 SQ.KM.)

It has 4 wild life sanctuaries -

- Sajnekhali wildlife sanctuary (362 SQ. Km.)
- Lothian island wildlife sanctuary (38 SQ. Km.)
- Haliday island wildlife sanctuary (5.95 SQ. Km.)
- Bhagabatpur crocodile park

Also, it is a habitat for nearly 90 percent of the aquatic species of the East Coast. Sundarban got its formal recognition in the year 1830 when Sir James Princep delineated its northern limit. At that time the Commissioner and the Surveyor of the Sundarban Commission were William Dampier and Lt. Hodges respectively. The Northern limit of Sundarbans was named the Dampier-Hodges Line after these two gentlemen.



Village women and involved in tiger prawn seed collection is one of the major ecological issues of the region



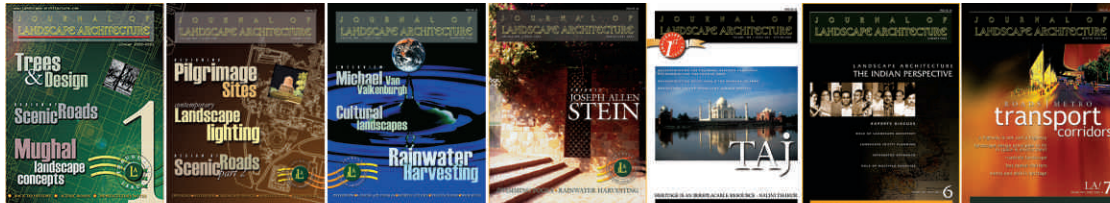
A Riparian economy



One of the many creeks that criss-cross the islands



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