



Volume II Issue 1 - Spring/Summer 2005

Journal of the Development and Research Organisation for Nature, Arts and Heritage

For the best Books on Indian Architecture...





...And books on Indian Art, Music,

Dance and Culture



SHUBHI PUBLICATIONS

Contact : **Sanjay Arya** 15, AKD Towers, Sector 14, Gurgaon-122 001, Haryana Phone - (0124) 5081199, 9811065451









Contents

Editorial 5
Compiling Records
Design Principles in the Elevation of a Haveli: Jorawarmalji's Haveli, Jaisalmer Himanish Das
<i>Mandu: The Royal Living of the Bygone Era</i> Tapas Kumar Bhattacharyya and Arunabha Chatterjee
Methods and Approaches
Contemporary Research on South Asian Architecture : Issues and Approaches Adam Hardy and all
Restoration of the Santhome Cathedral Ravi Gundu Rao & Associates
Design Interventions in the Urban Areas of Jharkhand : Urban Transformations Ajay Khare
Transport Policy & Management : Calculating Risks and Options Ravinder N. Batta
Proposed Action Plan for Conservation of Waterbodies in Delhi Manu Bhatnagar
Self Help Groups : A Successful Alternative for Poverty Alleviation Jyotika Khimta
Sustainable Solutions
Post Earthquake Rehabilitation Yatin Pandya
A Partnership Approach to Local Energy Management between European and Asian Cities
Peter Webber, Vasco Ferreira, Manuel Pardo, Don Lack, Luis Castanheira
Heritage Album
Gingee Fort Kamalahasan Ramaswamy75
Painted Houses of Hazaribagh Bulu Imam
Reviews
<i>The Case of the Intach Charter</i> Vishakha Kawathekar, Paromita De Sarkar and Gurmeet S. Rai
Events

Chief Editor Shikha Jain

Board of Editors Ajay Khare Cheena Kanwal Suchandra Bardhan

Editorial Advisors Adam Hardy, PRASADA, Welsh School of Architecture, Cardiff, UK

A.G.K. Menon TVB School of Habitat Studies, New Delhi

Madhuri Desai, University of California, Berkeley, USA

> Rima Hooja MSID India Program, University of Minnesota, USA

Shankar Ghose Charkha, Development Communication Network, New Delhi

Monideep Chattopadhyay Dept. of Architecture, Jadavpur University, Kolkata

Designing and Production

C. Sujatha and Birendra Prasad (011) 51831074, 9891299959

Copyright © 2004 Dronah, India

All rights reserved including the right to reproduce and contents of this publication in whole or in part without prior written permission of the publishers. Neither this book nor any part may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, microfilming and recording or by any information storage and retreival system, without permission in writing from the publisher.

> Printed and published by DRONAH A-258, South City - I, Gurgaon-122001 Tel: 0124 5082081, 0124 2381067 Email: dronah@rediffmail.com Website: http://www.dronah.org

ISBN:81-902313-1-6 Vol II Issue 1 Spring/Summer 2005

Editorial

The balance that holds our system together is certainly gravely in need of corrections. And it has to start with the interpretation in our minds of the environment around us and more importantly in recognising the place we have been assigned in this comprehensive order – the system. Fritz Schumacher said that science and engineering can only produce 'know how' – the 'technology' but it can not produce ideas by which to sustain life. So we turn to art, a very human subject.

CONTEXT is an idea and in this issue, we follow on in bringing to you the problems, issues and some solutions that relate to us. The documentation section presents impressive renderings of a *haveli* in Jaisalmer and evolution of design and built form at Mandu.

The feature articles are an interesting mélange for individual preference starting with doctoral research approaches for studying south Asian art and architecture at PRASADA and moving on to the technical aspects of building conservation in Santhome Cathedral. The following articles have a special focus on sustainable urban planning highlighting the difficulties and breakdown of metropolitan life and interventions required in physical and transport planning presented informatively by Ajay Khare and Ravinder Batta. The article by Jyotika Khimta provides a glimpse of community initiatives with its first hand experience in assisting economic liberation of women in rural India.

'Sustainable Solutions' documents two case studies – one in post earthquake rehabilitation at home and another in energy management partnership across borders.

Heritage Album showcases the grandeur of the remains of Gingee Fort captured by architect Kamalahasan through his camera and the magnificence of numerous unnamed artists who carry on the tradition of painted houses of Hazaribagh.

Hoping you enjoy it all!

Cheena Kanwal From the Board of Editors

Compiling Records

Design Principles in the Elevation of a Haveli: Jorawarmalji's Haveli, Jaisalmer

> HIMANISH DAS pg.7 The author is a Doctoral student at PRASADA, UK.

2 Mandu: The Royal Living of the Bygone Era

TAPAS KUMAR BHATTACHARYYA AND ARUNABHA CHATTERJEE pg.11 Tapas Kumar Bhattacharyya is Reader & former HOD, Department of Architecture, Jadavpur University and Arunabha Chatterjee, Student of M.Arch.



In the western part of Rajasthan lies the desert city of Jaisalmer, which owed its prosperity to its location on the trade route from the Doab valley to Sind and Afghanistan. Jaisalmer is famous for its fort and its many *havelis* (courtyard houses) built in ochre-coloured sandstone showing intricate building crafts of the region. The eithteenth and nineteenth centuries can be considered the 'golden age' in the development of architectural tradition of Jaisalmer. Peace and prosperity during this period allowed wealthy merchants to build *havelis* of unprecedented scale and grandeur, rivaling even royal palaces and other buildings.

Three distinct architectural schools, or *shaili*, have emerged in Jaisalmer since late medieval times. The *Sompuriya shaili* (the Sompuras are traditional temple builders) has its roots in the medieval architecture known from surviving temples, the *Mughlai shaili* is influenced by the imperial *Mughal* style, while the *Angrezi* (English) *shaili* brought an influx of western Classicism. Broadly speaking the schools correspond to three phases, but there were moments when the different schools worked alongside one another, and sometimes the three architectural languages were deliberately mixed together in a single building. The huge, four-storey front elevation of Jorawarmalji's haveli is a superb composition of windows, *jharokhas* and panelled wall surfaces, extensively sheathed in decorative carving, interwoven with plain surfaces that provide a foil. The first floor is the most elaborate, the decorative treatment becoming progressively bolder and simpler towards the top of the building, where ornament is less perceptible from the street. Monotony, in such a large and symmetrical façade with its structural pillars all in a single plane, is avoided through variation in width among the seven bays, and also with ingenious modulation of projections. The overall massing may be interpreted as a giant 'T', comprising three floors, projected from the surface of the façade, supported on brackets. This rests on a porous diwankhana (verandah-like space) on the ground floor, its five central bays treated so as to accentuate the 'T' above, with a porous basement floor below. The central bay on the first, second and third floor, steps out progressively from the surface of the 'T', right up to the level of the parapet. This bold composition is enriched by the diversity of *jharokha* forms.

In the 'kit of parts' that makes up the architectural vocabulary, a basic unit is the aedicule, as Adam Hardy has shown in relation to Indian temple architecture.¹ An aedicule is a miniature representation of a building, and the design skill in this tradition lies partly in inventive variations on the various types of aedicule, and partly in the way that a palette of different types is arranged. In these havelis, windows and jharokhas (balcony-pavilions) are treated as aedicules, along with wall-panels and niches. Elements such as pillars, brackets (including cusped arch brackets) and chajjas (stone canopies or awnings providing shade) are the constituents of the aedicule.





Front elevation of one of Jorawarmalji's *haveli*, the fifth *haveli* in the northern row of the *Patuon ki Haveli* group. This belongs to the first half of the nineteenth century, and its style is decidedly *Mughlai*.

Characteristic of the mature Mughlai shaili are the panelled external wall surfaces, integrated with the structural layout, although this is not practically necessary as the outer planes are detached from the load-bearing pillars and beams. Each bay is divided into three vertical panels, the central panel wider than the side ones and the position of the pillars is also marked by panels, generating a distinctive horizontal rhythm across the breadth of the façade. It is the central panels that are treated most emphatically as aedicules, whether windows or *jharokhas*. Horizontal bands such as string courses and chajja canopies (some corresponding to floors or ceilings) run across the verticals, creating swathes of shadow and a framework providing an opportunity for further enrichment through a great variety of tracery patterns, some blind and others open jalis.

Through these means the craftsmen gave this building a public face of great beauty and complexity. One of the many surprises that it holds in store for the spectator on the street is found in the five central bays of the second floor, which correspond to a *chandni* (open terrace) immediately behind the façade. Looking up at the façade one can see patches of sky, deftly framed by the window and *jharokha* openings that add an element of sheer surprise! ¶



Notes and References ¹ Adam Hardy, 1995, Indian Temple Architecture, Form and Transformation, IGNCA, New Delhi "What words of mine can describe the beauty of the grass and the wildflowers? They clothe each hill and dale, each slope and plain. I know of no place so pleasant in climate and so pretty in scenery as Mandu in the rainy season..! What I have noticed is but a small part of the many beauties of Mandu!" — Jehangir The Mughal

–Jehangir, The Mughal Emperor



Introduction

Situated in the Central Indian state of Madhya Pradesh, Shadiabad or the present Mandu was an important city of the ancient and particularly the medieval India. Consequent to its location as well as topographical advantages, the city of Mandu flourished. Being situated on an isolated and inaccessible spur of the eastern edge of the Malwa plateau, it was an excellent natural fortification. Besides its strategic significance, it was rated to be a place of preference by the conquerors for its natural beauty and delightful mild climate.

Mandu experienced a conglomeration of different cultures, religions and especially dynastic ambitions, power and pleasure contributed by the invading emperors over the centuries, forming a complex but unique characteristic of its own. Gradually, Mandu became a symbol of abode of princely romance. Some of the palaces were constructed over the hilltops; some in the midst of water bodies or on the waterfront and some in the middle of grand gardens signifying the very fascination of the patrons for lush landscaping. The scale and elegance of the palaces manifested a passion of the Royal Emperors of Mandu for majesty, pomp and gaiety. The extravagant lifestyle is possibly best portrayed in the buildings of the Royal Enclave, lyrically set in a magnificent environment of the plateau.



Plan of Dilwar Khan's Maqbara

Dilawar Khan's Maqbara - The tomb of Dilawar Khan [died AD 1405] is the earliest example of Islamic Pathan architecture in Mandu. This architectural style clearly indicates that originally it was a temple. This fact can be supported by the decoration with a large number of bracketed pillars and a flat roof without any dome. Possibly under the Muslim rule, it was converted into a mosque. Dilawar Khan Ghauri was buried here after his death and so it was converted into a tomb that became to be known as Dilawar Khan's Maqbara.

History

The Hindu city Dhar, a place about 24 miles north of Mandu was the capital of Malwa, a part of today's Madhya Pradesh. Muslim conquest in the area began in 1305 AD when the area was brought into the Delhi Sultanate and was ruled by a governor installed under Ala-ud-din Khilji. As with many other Muslim conquests, among the first state buildings to come up were mosques, built with pillars taken from Hindu temples, very similar to the Qu'wwat-ul-Islam mosque at the Qutub, Delhi.

The sack of the city of Delhi by Timur and the consequent decline of power of the Sultanate at Delhi prompted Dilawar Khan, the then Ghauri Governor of Mandu to declare his independence and proclaimed himself as the Shah in 1401 AD. He renamed it Shadiabad - the City of Joy. It was left to his son, Hoshang Shah, to shift the capital from Dhar to the plateau of Mandu. Bounded on three sides by a rift valley, and overlooking the Narmada to the south from a height of 300 metres, the fortress of Mandu was virtually invincible. Mandu was annexed by the Mughal Emperor Akbar in 1569 A.D.

The greatest Mughal emperor Akbar had many of the battlements and gates smashed in 1564 AD



Natyagriha - It is a majestic space where big conventions were held or musical and cultural programs were performed. There were two green rooms on the two sides of the stage. There is a passageway connecting this Natyagriha with the Royal Residence. This was the way through which the royal ladies could enter the Natyagriha. There were separate sitting arrangements for the royal members and the general people. The general people used to sit in a common area surrounded by lofty arched walls in front of the stage. There was a main entry for the outsiders. There were beautiful columns in front of the stage which could be traced out from the ruins.

during the first of his four visits, when he came here to subjugate a rebellious governor. This marked the end of the independent *Pathan* sultans of Malwa, who had known Mandu as Shadiabad. Akbar got a verse inscribed that translated thus:

Lo, the owl hath built her nest In Shirwan Shah's high storey Warning nightly by her cry 'Where now thy pomp and glory?

Even Akbar could not resist the temptation to put his name down on the magnificent structures built by former Afghan rulers. The Ashrafi Mahal, once a thriving madarasa as well as the tomb of three Khilji sultans of Malwa, bears a stone engraving in which Akbar reminded the onlooker that he, too, got repairs done here. But it was Jehangir who paid the richest tributes to Mandu. Earlier, a battle-weary Humayun had fallen victim to the beauty of Mandu-in-the-rain. The Akbarnama notes that he developed an opium habit during his stay here, a possible reason for his subsequent downfall. During Mughal rule, Mandu continued to be a pleasure resort, its lakes and palaces the scenes of splendid and extravagant festivities. And the glory of Mandu lives on, in its palaces and mosques, in legends and songs chronicled for posterity.

Monuments of Mandu

The monuments of Mandu can be broadly divided into several categories of which the Royal Enclave, primarily consisting of a number of palaces and functional spaces for allied activities, is one of the prominent groups of buildings. The others may be classified as - the village, or the central group consisting of Jami Masjid, a huge mosque with adequate space for a big crowd for prayer and provision for accommodation of the priests; Ashrafi Mahal - a centre for Islamic education and residential accommodation for students; Hoshang Shah's Tomb - the first marble edifice in the country which was an inspiration to the architects of Taj Mahal who came to see it under instruction of Shah Jahan and, the Rewa Kund group -the magnificent buildings in this complex are threaded with a nostalgic emotional garland of love stories of the poet prince Baz Bahadur and Rani Roopmati.

Each of these groups can claim its excellence in architectural monumentality, style and decoration. The design of most of the buildings, however, lacks Jahaz Mahal - This is the most prominent and less damaged building of the Royal Complex. It is believed to have been built by the Sultan Ghiyas-ud-din Khilji for his large harem. The Jahaz Mahal is a 120 metre(400 foot) long 'ship palace' built between two artificial lakes, Munj Talao (tank) and Kapur Talao. This is an elegant two-storied building. With its open pavilions, balconies overhanging the water and open terrace, the Jahaz Mahal is an imaginative



Jahaz Mahal

recreation in stone of a royal pleasure craft. The building accommodated hundreds of queens in the harem. The pavilions on the rooftop acted as shelters against rains and facilitated ceremonial occasions of pleasure. The rooftop itself was utilized as a collector of rain in a very scientific way. The harvested water after getting collected on the roof travelled through meandering pathways and channels to various fountains depicting floral patterns on the roofs at lower terraces.



Hindola Mahal -Another grand structure within the Royal Enclave, Hindola Mahal was an audience hall, also belonging to Ghiyas-uddin's era, and derived its name of a 'swinging palace' possibly from its sloping sidewalls. The sloping buttresses also added significantly to the structural stability of the building. Superb and innovative techniques are also evident in its ornamental facade, delicate framework in sandstone and beautifully molded columns. This vast longitudinal room with enormous arches punctuating its length is uncharacteristically massive, with strongly buttressed walls adding to its pompousness.

in purity of style since the buildings or their components reflect architectural styles from the ruling dynasties of varied origins.

Royal Enclave - The Royal Enclave is the most preserved, complete and romantic set of buildings at Mandu. The setting of almost all buildings and structures of the complex portrays a strong sense of planning. Judicious location of axes, nodes, edges and vistas excellently attribute to the complex fervour of beauty and a sense of joy. The presence of a couple of large lakes has been very dramatically harnessed in the overall landscaping plan of the complex. The contours of the land have also been potentially utilized in the design and development of the buildings in the complex. Most of the buildings in the complex are more than one storey high. The multiple levels of these buildings are arranged in an appreciable way so as to create a sense of togetherness and romance. The balanced distribution of flanking water bodies, green landscaping and grand plazas ensures a coziness of ambience and royal grandeur.

The various building elements in each building possess thoughtful and intricate ornamentation. The pillars, lintels, doors and openings in most of the buildings bear this decorative ornamentation. Access to water bodies from multiple levels, interconnecting water channels, rain water harvesting from roofs and terraces of buildings, Turkish bath, the steam bath, the ornamental and meandering routing of water channels, the floral designs of fountains and vast lakes for idle boating reflect a strong passion of the



Hamam (Turkish bath) -The floor of the Turkish bath had small holes by which the Sultan and his queens could enjoy steamed sauna baths. The double water channels along the perimeter carried hot and cold water alternately. The opening in the channels could be plugged and unplugged to store water at any desired temperature in small tubs along the walls. The roof of the Hamam was constructed in stone masonry with punctures resembling the moon and the stars. Light, in a mystified way could enter the bath and a dramatic environment of light and shade could be experienced through such projections on walls and floors. Sufficient illumination from the sun and the moon was also ensured during bathing for such dramatic ornamentation. This vividly signified the bathing luxury of the elites.



rulers for water as a design element. The well thought planning of the interior spaces for accommodating various functional facilities also reflect a good sense of design and the opulence in lifestyle of the sultans and shahs who created it.

Royal Residence - While Jahaz Mahal stands timeless in its grandeur and beauty boastfully dominating the north - south axis of the Royal Complex, the Royal Residence located somewhat at the middle of the complex can be referred to as a significant part of the Royal Complex. Located on the northern side of the Munj Talao the Royal Residence extends to the east up to Champa Baoli, to the north up to the royal theatre and hamam (hot bath). It is connected to all these buildings by passages, arched gateways, long arcades and steps of various widths at different levels. ¶



Notes and References

Brown, Percy.,1981.*Indian Architecture*, D.B. Taraporevala Sons & Co Pvt. Ltd.,

Havell, E.B. 1978, Indian Architecture, S. Chand & Co Pvt. Ltd.,.

Grover, Satish, 1981. *The Architecture of India, Islamic (727-1707A.D)*, Vikash Publishing House Pvt. Ltd..

Albanese, Marilia 1999. Architecture in India, Om Book Services. Indian Society of Engineering Geology, 1992, Indian Monuments Through

the Ages, Oxford & IBH Publishing Co. Pvt. Ltd.,

Tour Reports prepared and submitted under the guidance of the present author by the students of the Department of Architecture on Mandu during their Educational Tour in 2004. Methods & Approaches

Contemporary Research on South Asian Architecture: Issues and Approaches

ADAM HARDY AND ALL

abstract

The aim of PRASADA is to integrate academic research with creative practice in the arts and architecture of the Indian subcontinent, through research projects and publications, design consultancy work, teaching and postgraduate research programmes. The text that follows is intended to give a flavour of doctoral research currently in progress, and the introduction puts across the issues and approaches that have emerged in this research and in earlier completed doctorates at PRASADA.

Introduction

Basic ingredients for a PhD are either new material or a new approach. To find new material among the oldest monuments is relatively difficult (for architects, if not for archaeologists), as these have been the objects of academic interest since the nineteenth century. British scholars at that time tended to see Indian art as a story of progressive decline and decadence after the fifth-century Gupta era. However, other periods thought worthy of study have crept in later through the course of the twentieth century. Non-Islamic buildings from the fifteenth century onwards, which the British had labeled the 'Islamic period', were largely ignored until the last twenty years. Folk and contemporary popular traditions, both of which are fertile in South Asia, have fallen more

Adam Hardy is teaching at Welsh School of Architecture, at Cardiff University Wales, UK. He is the founder of PRASADA (Practice Research and Adavancement in South Asian Design and Architecture). PRASADA is currently being established at the Welsh School of Architecture. PRASADA's earlier years were at De Montfort University, Leicester, where it was set up in 1996, and it is privileged to be one of the research groups of the British Academy's Society for South Asian Studies



recently under the academic searchlight, along with a burgeoning interest in the historiography of the field – the study of other researcher's findings, and the tracing of colonialist and postcolonial discourses. Yet, to find new material in South Asia is easier than in Europe, as the whole region is still rich in beautiful historic buildings and environments that have never been documented or studied. This is true even of the earlier material, as Ajay Khare has shown in his study of scarcely known temples of the tenth and eleventh centuries in West Bengal.¹

To find a new approach is not difficult, for architects at least,- for the simple reason that South Asian architecture has been studied by archaeologists, indologists and art historians, but relatively little from an architectural point of view. I would not pretend that there is only one architectural approach, but in the research work done at PRASADA the staring point has been to search for the design principles underlying a form of architecture, deduced primarily from the evidence of the buildings themselves. This amounts to finding an appropriate way of seeing the architecture in question. Drawings play an important part in such an analysis, not merely for descriptive purposes, but for conveying conceptual and interpretive ideas. They can also be the actual means of discovery of formal properties. Such a 'design approach' to architectural history,

Shyam Raya temple, Bishnupur, Bankura

founded on clear visualisation of formal and spatial patterns, can also be the basis for understanding the transformations of architectural ideas through the course of a tradition.

'Form' is a slightly shocking word, not least to architects (who feel less guilty about 'space'), and if you analyse *form* you are liable to be accused of *formalism*. But meaningful connections can be traced between architecture and other manifestations of society and culture only by starting from a thorough understanding of the actual medium of architecture: otherwise the broader picture will never be more than *'background'*. It is also through understanding of formal principles (not, of course, in isolation from materials and construction) that we can begin to reconstruct and relive the process of creation that brought a particular architecture into being.

If the design principles of an architectural tradition can be deduced, then they can also be learned and used, and lead to an architecture that draws from tradition in more profound ways than past revivals and historicisms. Underlying principles could be used independently of traditional forms, but since it is from the forms that they can be deduced it seems necessary to study the forms themseleves. However, knowing the forms and knowing the principles for putting them together can still lead to mechanical and lifeless art, unless there can be life and creativity in the process of making, wherein the spirit lies as much as in the conception.

In terms of subject matter, the PRASADA doctoral research has fallen largely into the categories of religious and domestic architecture.²

Janhwij Sharma's research on monasteries in Ladakh is of the former category, and attempts through representative examples to understand a whole tradition and a whole cultural landscape. Temple architecture has been the mainstay of PRASADA's research projects and architectural commissions, which have provided creative and intellectual stimulus.

PRASADA's work on traditional domestic architecture, a field with vast unstudied areas in South Asia, began in 1997 with a study of village architecture in Orissa.³ It is now finding creative application in a study for Ashram Housing Association, Birmingham, involving community consultation to propose ways of housing design appropriate to Asian communities settled in Britain. The works of Rupa Raje Gupta and Himanish Das focus on different aspects of traditional courtyard houses, one aiming to grasp the whole of a regional tradition, with its local variations and developments through time, the other grappling with design principles and the creation of an architectural whole.

Sumesh Modi discusses domestic architecture in relation to the city planning of Champaner. His research is exploring the whole system of water harvesting that was developed in that city and its surroundings, where previous studies of water architecture have concentrated mainly on single structures. Modi's work shares the theme of water with Ratish Nanda's, and both are concerned with Indo-Islamic architecture⁴ (in which PRASADA's claim to fame has been the design of neo-Mughal street furniture for Birmingham's 'Balti zone').

Nanda's research is showing that even a famous building like Humayun's Tomb in Delhi leaves scope for research, not so much in terms of formal composition as through a conservation architect's analysis of the alterations to its fabric over the years. Nanda and Modi, like Sharma, are trained in architectural conservation, a concern that further links their three articles. Modi argues elsewhere that the sophisticated water systems of fifteenth-century Gujarat are unmatched, and to understand them can have practical benefits today; rather as Das implies in his work, that traditional design processes and craft skills are relevant not purely for conservation purposes, but for a culturally-rooted contemporary architecture.

It should be clear that the theme of *The Whole* is common to all the studies glimpsed at here. Conventional advice to PhD students, apart from exhorting them to find new material or a new approach, has urged them to limit their scope and focus. "Don't try to do too much or you'll end up getting lost and saying nothing new" is common sense and the safest advice to follow. The riskier but potentially more rewarding search for the whole picture has been the path that PRASADA has tended to take. There are, of course, many different notions of what constitutes the whole picture, leading ultimately to the Universe; but even within the confines of architectural history there are countless wholes that researchers often ignore. Often one fails to understand an architectural tradition because the focus is on a single time or place or architect. And if one does not see a whole, how could they design a whole?

Following excerpts from the current doctoral works at PRASADA present the wide variety of issues and approaches for research.

Documentation of the Buddhist Monasteries of Ladakh - Janhwij Sharma

Sandwiched between the Karakoram and the Great Himalayan ranges, the region of Ladakh (comprising the eastern part of the Indian state of Jammu and Kashmir) is a narrow valley running west to east, with the river Indus flowing along its entire length before going north-west into Pakistan. The region is considered a high altitude cold desert with phenomenal temperature variations. This factor, together with low precipitation and a unique geology and terrain, ensures that Ladakh has an extremely low population density of two persons to a square kilometre.

Ladakh has been a cradle for Buddhism, which has flourished there for more than a millennium. Two 'Advancements', in the 6th and the 9th centuries AD, brought Buddhism to the region, as a result of cultural and political developments in neighbouring parts of Kashmir and western Tibet. The second advancement firmly established Buddhism not only as a religion but also as a way of life, still practised today. Buddhism thrived in Ladakh, and despite attempts by a few powerful invaders from the neighbouring kingdoms, the religion continued to flourish, protected largely by the difficult and relatively inaccessible terrain.

The earliest examples of Buddhist art and architecture surviving in Ladakh are of the late-tenth and earlyeleventh centuries, and are ascribed to Lhotsava Rhin-Chen-bZang-Po (AD 958-1046), a prolific teacher and translator of the sacred Buddhist texts from Sanskrit to Tibetan. The early Buddhist monasteries of Ladakh were built mostly on the flat land, adhering to the Indian mandala system of planning, and embellished by a blend of Kashmiri and Tibetan art. Later, with political instability and a number of invasions, the architectural form of the monasteries changed to a new type almost like a fortress. Generally built on hills, such monasteries were tiered in form, the lower tier consisting largely of the residences of lamas, while the upper tier had a concentration of religious structures. From the sixteenth century onwards, another type of monastery emerged, composite in nature. These monasteries were usually located on sites similar to those of the early monasteries, but the later ones were much bigger complexes, combined in a single large structure, generally between three and five storey high.

The first comprehensive listing of the architectural heritage of Ladakh was published in 2003 by INTACH (Indian National Trust for Art and Cultural Heritage). This listing was built on work done by the architect Romi Khosla⁵. Among the structures catalogued were forty-five prominent Buddhist monasteries of various types, in different parts of the region, their current condition being recorded, and each allocated a grading according to their importance.

Previous publications on the art of Ladakh – wall paintings, stucco images, *thankga* scroll paintings, and the Buddhist iconography portrayed in all of these – are numerous in comparison with studies of the architecture, of which the only significant one is Khosla's.⁵ Khosla has classified the monasteries on the basis of periods, 'early' (10th-13th centuries) and 'late' (14th century onwards). Part of my research is an attempt to develop ways of classifying these monuments that take account of aspects such as siting, planning, architectural forms, and materials and construction techniques.

Buddhist monasteries are an ubiquitous part of Ladakh's culture, their presence underpinning the way of life of the community. The Buddhist way of life is attested to not only through the presence of these monasteries, but also through other structure types found throughout the landscape of Ladakh. These are, for instance, chortens (votive stupa-like structures), mane walls (long walls containing stones carved with religious inscriptions and images), mantrachakras (prayer wheels with mantras inside them) and *lhatos* (commemorative structures made of prayer flags, stones or horns). All of these occupy strategic locations at the edge of settlements, on hilltops or along mountain passes echoing the intrinsic importance of Buddhism in day to day life. Chortens and mane walls mark the entrance to a village. Mantrachakras are built at important street intersections, and smaller versions embedded in walls along the streets. Often, house entrances are marked with riksum gombo (deities or chortens placed above the doorways) to keep evil spirits at bay, and parapets are lined with prayer flags. All these religious objects manifest the identity of the Buddhist community living in these areas. The landscape of Ladakh needs therefore to be understood as a Buddhist landscape.

The Menavali *wada* at Wai: a courtyard house in Maharashtra -Rupa Raje Gupta

As in other parts of the world with a hot climate, the traditional form for urban dwellings in many regions of India is the courtyard house. In north-western India the form is known as the *haveli*, whereas in Maharashtra, the region corresponding to the upper



Phadnis wada, built:1768, Menawali, Taluka: wai, dist.satara wall painting in Rajputana style in the personal quarters of nan Phadnis



Phadnis wada, built:1768, Menawali, Taluka: wai, dist.satara entrance to the wada

Deccan plateau and the coastal Konkan – the Marathispeaking state that includes Mumbai (Bombay) – this traditional house form is known as the *wada*. Many *wadas* survive from the period 1600 -1850 AD, when the house form dominated the urban fabric of the region, perfectly reflecting the culture and way of life of its inhabitants, and accommodating their traditional joint family structure. The research is aiming to arrive at a systematic overview of the architecture of the *wadas*, identifying and explaining the regional variations.

Wadas are closely associated with the Marathas, the Hindu rulers who wrested power from the previous Muslim sultanates in 1646, when Shivaji captured the fort of Purandhar near Pune. From this time the *wada* form received royal patronage and took on a fort-like character. During the eighteenth century the Peshwas, a line of Brahmin prime ministers, became in effect the actual rulers, and consolidated Marahtha power over much of northern India. The defensive function of *wadas* became less pressing, and more fanciful and ornamental forms became possible.

It was one of the Peshwas, Nana Phadnavis, who in 1768 built as his residence the Menavli *wada*, illustrated here, in the town of Wai. The *wada* is still

inhabited by the Phadnavis family, after five generations. Wai means 'wedge', and was so named because it formed a wedge between Desh and Konkan regions of Maharashtra. The town lies on the Narmada, one of the sacred rivers of India, and the Menavli *wada* is built on its banks, not as an independent structure, but forming a complex with a group of temples, all linked to the water below by a series of stepped *ghats* (embankments).

The residence is entered through a scaled-down version of the kind of doorway that had been used in the earlier fort *wadas*. The building is well preserved and even contains some intact wall paintings similar in style to those found in Rajasthan.

Though not an especially imposing structure, the *wada* has no fewer than six courtyards. Courtyards provide light and ventilation, and moderate extremes of temperature. These are also the hub of family life, and the focus of ritual and celebration, especially during weddings and festivals such as Holi and Diwali. Two of the six courtyards here contain receptacles for the sacred *tulsi* (basil) plant used for daily worship in the domestic shrine. Being open to the sky the courtyards need to be drained, and the drainage system here is remarkable, having open

joints in the stone paving that allow water to run into drains that discharge along the *ghats*.

Opening onto the courtyards are covered terraces, used especially during summer evenings and winter afternoons. The enclosed rooms overlooking the courtyards are equally well ventilated, by means of full-height windows. These have low balustrades, so that people can look out when sitting on the floor. Neither the courtyards nor the rooms and spaces around them were intended for fixed functions, but were adaptable to various uses at different times of day.

Most of the walls, including the main facades, are of brick, with sloping, clay tile roofs. Wood is used for the floors and the roof structure, for the doors, windows and shutters. Also of wood, and supporting open halls on the first floor, are fluted columns with cusped arches (in this particular form known as 'Peshwai' arches after the period in which they were popular). The rear wall, however, is in dressed stone, with alcoves where oil lamps were lit at night. It rises from the stone *ghats* on a tall stepped plinth. Ranged along the banks of the Narmada are the stone temples, with their finely carved spires. Viewed from the river the whole group merges amidst lush greenery against the western sky.

Aquatic Architecture and Urban Morphology at Champaner-Pavagadh - Sumesh Modi

An impressive water management system was developed in Champaner-Pavagadh, the late-medieval capital of greater Gujarat. This included water catchments at the regional level, distribution of water to settlements, a system of ground replenishment within the settlements at the local level, and a means of procuring water from wells and tanks at the domestic level. The history of the hydraulic system of Champaner-Pavagadh began with the Khichi Chauhan dynasty, a line of Rajputs who came to power in 1297. Champaner-Pavagadh remained their capital until 1484 when Sultan Mahmud Begarha captured it and made it the capital of his kingdom of Greater Gujarat.

The sultan adopted the already established hydraulic system and developed it to suit the needs and extravagance of his empire. In its heyday the system sustained as many as 50,000 people. This water harvesting system became so efficient during the sultanate times that, apart from its consumption in day to day chores, excess water was available for





Zar-e-Zamin

recreational activities, and also used lavishly in individual houses of the nobility to keep the interiors cool and pleasant. Typical of the sultanate city planning and landscaping principles are the late-



A Pleasure Pavilions

fifteenth century residences and pleasure pavilions, briefly illustrated above.

Zar-e-Zamin, is an underground pleasure pavilion where interesting manifestation of a water retreat can be seen. Suction wells connected to airshafts drew in and expelled air through ventilation holes in the external walls. The air was passed over water channels, reducing its temperature to make the pavilion cool enough for the Sultan and his courtiers. Such structures placed within the royal gardens encouraged social interactions among the royalty, nobility and citizenry.

Water structures were significant morphological elements of Gujarati sultanate cities and their gardens. These structures testify to a highly evolved urbane culture. The concept of water structures knitting together the urban fabric at various levels of a hierarchy was lost in later Islamic cities of India, such as those of the Mughals, even though water structures continued to remain important elements in gardens and landscapes.

Humayun's Tomb: Restoring the Emperor's Gardens - Ratish Nanda

The Mughal emperors' greatest contributions to landscape were the formal gardens laid out across the Indian subcontinent. In this, they followed a tradition initiated by their ancestor Timur (Tamerlane). Babur, who became the first Mughal emperor in 1562, built many gardens, where he planned his military campaigns, held public audiences, wrote his memoirs, composed poetry, entertained and revelled. Nasir ud din Muhammad Humayun (1508-1556), the second of the Great Mughal emperors, known as a sensitive, kind and intelligent man, was deeply interested in astrology. The emperor's garden-tomb in Delhi is the first of the grand dynastic mausoleums that presaged the flowering of Mughal architecture in India, and set a direct precedent for the even more famous Taj Mahal at Agra.

Housing over a hundred Mughal family graves, the tomb was built in the 1560's under the supervision of a Persian 'architect', Mirak Mirza Ghiyas, by the emperor's grieving widow, and with the patronage of Akbar, his son and successor. Standing on the banks of the Yamuna, adjacent to what is now the capital New Delhi, the tomb complex occupies thirty acres of land. The tomb lies at the centre with six metre high, arcaded walls enclosing it on three sides. It is entered through majestic gateways on the west and the south. The whole scheme is laid out as the classical Char-Bagh (literally 'Four- fold Gardens'), divided into quarters by wide pathways, each quadrant further subdivided by minor paths into eight plots. Along the middle of each path runs a water-channel, and pools rectangular, octagonal or foliated - emphasize the intersections. A large pool interrupts each of the four main paths midway with a fountain at its centre. A tomb-garden of this kind represented the ancient ideal of the paradise garden. The large square enclosure, divided with geometric precision, symbolised the ordered universe; in the centre, the tomb itself rose above the four rivers of the Koranic paradise, represented by water-channels made to flow out from beneath the tomb.

While recommending World Heritage status to the mausoleum in 1992, the International Council on Monuments and Sites (ICOMOS) expert report noted the state of neglect of the gardens and recommended urgent attention. The project became the first largescale garden restoration project in India, as well as the first privately funded project at a nationally protected monument, encompassing a variety of disciplines including archaeological excavation, conservation science, landscape design and hydraulic engineering.

Conservation works, commenced in 2001, were preceded by two years of excavations and archival research, which included the assembly of a continuous record of photographs taken from 1849 onwards. This research brought to light many inappropriate changes that had been made since that



Humayun's Tomb

time. For example, in 1860 (three years after the 'Mutiny', and the arrest of the last Mughal king, who had hidden at Humayun's Tomb), the landscape was made more British in style, with roundabouts for carriages! Much of what seemed until recently to belong to the original design proved to have been the result of the Viceroy Lord Curzon's early-twentieth century reinstatement of a Mughal layout. In 1916, a planting scheme emphasised the axis with unsuitable trees such as palms. After independence and partition the garden became a refugee camp for five years. More inept tree-planting schemes followed, and various unsuccessful attempts were made to flow water again.

Restoration of water flow in the channels and pools was a major component of the recent project. A

comprehensive rainwater harvesting system was reinstated: historic wells were de-silted, and 128 ground water recharge pits were introduced. Excavations revealed that water was originally lifted from wells and drained into the river. Many later alterations to the slope of the channels led to inconsistent direction of flow. Much of the masonry bedding had been replaced by concrete. Major repairs were required for water to flow once again in the 2200 metres of channels: partial dismantling of the channels, provision of a lime concrete base and wall surface of brick tiles in lime mortar, and application of a layer of traditional fruit extracts and gur (molasses). The latter served as a waterproofing, covered by a further layer of lime-compatible waterproofing, a layer of lime plaster, and a final layer of almost pure lime. Not all parts of the system were restored for flowing water, in keeping with a conservation philosophy based on minimum intervention and with the basic need for water circulation.

The project culminated with flowing water restored to the garden and fountains springing to life after more than four centuries. With the newly planted lemon, pomegranate, hibiscus, motia and mogra already in bloom, the birds chirping; Emperor Humayun's mausoleum once again stands amidst a paradise.¶

Notes and References

¹ Ajay Khare, *Temple Architecture of Bengal*, 9th-16th centuries, PhD thesis, De Montfort Univesity, 2004. Also Temple Architecture of Eastern India (2005, Shubhi Publications, Gurgaon)

² Ashutosh Sohoni, Temple architecture of the Marathas in Maharashtra, PhD thesis 1998; Meera Dass, Udayagiri, a Sacred Hill: its Architecture, Sculpture and Landscape, PhD thesis 2001; Deepanjana Danda, Maharashtra

and the Cross-Fertilisation of Style of Brahmanical Cave Temples in India, PhD thesis 2002, all De Montfort University; Ajay Khare (see note 1). See also Meera Dass and Michael Willis, 2003, "The Lion Capital from Udayagiri and the Antiquity of Sun Worship in Central India", South Asian Studies, 18, 25-46. ³ Adam Hardy, 1999, 'Birabalabahdrapur: a Brahmin Village in Orissa', South Asian Studies 14, 67-84. Completed doctorate: Shikha Jain, The Havelis of Rajasthan: Form

and Identity, PhD thesis, De Montfort University, 2002; see also her Havelis: A Living Tradition of Rajasthan (2004, Shubhi Publications, Gurgaon). ⁴ Cf. also Jyoti Sharma, Urban Transformations through colonial intervention -A case study of Shahjahanabad / Old Delhi, PhD thesis, De Montfort University, 2005. ⁵ Khosla, Romi 1979: "Buddhist Monasteries of the Western Himalaya", Ratna Pustak Bhandar, Kathmandu, Nepal

Restoration of the Santhome Cathedral

RAVI GUNDU RAO & ASSOCIATES

Abstract

The history of Santhome and Mylapore is well known and is a part of the great past of the sub-continent. The existence of Mylapore and Santhome was recorded by Ptolemy's maps of 140 AD, 'Tevaram hymns' of 7th century AD by poet 'Thirugnana Sambhandar' written at 'Mayilai', as well as the visiting foreign travellers of the past. Although earliest records start from 2nd century AD, archaeological findings suggest that Mylapore was a very historical site and a well-populated settlement. There is evidence of a major 2nd century Jain settlement in this area as seen in excavated statues of Jain Tirthankars (monks). This gives a glimpse of the rich history of the place. These facts provide a broad indication of the archaeological significance of the area.

In June 2003, the comprehensive restoration work was awarded to Ravi Gundu Rao and Associates. Larsen and Toubro were awarded the role of the client engineer for the said work. The methodology and the scientific techniques used in restoration for this historic building form the body of this article. The restoration work followed minimal intervention. The renovation works in the Santhome Cathedral like the new marble flooring, cladding, lighting, and many other things were done by local experts. The underground prayer hall was constructed below the old church to allow larger numbers of devotees to pray at the tomb of the Saint directly as against the small space that existed before. This work was carefully planned by renowned structural engineer Mr.Alex Jacob while the actual execution of the same was done by the leading onstruction company of India, Larsen & Toubro Limited.

Ravi Gundu Rao & Associates, Mysore is an organization providing heritage building conservation services in India. The organization is formed in the leadership of Ravi Gundu Rao by a group of conservation architects and engineers, earlier working with M/s Associated Cement Companies under the name of Architectural Conservation Cell



View of Cathedral after restoration

History

The discovery of ancient stone inscriptions in Tamil, Sanskrit and Portuguese establish the long history of the area, which has seen Chola, Jain, Vijayanagara, Portuguese and British influences over 2000 years. The crypt of the Apostle in the Cathedral is the most precious part of the faith in this part of the world. However, the exact date of construction of the oldest Church at Santhome is unclear. Santhome, known to Arabs in the 9th century as 'Betuma' (the town of Thomas) is known to have had a church and tomb over the buried site of St. Thomas. Marco Polo in 13th century recounts "The Nestorian Chapel of the Tomb of St. Thomas and Nestorian monastery atop St. Thomas Mound". It is also the Church where Vasco-Da-Gama and St. Xavier prayed during their visit in the 16th century. The ancient stone image of St. Thomas in Mylapore in 1729 (mentioned in the letter from the 7th bishop of Mylapore to the bishop of Verapoly) is amongst the prized archaeological discoveries of the site. From the records it is learnt of a certain Portuguese devotee who added a Roman-Doric pillared South portico to an existing Church. It is reliably recorded that the old Church was pulled down in 1892 and a new and larger Church built on the same site but in Gothic style with an awesome spire and sloping roof on timber trusses.

From the testimony of 7th Sessanian - Pahlavi inscription found in Malabar and Mylapore there must have been rather numerous colonies of Persian Christians (Nestorian Jesuits) in South India much before the arrival of the Portuguese in the 16th century. Historian Gibbon says that even in 6th century AD, "The pepper coast of Malabar and the isles of the ocean, Socatra and Ceylon were peopled with an increasing magnitude of Christians and the Bishop and clergy of these sequestered regions derived their ordination from the Catholics of Babylon". The martyrdom of St. Thomas Didymus, the apostle of Jesus Christ, at the site of the Church and the burial of his holy remains in the near 2000 year old crypt is the single most significant aspect of history of Santhome area.

The consecrated new Cathedral, designed by Capt. Power in 1896 and Rt. Rev. Dan Henriques de Silva, the first Bishop of the diocese of Mylapore, has seen over a century of social, economic and religious developments in South India. The Santhome Cathedral Basilica has a cross shaped plan with the holy crypt and the remains of the Apostle St. Thomas at the centre. The spire with a splendid belfry raised at a height of 155 ft in the air is a landmark in Chennai's skyline. The interior of the Church is spacious with exquisite stained glass windows in East, North and South lancet windows. The nave has ancient holy paintings on canvas, depicting the legendary log of wood that St. Thomas dragged on to the shore to build a Church and that of St. Francis Xavier driving away his enemies. Besides the Bishop's wooden throne from the original Church, the lance head that killed St. Thomas and his precious bone are ensconced and preserved to the date.

Site Inspection and Restoration Strategy

The Cathedral Basilica built in 1896 is a robust and pleasing example of Gothic architecture. Over the century, the Basilica has been repaired over a number of occasions. Although being in the close vicinity of the sea, the ageing of the cathedral was negligible with no outward visages of any specific problem. But the interiors had a different story to tell. Considering the tremendous historical significance of the holy cathedral, the Santhome Cathedral authorities invited Mysore based conservationists Ravi Gundu Rao and Associates - specialists in conservation of heritage buildings to make a scientific study and technical restoration proposal in July 2002. The team of specialists including qualified conservation experts, engineers and architects carried out the inspection of the Cathedral for a period of 15 days. Measurements were taken to prepare outline drawings to aid site inspection and recorded observations. Gothic architectural edifice, replete with towering spire stands on sturdy masonry with arched openings. A closer inspection revealed the chronic issues somehow gone unobserved over the years. For instance, the external plaster albeit with a modern paint looked convincing, however closer inspection showed that the entire plaster (leaving some portion of original lime plaster in the render untouched) was re-done sometime in early 1940-50's with a limecement-composite mortar. Laboratory investigation proved the same although the year of intervention could not be ascertained.

On the exterior, the reconnaissance survey showed damages to the priceless stained glass windows in the altar and the aisles, flaking paint and efflorescence, external composite mortar, ageing of wood on the distressed windows, unimpressive modern finishes to the wood in doors and windows and missing coloured glasses in windows. Samples of existing original as well as the subsequently repaired composite mortar were taken and the same were tested in material science laboratory to confirm the visual observations. The chemical analysis of the mortar samples, microscopy and X-Ray diffraction were done for further reference. In the interiors it showed badly decaying plaster in and around the openings and the ends of the vaulted zinc ribs joining the walls. The fully panelled timber ceiling despite the misleading oil paint, showed signs of recurring dampness caused by the leakage in the Mangalore tiled roof over the timber trusses. More concerning was the use of incompatible modern materials like cement in repairs which had eroded the historical ambience of the Church. The precious stained glass needed urgent restoration too.

The original designs, materials, and finishing all needed preservation. It was clear that the maintenance of the roof to keep the building dry was the main issue structurally. The rest of the problems were related to the primary issue of leakage from the roof. Detailed inspection of the roof structure was done by removing some tiles and entering the spaces in between the timber trusses and the curved Gothic ceiling. The condition of the timber especially the members that were embedded in masonry was observed and recorded. It became apparent that once the roof leakage is kept under control the remaining issues were much easier to come to terms with.

The scientific study elaborated the building elements, physical problems and their causes, documented the same and proposed the minimum intervention conservation program that would help conserve the monument according to the best international standards. Use of original materials, methods and skills were foremost in arriving at the proposals, including long term maintenance measures.

Pitched Roof Works

The roof was the principal cause of the deteriorating state of the building. Broken Mangalore tiles and dilapidated gutters lead the rain water straight into the building, thus causing immense damage to the structural fabric of the building. Lack of proper access to the roof was also one of the reasons of neglect. It was an urgent need to arrest this water entry into the building.

The Mangalore tiles were removed carefully, sorted out for further use and stacked. The teak wood reepers were also removed and stacked for reuse. The timber structure was opened up for further inspection of the teak wood members. As a precautionary measure against the unseasonal rains, the roof was opened up in parts, especially the long roofs like nave and altar. And after the day's work, the open area of the roof was completely covered with tarpaulin sheets on day to day basis. The timber truss is a very interesting element with two king posts, two mild steel cross tie rods and interconnecting horizontal ties of teak wood. The reepers resting on the principal rafters take the Mangalore tiles. The curved ceiling below formed a major attraction, giving it a beautiful shape. The space between the roof and the ceiling (attic) was barely enough for a man to stand straight. Thus it was a painstaking effort by the restoration team to enter, manoeuvre and work inside these spaces with the curved floor below and triangular shape on top, all at a height of more than 12 metres from the ground level. The broken and damaged Mangalore tiles were stacked separately for disposal and the reusable tiles were cleaned with soft brushes and non-ionic solvents. Almost 50 percent of the tiles turned out to be non-usable due to aging and the harsh coastal environment in this part of the country.

The perennial problem of severe water ingress from the roof into the building needed a lasting solution. A



A view of the roof top of the church for the ball tower



The neglected state of the Mangalore tiled roof

reversible membrane was required as a protective barrier between the environment and the valuable roof structure. Aluminium, by nature is free from corrosion, is very light in weight and is also a reversible material. Thus aluminium sheeting was the best choice to give the roof, the required longevity with negligible increase in dead load of the roof. The teakwood reepers ready with all wood preservation treatments, were fixed directly on the aluminium sheeting with desired levels and alignment so as to take the Mangalore tiles. Almost 70 per cent of the original reepers were treated and then recycled back onto the roof. The reepers were also extended into the wall by 10 to 15 cms so as to keep the extra length of Mangalore tiles at the ends. Aluminium flash strip was stuck onto the screws and nails in the entire area. Thus the aluminium membrane was sealed completely from rainwater ingress into the area below. Doors were also provided in the aluminium sheeting for access onto the roof for maintenance related works. As shown in the roof plan, almost 50 per cent of the tiles were recycled and remaining 50 per cent tiles of same brand and quality were sourced from Kerala. The ridge tiles were sealed with silicone sealants and the wall junctions were sealed with brick-lime concrete "vattas". Thus the most challenging work of roof restoration was completed just in time before the monsoon.

Roof Elements - RCC Repairs and Gutters

Ornamental RCC grills and elements were a later addition into the building during the major restoration programme which could have happened in the 1940's or 1950's. The same were showing signs of aging and reinforcement corrosion was rampant especially on the top of the grills. The RCC grills were patch repaired using conventional anti corrosive treatments and polymer based mortars. The entire gutter area was replastered using waterproof mortar. Existing system for rain water drainage consisted of high quality asbestos cement pipes. Fifty per cent of the pipes were doing well functionally and were retained. Only routine maintenance like clamping, joint filling etc was done for most of the pipes in Sacristy and Meditation halls. The pipes in the nave area were almost completely replaced and in the altar area only 50 per cent of the replacement was done. A few places near the drain



The Mangalore tiles being removed to expose the timber structure



ceiling (attic floor)

mouths were affected with severe vegetation growth. These were treated and removed completely.

Traditional Plaster Works

The water from the roof was playing havoc in the interiors of the Church. In addition to the seepage problems, the incompatible and non-breathable mortars used in earlier repairs, were harming the building. Moisture trapped inside the 1 metre thick walls was virtually eating away the structural fabric of the building, thus weakening the load bearing structure.

The plaster in the attic was incessantly damp and deteriorated. Efflorescence was visible in the walls of the attic. The external plaster was a later addition, done during the 40's or the 50's. As observed and proven in the various tests, the external plaster was a high quality composite mortar done with great care. But these composite mortars are brittle due to the presence of cement and hence the brittle cracking pattern visible in the visuals. Migration of salts to the surface at a few places pointed towards the environmental factors and also probable use of slightly salty sand or water in plastering. The original lime plaster existed in 90 percent of the interior walls,

except for quite a few hard mortar patches, which must have been done during the earlier repairs. During the investigation of the exterior walls, original lime mortar plaster was found on the external walls at a few spots. The clients as well as consultants mutually decided on complete re-plastering of the interiors except the original jambs and mouldings, which were in excellent condition. For the exteriors, it was decided to replaster the complete front elevation and the elevation of the North Cross Aisle.

A feebly hydraulic kankar lime was sourced, which was basically from South Andhra. After testing the

The distressed state of the interior wall plasters





The cracking plaster and efflorescence in the exteriors



A close view of art mouldings under restoration with lime mortar







The plan, section and elevation of the decorative window jambs





The decorative jambs during and after restoration



The art mouldings, jambs and cornices before, during and after restoration

particular lime on field for reactivity and in laboratory for purity, it was decided to use the said lime for lime plaster work. Sand selected was sparsely coarse river sand, generally free from silts and clays. A complete lime mortar manufacturing plant was setup in the church complex. Lime mortar was prepared first with various permutations and combinations of grain sizes, proportioning of sand, proportioning of organic additives and pozzolana, etc. Trial plaster patches of various mix designs were made and kept for 1 month under observation. The selection of the best mix was done based on past experience and on the performance of the samples for the required plaster thickness. The beauty of lime mortar is that unlike cement mortar, lime mortars made with different types of available limes in India, give a lot of variation in properties like setting time, strength, plasticity, water retention etc. Hence it becomes necessary to investigate the type of lime correctly and then decide the proportioning and mixes. Mortar preparation was started on a large scale to facilitate the massive plaster work involved.

Art Mouldings

After the completion of the roof in all respects, the interior plastering was taken up first during the month of December 2004. Special tools and templates were made for the art mouldings and cornices. Each and every heritage building has its own features that are rare and distinct. More than 70 templates and tools were made especially for the different varieties of art

mouldings and cornices in the building. A special feature of the art mouldings in this building was that they were made in lime mortar in many layers, irrespective of the thickness. It was found that some mouldings in the jambs of arches were even as thick as 20 cms built purely in lime mortar, without any anchors or reinforcement. This property is not present in cement mortar and this is considered an exceptional versatility in lime mortar.

Another interesting fact noted about the cornices was that they were not anchored into the wall with bricks (as per usual practice) but with brick pieces resting on wooden nails. The technique was not very great, because the cornice was loosely held and there was a weak bond between the wall and the cornices. Thus when the plaster was being removed, the entire cornice fell down completely. Those cornices were reconstructed by making grooves into the wall and using hand made bricks to match the original profile of the cornice. Like the cornices, the round pilasters on the walls were also weakly bonded with the wall because they were constructed by supporting bricks on wooden nails. This technology seems to be a feature of this particular building construction. Due to the weak bond with the wall, one of the pilasters in the North Cross Aisle, actually gave away right from the centre and fell off completely. As is always the case, this was an area of work not envisaged and an 'in situ' strengthening technique was devised. The pilasters were strengthened by tying coir ropes over layers of lime mortar with wooden nails fixed into the walls.

Interiors

The interior finishes of the Church building for various parts like doors, windows, plaster, painting, white washing etc except the flooring and cladding was undertaken. The marble flooring in the entire Church, marble cladding in nave and the aisles, marble railing in the altar, granite cladding in the passages, granite paving, light poles etc were undertaken by various other agencies and parishers of the Cathedral. The work was carried out smoothly with proper coordination between the various agencies. The end result was a wonderful combination of vibrant interiors and dazzling exteriors. The interior walls of the Cathedral were restored completely with lime plaster, barring a few original lime plaster features, which were in excellent condition. Thus the interiors had a soft mortar at all the places on the walls. It was decided to have traditional lime wash finish for the



A view of the interiors of the Cathedral from the Choir area before restoration



A view of the interiors of the Cathedral from the Choir area after restoration



A view of the interiors of the Altar area before restoration



A view of the interiors of the Altar area after restoration

walls. High quality shell lime was brought and converted to lime wash fluid. The process involved slow and gradual hydration of lime and filtering through various types of linen. A few organic additives and glues were added to make it more durable and slightly hydrophobic in nature.

Exteriors

The existing exterior wall plaster was a hard composite mortar, which was laboratory tested at the ACC-RCD in Mumbai. Only 10 per cent re-plastering was done with soft mortars and 90 per cent plaster in the exteriors was hard mortar. The original paint system in the building was cement based paint and was flaking due to various environmental factors and efflorescence. Considering all the above factors, it was decided to use breathable 100 percent acrylic paint of Asian Paints. The entire hard wall surface was cleaned well with water and hard brushes and "*patras*" so as to remove the loosely held paint layers. After thorough cleaning, the paint was applied as per manufacturer's specifications.



A view of the North elevation before restoration



A view of the North elevation after restoration

Restoration works of Santhome Cathedral Basilica: Maintenance Schedule

Considering the significance of this monument and the massive efforts of restoration work it became a necessity to maintain the building in a scientific manner and with a good amount of vigilance. Following were some of the basic guidelines to be understood and implemented:

- The building roof, especially the Mangalore tiles, the gutters and the flat terraces to be inspected thoroughly once in three months, but in fortnightly intervals before, during and after the monsoons. It was advisable to do rain water system checks by pouring water into the mouth of the gutters.
- Under no circumstances, walking over the roof tiles to be allowed. Walking over the roof tiles was a great temptation especially during the festival lighting of the Cathedral.
- The attic area to be inspected and cleaned with vacuum cleaners once in a year. Inspection of all the timber members to be done for problems like water marks, cracks, termites etc.



View of Altar area in lights



View of Nave area in lights

- The doors leading to the attic area to be closed correctly and covered with Mangalore tiles, whenever used for cleaning or electrical maintenance etc.
- Cleaning of the bell tower area to be done on monthly basis. Inspection to be done for cracks in the walls due to vibrations because of the bell usage.
- Windows in the choir, entrance lobby and upper windows in the Nave to be kept closed during the monsoon. These windows if kept open during the dry season, the shutters to be locked with anchors provided. The windows if kept closed, the shutters to be locked with clamps provided.
- The Choir area to be cleaned on weekly basis.
- The doors/ windows to be checked for smooth functioning and fixtures, fittings, glass breakage etc once in three months. It is advisable to clean the door windows once in three months.
- The stained glass and the window frames to be cleaned once in a month with a clean cloth very gently, with precaution to prevent any kind of damage to glass. The toughened glass and the window frames to be cleaned once in three months.



View of Cross Aisle ceiling in lights



View of Cross Aisle area in lights

- All plaster and paint on walls to be inspected once in three months for problems like cracking, peeling, flaking, dampness, moisture ingress, watermarks etc. Cleaning the walls with vacuum cleaners was advisable once in three months, especially the elements like cornices, capitals, jambs, art mouldings, art work etc. Else this cleaning was to be done with a clean cloth manually.
- The artefacts and wall paintings to be cleaned with clean cloth once in a month.
- The ceiling to be cleaned and inspected closely once in three months. It was advisable to use portable aluminium ladders for the purpose of maintenance at great heights.¶

Notes and References

Gibbon, Edward, 1993, *The Decline and Fall of the Roman Empire*, Vol. III, Modern Library Edition, New York. Ravi Gundu Rao and Associates. 2004. *Restoration works of* Santhome Cathedral. A report prepared by M/S Ravi Gundu Rao and Associates, Mysore Zaleski, L.M., 1912 *The Apostle St. Thomas in India: History, Tradition and Legend*, Mangalore

Design Interventions in the Urban Areas of Jharkhand : Urban Transformations

AJAY KHARE

Abstract

With the newly constituted states in India now planning their cities, this phase in Indian architecture could well become a turning point if perceived with a dynamic vision and an open and constructive approach. Some steel townships like the planned city of Tata Nagar form a backdrop for the newly declared state of Jharkhand and there lies an opportunity to develop the towns that fulfill public aspirations. And these are very simple aspirations- clean environs, adequate infrastructure governed by functional planning norms and creative urban and architectural design that provide a decent basis for human existence. The state has already taken the initiative and now professionals have to deliver their best to nurture the cities of Jharkhand as models of urban planning and urban design. The paper proposes the approach of Urban Transformation for the smaller towns of Jharkhand. It also discusses the need for changes in the organisational, financial, legal and technical spheres of urban development activity.

Introduction

Ajay Khare, Headof Department, Department of Architecture, BIT (Birla Institute of Technology), Mesra, Ranchi The state of Jharkhand has 139 urban areas, out of which 42 towns of 10,000 or more population are proposed to have their development plans prepared in the near future. There are four other bigger towns namely Bokaro, Ranchi, Dhanbad and Jamshedpur which have already

experienced some kind of planning process as parts of Bihar state. The Jharkhand state in the last few years has experienced around 20 percent rate of growth of urbanisation and it is clear that urban areas of Jharkhand are going to face tremendous pressure in the coming years. Presently only 21percent population lives in towns. The aspirations that go along with the new state and hope for a better life will motivate a large part of rural population to migrate into urban areas. The sheer growth of urban population will force us to restructure the poorly built cities of the region.

For the first time in the history of this region, we are able to perceive an enormous quantum leap in urban growth; a perception that should prompt us to readjust the scenery we have inherited. Intelligently done, this could lead to staggering geo-political implications in the state. Consider, for instance the leverage the United States gets from an urban structure which spans a continent and connects two oceans and similarly the advantage with India having an urban structure spanning two seas. What is proposed here for the Jharkhand state is an urban structure spanning across the state instead of all big towns on one side as they are at present. Here the example of central Uttar Pradesh with its major towns of Lucknow, Kanpur and Allahabad forming an urban system of manageable size towns within 200 kms is worth examining.1 We need to identify the growth centres of north and west parts of Jharkhand to create a balanced urban system.

Urban Transformation

Coming from the regional scale to town scale, I have tried to advocate a mode of urban growth which may prove suitable for the state of Jharkhand. Two of the most prominent modes of urban growth are growth by extension, characterised by the urbanisation of open areas around a town, and growth by substitution, involving the demolition of existing urban elements. The third process, the growth by additive transformation, in which an original nucleus is transformed by a sedimentary and incremental process of addition of new parts that may prove to be most suitable for growth of small and medium size towns of Jharkhand.

Additive transformation² is a mechanism of growth and change which has many advantages over other modes of urban growth due to following characteristics:

- In fact, urban transformation is gradual incorporation of parts into an existing core implying the use of a pre-existing urban structure, and by doing so, extending the likelihood of this being in use for a prolonged period.
- Being based on the retention of what already exists, additive transformation is a form of development characterized by its low cost, both in social and material terms. It doesn't necessitate the compulsion of migration, required in other forms of urban renewal but maintains some kind of continuity in the normal rhythm of life of the area. The material costs are relatively low since extensive use is made of existing facilities, elements and available energy and labour.
- Because it is a sedimentary process, additive transformation ensures a sense of continuity in the construction of the town, and a sense of place in both historical and spatial terms. In historical terms because it is in this way that the city builds upon itself and buildings become repositories of successive interventions and in spatial terms because a true complexity and a meaningful variety arise from the gradual accumulation of elements which confirm, define and reinforce urban space. This sense of continuity is further reinforced by the intelligence of successive generations, which produces a socially relevant architecture, elaborated with the concurrence of many people.

The present day approach to development is very different than above, when "society squanders its resources as though permanent abundance were no less than the obligation of history." ³

Areas of Interventions in Jharkhand

Large Towns: All four large towns of Jharkhand suffer from a lack of a cohesive urban structure. The urban pattern is fragmented and dispersed in the housing zones of various private and public sector organisations, while being over-concentrated on a megascale in the centres of these towns. Public buildings are often isolated from the urban fabric and commercial buildings assume a bigger status which is semantically questionable.⁴ Such town centres owing to their monolithic and introverted nature and their control over urban functions are an unbearable obstruction to the development of civil life.

To recreate a sense of place, location and referential order through a further development of their plans into a denser, more cohesive and better-defined


formation is an ambitious project that must be attempted. A re-urbanization of these towns would seek to be unifying while allowing for diversity to ensure a positive urban development. It would involve gradual reappropriation of buildings and vacant land, so that a plan that reflects the needs and urban consciousness of the inhabitants may take shape. Perhaps it would be ideal to set up a general plan as a basis of reference, coordinating the elements of the towns, its implementation being left to occur as an action of direct residents' control.

Smaller Towns

The Jharkhand Government has initiated a process of preparation of development plans for 42 towns through different organisations or professionals. But It seems without specifying an urban development policy for the state of Jharkhand, the proposed plans may moot very divergent views or may bring forward a plan for immediate application. The complex urban development problems posed by sick and fragmented cities cannot be dealt with by hasty, one dimensional, rationalistic proposals designed for immediate application. As the forces that form the city are not purely designed related, reforms are needed in organisational, financial, legal and technical spheres: 1. The prevailing bye-laws and concepts such as FAR which more often than not, inhibit good creative urban design, while being unable to prevent absolute horrors from being built, should be scrapped. They should be replaced by conventions (where an intact building culture exists, such as found in the walled towns of Rajasthan - Jaisalmer, Jaipur, etc. and conventional building methods of Tamilnadu and Kerala). And they should be replaced by the use of design briefs for specific areas, achieving technical objectives (light, ventilation, services and access) while allowing greater scope for interpretation and enabling rehabilitation and modification.

2. In Jharkhand towns the urban development should ideally be attempted to produce densities high enough to support an educational system and a transport system, yet low enough for each family to keep a kitchen garden and cattle. In fact if residential densities can be brought down to about 50 households per hectare, it becomes feasible to dispense with central sewage systems and recycle waste matter to considerable advantage: cooking gas, fertiliser, etc.⁵ Now if we look at all the fashionable concerns of environmentalists today-balanced ecosystems, recycling of waste products, appropriate life-styles, indigenous technology- we find that the people of Jharkhand already have it all. What we need to provide them is the 'urban

context' in which these marvellously inventive solutions are viable.

- 3. Transformation carried out should be functional as well as aesthetic and spatial. The most urgent necessity in creating more convivial cities is the repeal of monofunctional zoning plans. All development above a certain size should be required to include some mix of uses, so that travel between different activities can be reduced, and working and living can resonate together again.
- 4. An inversion of power pyramid in the decisionmaking process is necessary. Bureaucrats are immobile, and politicians rarely willing to offend vested interests. Therefore, the participation of people in managing their own environments is not merely possible but imperative. A kind of creative anarchy at the small scale is what is called for. Here it is necessary to remind that not many of these 42 towns of Jharkhand has their urban local body hence no public representatives for urban affairs.
- 5. In the changed circumstances in Jharkhand, individuals and communities are determined to regain control of their habitat, necessitating a drastic change in the role of the urban designer.

The transformation of the professional is called for. The professional must be the interpreter, facilitator, designer and constructor when working for an existing community, or a group intending to become one. The participative process and the designs that emerge have much to teach us about the creation of less alienating cities. The urban designer must change, from being an expert to being an enabler, assisting people and neighbourhoods identify and solve their problems. The professional's role is thus extended beyond the physical design to involvement in the economic, social and organizational framework within which development takes place, requiring new tools and skills which are not generally taught in architecture and planning schools. This calls for a change of attitude from the elitist image of the designer as team leader to that of mediator and active participant in a team.⁶

Urban transformation is a process and a tool of intervention which should become a commonly used urban design method to attain historical and spatial quality for urban places. In all transformations, their possible range is restricted by the culture in which they occur and the morphology of the urban context. The circumstantial conditions in the transformation process spring from the lack of required facilities in a given town or neighbourhood, from the balance of economic and political power within a society, from the coincidence of ideas and from fortuitous or chance events.

Conclusion

Today, the changed scenario of Jharkhand demanding the rectification of unsatisfactory environments, combined with economic imperatives, new urban design skills, and the will of users to make matters better themselves, could lead to changes that are both necessary and possible. The urban planning approach should be that of a generalist who speculates on how the pieces can fit together in more advantageous way. To do this in the context of the Jharkhand the planner/ architect/designer must have the courage to face the challenges after identifying them. Change is the physical expression of a society's hopes and intentions and a means of using and developing human and architectural potential. This will give the urban environments of Jharkhand both temporal depth and associative perspective. A large and sprawling urban agglomeration does not by itself constitute a city. If we wish to see the things we desire and love in a great city, we can and should restore the attributes which determine how it is perceived and enjoyed by people.¶

Notes and References

- ¹ Ministry of Urban Development, 1987. "Urbanisation: An overview," in Interim Report of National Commission on Urbanisation, Govt of India, New Delhi
- ² Rodrigo Perez de Arce, 1978. Urban Transformations," *Architectural Design*, 4/
- ³ Segal, R 1974. America's Receding Future, Pelican.
- ⁴ Main square of the Ranchi town is known after a shopping outlet – Firayalal Chowk and most important commercial spine is called Main road which hardly have any public functions.
- ⁵ Correa, Charles.1989. The New Landscape: Urbanisation in the Third world, A Mimar Book, Butterworth Architecture,
- ⁶ Alexander, Christopher and others, 1979. A Pattern Language, Oxford University Press

Transport Policy & Management: Calculating Risks and Options

RAVINDER N. BATTA

Abstract

Some transport costs are also external to those who make use of transport; and are often unaccounted for. The main external costs of transport use are congestion (loss of time), accidents (health and safety risks) and environment (pollution and depletion of natural resources). One of the prime concerns of a transport policy is the development of transport infrastructure while keeping these externalities under control. This paper is an attempt to highlight the environmental costs of transport use and an alternate policy option of using economic instruments to control the environmental implications of transport development.

INTRODUCTION

Transport has a major impact on our lives. Even though lack of efficient transport in the developing countries acts as a serious drag on economic development, too much of transport in the developed world is the cause of serious gridlock, congestion, pollution and health damage. Traffic in major cities of the world is heavily congested resulting in billions of dollars lost to economies and serious disruption to everyday life (World Bank 1996). Further still, growth of demand for transport is a major factor in the growth of greenhouse gas emissions (GHG) and the problems associated with climate change. In developing countries, local air pollution from transport cause premature deaths of over 5,00,000 people every year, and imposes an economic cost of up to 2% of gross domestic product (GDP) in many countries (World Bank 2002). It is argued that the

Dr Ravinder N. Batta is currently posted as Secretary, State Transport Authourity, Himachal Pradesh. Having done MA, M.Phil in Economics from India followed by a Master of Science from the University of Bradford, U.K. and a Doctorate in Environmental Economics from India; he is keenly interested in application of tools of environmental economics in different fields of development. The author has several publications to his credit in the area of tourism, transport and the environment. He has also written a book on Tourism and the Environment, which is a reference book by the Indira Gandhi National Open University for courses on Tourism and Environment



gains from low emission technology vehicles are offset due to increased kilometres of travel thereby pushing us further up the GHG emission curve.

However, the usual policy response to the problems of transport has been to invest more money in infrastructure such as roads and highways leading to higher volumes of traffic and in the absence of reliable public transport a switch over to personal modes. Unfortunately, these investments take a significant slice of the budget at a time when healthcare, pension and social infrastructure need more attention in the wake of rising costs and falling allocations in real terms.

The transport sector accounts for a large share of global GHG emissions with further prospects of growth (World Bank 2003). In the developing countries, owing to higher energy consumption within the transport sector, the share of the transport sector is likely to increase manifold. For India, the most serious environmental impact is that of air pollution, particularly because of its effect on human health directly and indirectly.

Many people here spend time in close proximity to road traffic and therefore remain more exposed to harmful emissions because of their lifestyle, economic condition, and occupation. The problem is further aggravated by traffic congestion, which reduces travel speeds incurring environmental and economic damage. As a result of traffic congestion, fuel consumption increases and so do vehicular emissions, which exacerbate air pollution and noise. While greenhouse gas emissions from motor vehicles may not be a serious concern for developing countries at present, the rapid pace of urbanisation and even faster pace of motorization will require a change in perception at all fronts. According to the Intergovernmental Panel on Climate Change (IPCC), energy use by the transport sector accounted for 22% of global CO_2 emissions in1990. In India, two main factors contribute to vehicular pollution namely a large number of two wheelers and a rising number of diesel vehicles.

The discussion hereinafter explores an alternate policy option that has the potential of controlling transport costs with net additional resource mobilization. The focus is on the economic



Some transport costs are external and often unaccounted:congestion,accidents & environment

instruments (EI) and their potential applications in different areas of externalities: pollution and congestion. However, a caveat is in order here: while the prescription may appear to be rather simple, its actual implementation is fraught with roadblocks both administrative and political. It will be too hazardous to presume it a painless remedy for the problems associated with transport use.

THEORETICAL FRAMEWORK

As the basic source of externalities is the fact that pricing system is not applied to public goods, pricing the public goods is one of the alternatives suggested by some economists (Baumol and Oates, 1988; Jeanrenaud, 1997). The instruments applied for this purpose are called incentive based, as the sole purpose of the instruments is to modify the *behaviour* of the polluters. All of these have one characteristic in common: they make the polluters aware of *opportunity cost* of environmental resources and lead to the internalization of damage (Batta 2002). Among the most important economic instruments are: taxes/ charges, subsidies, and tradable permits.

Table 1: Health and Ecological Effects of Air Pollution

POLLUTANTS	EFFECTS ON HUMAN HEALTH	EFFECTS ON NATURAL ENVIRONMENT
Carbon monoxide(CO)	Can affect the cardiovascular system, exacerbating cardiovascular disease symptoms, particularly angina: may also particularly affect fetuses, stickle cell anemia in young children; effect on the central nervous system, impairing physical coordination, vision and judgment, creating nausea and headaches, reducing worker productivity and increasing personal discomfort.	126
Nitrogen oxides(NOx)	Nitrogen dioxide (NO ₂) can affect the respiratory system: Nitrogen monoxide (NO) and Nitrogen dioxide (NO ₂), where they play a part in photochemical smog formation, may indirectly increase susceptibility to infections, pulmonary diseases, impairment of lung function and eye, nose and throat irritations.	NO and NO, can contribute significantly to acid deposition, damaging aquatic ecosystems and forests; NO_x can also have a fertilizing effect on forests.
Sulphur oxides(SOx)	Sulphur dioxide (SO_2) can affect lung function.	Sulphur oxides can contribute significantly to acid deposition impairing aquatic and forest ecosystems. Sulphates can affect the perception of the environment by reducing visibility even at low concentrations.
Particulate matter(SPM and PM10	Fine particulate matter may be toxic in it self or may carry toxic (including carcinogenic) trace substances, that can alter the immune system. Fine particulates can penetrate deep into the respiratory system thus irritating lung tissue and causing long-term disorders.	Fine particulates can significantly reduce visibility. High dust and soot levels are associated with a general perception of dirtiness of the environment.
Lead	Can cause brain damage, encephalopathy in children resulting in lower IQ, death, hyperactivity and reduced ability to concentrate.	

Source: Houghton and Hunter (1994)

Taxes

Taxes can be used as policy instruments to correct under-pricing of the environmental resources. One of the basic differences between the direct controls and the pricing techniques is the way they treat the environmentally damaging activities. While the former is considered as illegal, the latter is reckoned as a part of economic activity that should certainly be curtailed, but not by the use of police powers of the state. The fiscal approach uses the *meter* rather than the *police inspector* for enforcement. Taxing the polluters for the privilege of polluting certainly affects their economic behavior. Tax assumes the role of a cost, which has to be internalized.

Among the major applications of taxation policy in the transport sector are:

(a) Parking charges

The act of parking is a close complement of vehicle



Parking charge is an effective tool to restrict vehicle use by pricing a close complement i.e. the parking space

use, especially in the case of urban transport. Charging a toll for parking may be needed to cover the cost of the parking space, and to allocate existing space efficiently. However, it is something beyond this: the idea is to tax vehicle use by taxing a close complement. Besides, it may be appropriate to tax parking as a way to control demand and correct existing distortions that under-price parking. Taxes can be applied on parking spaces, parking subsidies and parking rental transactions. The net outcome is a higher cost of movement and hence a lower level of mobility. Among the main weaknesses of this policy is the fact that it penalizes 'stopping' traffic vs. 'through' traffic and shorter trips instead longer ones.

(b) Taxing fuel

There is a natural correlation between fuel use and marginal private cost of transport. Taxing fuel has the effect of raising the marginal private cost of mobility. Since the fuel tax can be differentiated according to the fuel used and its quality, it can have a substantial effect on control of emissions. As diesel is more polluting in terms of particulate matter that has serious health effects, a higher tax could be levied on diesel compared to petrol and CNG. In petrol, a distinction can be made between leaded and unleaded petrol. However, the biggest limitation of taxing fuel is that it does not make distinction between vehicle type (car versus truck), vehicle technology and use: professional versus private. Differential taxes have been tried in Britain, Canada, and Australia. Australia, Canada and Finland have higher taxes for leaded fuel.

(c) Vehicle license fees

Taxing the vehicle ownership constitutes a way of increasing the fixed cost of vehicle use. Taxes on ownership can play a role since they can be differentiated according to vehicle type. They are easy to implement and are a good source of government revenue. However, ownership tax does

More investment in infrastructure leads to higher volumes of traffic and a switch to personal modes



not take into account, when and where, the vehicle is used and the external cost of congestion is higher. For the same reason, it might be less powerful compared to policies that increase the marginal costs of mobility. Ownership taxes are probably the most common form of motor vehicle taxation in the world. There are however, some limitations of use of tax as an instrument of control. One significant weakness of the tax approach is the uncertainty about the magnitude of its effects. It is difficult to ascertain the decrease in externalities to the corresponding increase in tax. It is therefore argued that the tax as an instrument of control of pollution in areas characterized by threshold-effect cannot be effective. Second, it is argued that it poses unnecessary burden. Finally, environmentalists object to the levy of the tax as it gives a license to the polluters to pollute.

Subsidies

There are basically two types of subsidies: unit subsidies and grants to defray the cost of pollution control equipment. The unit subsidies are payments based on reduction in discharges. The grants on the other hand are payments made to offset the cost of pollution control equipment. The use of subsidies to prevent pollution is to use carrot rather than the stick. However, still these have been applied. Potential applications in transport include subsidies for purchase of models with less emissions and energy saving; the subsidization of substitutes to privately owned vehicles, such as the public transport. It has been observed however that the demand for public transport might be very inelastic so as to require very strong subsidies. Other shortcomings include the difficulty in setting the optimal level of subsidy, the risk of mismanagement of funds and the rent seeking behavior. Moreover, compared to road pricing, this instrument would require an increase in fiscal revenues.

Tradable Permits

Tradable permits are a major category of incentive based instruments. As opposed to acting directly on prices, as is done in case of charges or taxes, the government fixes the maximum quantity of emissions by a company/firm by giving a corresponding amount of permits. Each permit entitles the firm to emit a particular level of pollutants. Companies, however, have the option of buying and selling permits or even holding on them for future use. The market forces: demand and supply, determine the price of the permit. One important example of application of this instrument is the case of Singapore. The government of Singapore introduced a quota system - first of its kind in the world in the year 1990. This system requires a Certificate of Entitlement (COE) to own a new car. The quota system has seven categories, depending upon engine capacity and intended vehicle use. Those who intend to register their motor vehicle have to first bid for a COE public tender. The COE premium in each tender is determined by the amount of the lowest successful bid. All successful bidders pay the same premium. The COE has a life span of ten years after which the owner has to either de-register his vehicle/s or renew the COE for another ten years

Table 2: Emission Rates from Different Types of vehicles (per km)				
Type of vehicle	Emission in grams			
	\mathbf{PM}_{10}	HC	СО	NOx
Cars	0.25	1.5	9.5	1.9
Taxi	0.33	6.2	28.9	2.7
3-wheelers	0.5	7.65	12.25	0.1
2-wheelers	0.5	5.18	8.3	0.1
Diesel bus	2	2.1	12.7	7.96
Diesel truck	2	2.1	12.7	7.96

Source: Xie, J. et al (1998)

by paying the prevailing quota premium. However, presently the COE is non-transferable in Singapore (MORT 2003).

The marketable permits can do better than tax in four respects. First, their receipts are unaffected by inflation. With the rising prices and declining real value of the currency, the bid will automatically rise to maintain the real earnings. Second, with rise in number of units and permits remaining unchanged, the permit prices will rise leading to a tendency to outbid the existing holders or incentive to reduce emissions. Third, it is possible to keep the levels of pollution and congestion in accordance with the sensitivity of the area or locality. For more fragile areas, smaller number of vehicle permits can be allotted.

ECONOMIC INSTRUMENTS AND VEHICULAR POLLUTION

Vehicular exhaust is affected by two factors: vehicular maintenance and congestion. While the focus of the paper is environmental pollution caused by the mobile source, the ways to control congestion are also of prime significance. Hence, this section is divided in two parts.

(a) Vehicular Technology and Maintenance

The causes of pollution emanating from the vehicle exhaust can be classified into four types: relating to the vehicle technology, vintage, fuel use, and usage. Over the years, *vehicle technology* has substantially improved resulting in better fuel efficiency and lesser emissions. Among the petrol driven vehicles, introduction of four stroke engines in two and three wheelers and accurate fuel injection systems controlled by electronics are the most significant aspects from an environmental perspective. The electronic control systems tend to optimize the ignition and the injection requirements.

While vehicles of the above technology are now being manufactured and sold in India, it is, however, important to develop an arrangement that encourages introduction and use of better technology vehicles. A suitable policy framework is required to substitute the in-use obsolete technology vehicles with new technology interventions. The road tax or the token tax needs to be structured so, that the incidence of the tax reduces with the technological improvements and relates positively to decrease in levels of pollution. Suitable tax concessions could be provided for four stroke engines in two and three wheelers, Euro-II engines in petrol and turbo engines in diesel vehicles.

Improvements in technology would certainly enhance performance parameters in pollution and road safety among new vehicles but attention also needs to be given to the in-use vehicles. Among the in-use vehicles, Inspection and Maintenance Program, Manufacturer Warranty Program and Scrap Program could help tackle the problem. As per the provisions of the Motor Vehicles Act 1988, all commercial vehicles have to obtain a certificate of fitness once in a year and private vehicles after 15 years of life and every five years thereafter. It has been done to ensure maintenance of vehicles. Introducing a progressive taxation that increases with the life span of the vehicle could induce early replacement or scrapping by the owners. In addition, providing incentives for retrofit measures such as the catalytic converter and engine replacement could also bring remarkable results. It is estimated (Reddy 2000) that older commercial vehicles retrofitted with modern engines could reduce particulate levels at least by 80 per cent and hydrocarbons by 60 per cent and no increase in NOx and noise levels.

Extending the responsibility of performance to the manufacturer is also one of the often-recommended

options. As the manufacturers would not like to be penalized through the warranty-covered repairs, the quality of the equipment will improve. It is being achieved in India by making suitable provisions in the Central Motor Vehicle rules.

Vintage or the age of the vehicle is another important factor affecting the pollution levels. It is important in India since the maximum life span of vehicles has not been prescribed here. As new vehicles are cleaner than older ones, policies that encourage early scrap age of the older vehicles hold the promise of significant emission reduction. One of the options used by many countries is introduction of a subsidy on scrapping a vehicle. The success of scrap program in terms of cost effectiveness and emission reduction however depends on the amount of subsidy. If the subsidy offered is less than the selling price of the old vehicles, it may not be effective while raising the level of subsidy may reduce cost effectiveness. Besides, due caution has to be maintained to ensure that the subsidy does not reduce the incentive to maintain the vehicle.

In terms of *fuel use*, CNG, LPG and petrol are considered to be less polluting compared to leaded petrol and diesel. Introduction of an emission charge based on fuel used is often advocated. A differentiated fee structure based on classifications given in Table 3 is recommended to encourage use of environment friendly fuel and technology in vehicles. It could further be made a progressively graduated charge based on the life of the vehicle.

Finally, the *vehicle usage* (private versus commercial) is also an important factor. As the commercial vehicles ply more, they tend to emit more pollutants. Besides, the problems of overloading and bad maintenance are also associated with the commercial vehicles. Therefore, the incentives for technological interventions like catalytic converters, electronic fuel injections, turbo chargers; modern carburetors and conversion to greener fuels need to be built in the emission fee or tax rate structures.

(b) Congestion

Traffic congestion imposes substantial cost to the society: pollution, energy and time. With the everincreasing vehicle population and increasing vehicle kilometres, the situation on congestion is likely to worsen in future (Batta 2004). Consequently, transport planners and policy analysts are faced with the problem of finding a policy tool to handle it. Among

Vehicle type	Rates of tax			
	10 yrs	15yrs	25yrs	Above 25yrs
Cars (Petrol)				1
Cars Diesel			101	
Taxies		e		
Taxies	613			
Three Wheelers (Petrol-2 Stroke)				
Three Wheelers (Diesel)				
Two Wheelers (Two stroke)				NORK
Two Wheelers (Four stroke)			me	
Buses		Z,		

Table 3: Proposed Motor Vehicle Taxation based onage and fuel used

the options are road pricing, subsidizing the public transport and introduction of rapid mass transit systems.

One of the options tried in many places of the world is road pricing. Among the most popular types of the road pricing are pay lanes, area licensing and cordon pricing. With *pay lanes*, of which the high occupancy or toll lanes are the examples, one of the several highway lanes is tolled while the others are not. The system seeks to improve efficiency by sorting drivers according to their value of time. The *area licensing* requires a license to drive in certain areas. Examples of its use are found in Singapore and several European countries. The *cordon pricing* aims at reducing congestion through a differentiated charge for entry into the area within the cordon. Well-known examples of cordon pricing are found in Norway and London.

One of the best examples of the road pricing is the congestion charge of London. At five pounds per day the charge currently raises about 500,000 pounds per day. It is estimated that due to this charge traffic is reduced by at least 20 per cent. Besides, the money so raised is spent on improvement of bus services in the London city. However, congestion pricing has at least three major limitations (Safirova et at 2003): high implementation costs, privacy issues and distributional effects. High implementation costs arise

as well as environmental



as a result of the need for a barrier to collect the toll. With manual collections, the costs and time implications both rise. However, the recent introduction of electronic smart cards to collect the toll has helped a great deal. Privacy issues arise mainly in the manual form of collection and are by and large over come with the smart cards. Distributional effects of congestion tolls remain an area of concern. Since everyone pays the same toll regardless of income, low-income motorists suffer disproportionately. Compensating the potential users by appropriately spending the revenue could improve the political feasibility of congestion pricing.

Subsidizing the public transport could be achieved in two ways: cash subsidy for operation and tax incentives to the public transport operators. While the first one is considered to be inefficient and also puts strain on the fund-starved governments, the tax concessions have found favour with governments in many countries.

The high-capacity mass transit system needs a serious consideration where very little additional capacity can be squeezed out of the existing system. The latent demand for road use, for example, is so high that any additional space is immediately occupied not only by vehicles in motion but also by parked vehicles particularly the freight vehicles, hawkers, and slums. Making improvements in public transport is an optimal way of responding effectively, at affordable costs and in an energy-efficient and environmentally sustainable manner, to the present and future transportation needs of the vast majority of people in developing countries. It leads to the establishment of integrated transportation systems, made up of complementary transportation modes that are compatible with travel demand and affordable for the urban population.

CONCLUSION

The first phase of control of externalities like the ones discussed above, throughout the world, involved traditional legal remedies such as emissions standards. Overtime, however, it became clear that traditional regulatory approaches to pollution control were excessively costly in some circumstances (Tietenberg 1995) and incapable of achieving the stipulated goals in others. Failures have been especially common in developing countries, where legal and regulatory institutions are often weak (Murti, James and Mishra 1999). In response to these deficiencies, the second phase of pollution control focused on market-based approaches. In some circumstances, they have substituted for traditional remedies, while in most of the cases they have complemented them. However, even the addition of market-based approach has not fully solved the problem of pollution control. The main difficulties are encountered in designing, implementing, monitoring and enforcing market-based regulations. For a successful application of economic instruments, it is essential to have researched the environmental costs properly, taking into account the special conditions of developing countries and carefully implementing it in a manner that averts possible disruptive effects and negative distributional impacts. It is argued (World Bank 1992) that the user costs are considered in the production of goods automatically if there are secure property rights and the social discount rate does not deviate too much from the private discount rate. However, with high private discount rates and/or open access resources, environmental costs are not taken into account unless forced to do so with incentive based systems or command and control (CAC) regulations. In other words, an intervention that

equalizes the private and social discount rates is warranted. A pricing policy that requires the polluter to pay can deal effectively with this problem.

To effectively reduce transport externalities, it is important to change transport pricing so that they are a better reflection of the marginal social cost of transport. Since transport demand is expected to grow further, the need for a better transport pricing will only be increased in future. This paper has attempted to explore some dimensions of the alternate policy framework that uses economic incentive approach along with the command and control approach.. It is argued (Frey et al, 1985) that the support for the economic instruments was the strongest in the academy and got progressively weaker, the closer one got to the trenches where the policies were actually made. Therefore, it is often felt that due to political and technological reasons it is likely that the reform process in the transport pricing will only be implemented gradually.¶

Notes and References

- Batta, R.N. 2002. Environmental Policy for Sustainable Development of Tourism Industry in Himachal Pradesh: A Study of Kufri-Chail Area. Unpublished Ph.D Thesis submitted to the Himachal Pradesh University, Shimla.
- Batta, R.N. 2004. Transport Policy in Himachal Pradesh: The Reform Agenda, under consideration with *Indian Journal of Transport Management*.
- Baumol, W.J and Oates, W.E 1988.
 Economics, Environmental Policy and Quality of Life. London: Prentice Hall, Inc.,
- Frey, B., F. Schneider, and W.W.Pommerehne.1985. Economists Opinions on Environmental Policy Instruments: Analysis of a Survey. *Journal of Environmental Economics and Management*, Vol.12, No.1.
- Harrington, W, R.D. Morgenstern, and P. Nelson. 2000. On the Accuracy of Regulatory Cost Estimates. *Journal of Policy Analysis and Management*, Vol. 19, No. 2:297-322.
- Houghton, G and Hunter Colin. 1994.
 Sustainable Cities. Regional Policy and

Development Series7. London: Jessika Kingsley.

- Jeanrenaud, C. 1997. Economic Instruments for Economic Policy, In C. Jeanrenaud, Edt. *Environmental Policy Between Regulation And Market*, Birkhauser Verlag basel, Switzerland.
- MORT. 2003. Urban Transport Policy for India. New Delhi: Ministry of Surface Transport.
- Murty, M.N., James, A.J., and S. Mishra 1999. *Economics of Water Pollution*. New Delhi: Oxford University Press.
- Patankar, P.G. 2000. Urban Transport, Survey of the Environment, 2000. New Delhi: The Hindu.
- Reddy, C. M. 2000. Vehicles Emissions: Beyond Technology. Survey of the Environment, 2000. New Delhi: The Hindu.
- Safirova, E., K. Gillingham, I. Parry, P. Nelson, W. Harrington, and D. Mason 2003. Welfare and Distributional Effects of Road Pricing Schemes for Metropolitan Washington, DC, Discussion Paper 03-57, Resources For the Future.
- Tietenberg, T. 1995. Design Lessons From Existing Air Pollution Control Systems:

The United States, S. Hanna and M. Munasinghe Edt. *Property Rights in a social and Ecological Context: Case Studies and Design Applications.* Washington, D.C: The World Bank.

- World Bank (1992) World Development Report 1992: Development and the Environment. New York: Oxford University Press for The World Bank.
- World Bank (1996) Sustainable Transport: priorities for policy reform, Washington DC: The World Bank.
- World Health Organisation (2002) Cities on the Move: A World Bank Urban Transport Strategy Review. New York: Oxford University Press for The World Bank.
- World Health Organisation (2003) A Five Year WHO Strategy On Road Injury Prevention. http://www.who.int/ violence_injury_prevention/
- Xie, J. Et al (1998) Fighting Urban Transport Air Pollution for Local and Global Good: The case of Two-stroke engine three wheelers in Delhi. Paper presented at workshop on Integrated Approach to Vehicular Pollution Control in Delhi.

Proposed Action Plan for Conservation of Waterbodies in Delhi

MANU BHATNAGAR

ABSTRACT

In 2001, a Delhi based NGO Tapas filed a PIL (public interest litigation) [Case No. 3502/2000] in Delhi High Court seeking directions to preserve the water bodies of Delhi. As there was no clear information about the number of water bodies existing in the national Capital Territory of Delhi, the Court ordered a field survey to be conducted by INTACH in association with several government agencies enjoying jurisdiction over the various water bodies of Delhi. The survey, carried out from October 2001 to December 2001, established that there were 508 water bodies in NCT Delhi along with their approximate areas and the agencies under whose jurisdiction the water bodies were placed. The survey provided a reasonable working basis for further action but could not be deemed hundred per cent accurate. Other survey carried out separately by GNCTD place the number of water bodies at over 600 and that by Tapas at over 700. The article summarizes the survey work done by INTACH and subsequent proposals for the conservation of water bodies of Delhi.

Definition of Water Bodies

There has been some debate in government circles regarding what constitutes a water body therefore a few of the standard definitions have been stated here. The Ministry of Environment & Forests [Government of India] has adopted the IUCN [International Union for the Conservation of

Manu Bhatnagar Advisor, Natural Heritage Division, INTACH Nature] definition, also used by the Ramsar Convention for wetland conservation.

IUCN Definition

"Submerged or water saturated lands, both natural and manmade, permanent or temporary, with water that is static or flowing, fresh, brackish or saline, including areas of marine water the depth of which does not exceed 6 metres at low tide".

The water bodies that are recognized as wetlands include: oxbow lakes, riverine marshes, freshwater lakes and associated marshes (lacustrine), freshwater ponds (under 8 hectares), marshes, swamps (palustrine), shrimp ponds, fish ponds, shallow sea bays and straits (under six metres at low tide), estuaries, deltas, sea beaches (sand, pebbles), inter tidal mudflats, sand flats, mangrove swamps, mangrove forest. coastal brackish and saline lagoons and marshes, salt pans (artificial), rivers, streams slow flowing (lower perennial), rivers, streams - fast flowing (upper perennial), salt lakes, saline marshes (inland drainage systems, water storage reservoirs, dams, seasonally flooded grassland, savanna, palm savanna, rice paddies, flooded arable land, irrigated land, swamp forest, temporarily flooded forest and peat bogs.

Modified IUCN Definition

"All submerged or water saturated lands, natural or manmade, inland or coastal, permanent or temporary, static or dynamic, vegetated or non-vegetated, which necessarily have a land-water interface are defined as wetlands." This definition has been used by ISRO (Indian Space Research Organisation) for its study on 'Wetlands of India' [June, 1998]. The standard classification of water bodies adopted for the ISRO project [nationwide wetland mapping project] as relevant to this action plan is as follows:

- Lakes : Larger bodies of standing water occupying distinct basins.
- Pond : Generally suggests a small, quiet body of standing water, usually shallow enough to permit the growth of rooted plants from one shore to another.
- The only difference between lake and pond is of size, which is also not quantified.

In a meeting [5th February, 2002 - Office of the Commissioner, MCD] of the several concerned government agencies it was noted that "In the context of Delhi water bodies are to be defined as bodies of still waters in the urbanscape or ruralscape which are either naturally present or intentionally created. Areas of unintentional water logging along railway tracks, canals, highways are excluded".

Nature of Water Bodies in NCT Del hi

The existing water bodies of Delhi come under the following categories:

- Most of the water bodies are village ponds located in the revenue area of villages. The size range is 700 sq.m. to 41000 sq.m. The village ponds are mostly created water bodies having very small localised catchments for gathering rainwater. Their original purpose appears to have been to cool the water buffaloes and to irrigate the adjacent fields. The availability of tube wells and canal water has put an end to such requirements. Thus most ponds present a picture of neglect. Some of the ponds have become absorbed in the urban area or village *abadi* area where they have been used to discharge the local wastewater and thus become cesspools.
- A few lakes remain. Most prominent are Bhalaswa Lake (a fresh water oxbow lake on the river floodplain). Another is Sanjay Lake (apparently a meander scour on the floodplain) in East Delhi. Najafgarh *Jheel*, which used to be the largest lake in this area, now lies mainly on the Haryana side of the inter-state border.
- Marshes are found mainly within the floodplain embankments. However Jehangirpuri Marshes, which presently constitute the largest water body in Delhi, is outside the floodplain embankments.
- Significant historical water bodies are also found. (Step well or *baolis* are excluded from the category of water bodies).

Several water bodies have disappeared from Delhi's landscape such as the Mughal Tank, Narela, the Badarpur Tank and several village ponds. Many village ponds have been marked for acquisition despite noting in official meetings to the contrary [e.g. Minutes of Meeting chaired by Hon. CM, Delhi on 26/ 4/99 and Minutes of Meeting of 30/6/99 referring to specific orders by Hon. Lt. Governor that no pond will be filled without his approval]. Even otherwise many water bodies are shrinking as a result of deliberate land acquisition and reclamation.

While the water spread is under pressure the water quality has also deteriorated. This is mainly due to water bodies receiving polluted inflows in unsewered



Waterbody near Qutub Institutional Area in Delhi

areas, pollution-generating activities being carried out in the water body itself and garbage being dumped in the water body. This leads to the water bodies becoming a breeding ground for disease producing vectors and at the same time allowing polluted water to percolate to the underlying aquifers. Aquatic life and fish, which are the indicators of the health of a water body, are conspicuously absent.

Water Situation in Delhi

The water supply level in Delhi has remained static for many years despite the fact that population levels are increasing all the time. This has led to situation of water stress with the yawning demand-supply gap being made up by resorting to groundwater extraction. The shallow fresh water strata of the ground water reserves have been nearly exhausted in the areas of acute resource stress.

The water supply from Tehri dam has been available from the end of year 2004. This resource augmentation would suffice to meet the situation till 2010. Thereafter, no further resource augmentation appears possible in the foreseeable future. The various reservoirs projected in the Himalayas for meeting Delhi's demand are unlikely to be ready even in another two decades. Delhi's water requirement in 2021 [based on a population level of 23 million and a per capita per day requirement of 150 litres] would be 800 MGD against a supply level of 700 MGD [post Tehri] from surface water sources. Hence, a certain degree of reliance on ground water would continue. Threats to water security in Delhi persist. These can manifest in the form of seismic risks to Tehri Dam, in the form of extended drought leading to shortages combined with rising demand from riparian states [being articulated politically and spilling on the streets].

Need to Preserve

In view of the unavoidable reliance on ground water there is a pressing need to augment the declining groundwater reserves. This is the reasoning which endows the remaining water bodies with a new raison d'etre - the large number of water bodies can now constitute : dispersed aquifer recharge structures for enriching the local ground water regime, habitats for aquatic and avian bio-diversity which is vanishing from Delhi, substantially add to the visual attraction of the area, cool the micro-climate, offer recreational possibilities, enable sustained tube well operations in the local area and increase soil moisture to support enhanced vegetation growth in the localised area.

Problems Pertaining to Survival of Waterbodies in Delhi

The different classes of water bodies, listed above, each face both common and distinct threats. These are outlined as follows:

- Due to urbanization, flows from catchments to water bodies are interrupted.
- In years of poor rainfall the water bodies dry out quickly.
- Most river fed water bodies are disconnected from the river because of intervening embankments.
- Siltation of water bodies takes place through settlement of sludge from waste waters inflow leading to eutrophication of water bodies.
- Solid waste is surreptitiously disposed into some water bodies to reclaim the land (even fly-ash disposal has been done in some major water bodies).
- Village ponds are often marked for acquisition and reclamation by the government for various forms of social infrastructure (schools, dispensaries, sports facilities, etc.). As the pond lands are public lands no acquisition proceedings or compensation is required.
- In many cases the ponds have become engulfed in the *abadi* area and become cesspools of wastewater and the villagers are glad to have them filled up.

Apart from physical threats there is also the threat arising from perception of water bodies. The poor quality of water, the remoteness and inaccessibility of most of them, as well as the poor quality of their surrounding development places them rather low on the environmental radar and as such authorities have no compunction about reclaiming them. The citizens are quite unaware and unconcerned about them and therefore, feel no stake in them. The rural citizen, having become reliant on tube wells and tankers also feels that he has no stake in them. As such there is little pressure from the public on official agencies to preserve water bodies.

Issues in Preservation

Preservation of water bodies is not the mandate of any government agency. The water bodies come under jurisdiction of different agencies, which are not charged with their preservation or maintenance. Thus, institutional arrangements in this regard are very weak. In spite of the survey conducted in 2001 some doubts persist with regards to the precise number of water bodies, the actual areas of submergence remain unmapped and unmeasured, the exact location of water bodies with reference to village *abadis* remain unmapped. This is an important layer of the environmental map the unavailability of which hinders the development of an action plan as well as deprives us of a monitoring tool to monitor changes. A major issue is whether every single water body should be preserved as it is or should the present available water spread be maintained on a reasonably dispersed basis. It is not possible to rejuvenate all water bodies or service each of them with water supply. Many of them are far too small to make any worthwhile impact on the aquifer. Should tiny water bodies or cesspools in the midst of *abadi* areas be preserved or should they be filled up and maintained as green? The lost water spread is recreated elsewhere where it can be part of a larger water body and be maintained perennially as well?

Awareness about the surface water bodies of Delhi and their potential is extremely low both in the government as well as in the public mind and there is a general apathy on all fronts.

Proposed Action Plan

With the above background a plan of action has been proposed. The plan of action, once accepted, is to be closely monitored by the Hon. High Court.

The first requirement is to draw up the institutional arrangements under the aegis of which sustained work can take place where all the concerned agencies can be represented. As such it is proposed that a Lake Development Agency/Authority [LDA] may be set up in Delhi on the lines of a similar Lake Development Authority in Bangalore. This may be headed by the Development Commissioner, Govt. of NCT Delhi, as most of the water bodies fall under the jurisdiction of the Development Department. Representation from DDA [Planning and Landscape Departments] is essential. Other major representation would be required from Delhi Jal Board, MCD and Department of Tourism, Delhi. Further, representatives from CPWD, ASI, Railway authorities and UP Irrigation department may be designated for representing their agencies when required. The Authority may be endowed with a small secretariat. NGO representation is strongly advised.

The objectives of the LDA are outlined here and may be further deliberated:

- To establish a mapped database of all water bodies based on satellite imagery [IRS 1D LISS and PAN merged imagery] of October, 2003.
- To draw up or consider plans for preservation and maintenance of waterbodies and water quality and surrounding development.
- To monitor changes in waterbodies deciding each

case on merit.

- To enforce preservation of water bodies (size and water quality).
- To promote awareness about Delhi's water bodies.
- To actively seek opportunities to enlarge the water spread in Delhi.
- To draw up plans for the use of water bodies for decentralized water supply and/or recreation and/or as biodiversity habitats.
- To draw up a phased program of action over a five year period.
- To arrange for funds for implementation from various sources [Court directives in this regard to Delhi Govt., DDA, MOEF, Ministry of Tourism (GOI) would be required].

The LDA's NOC would be required for any actions (public or private) which have implications for water spread, location and water quality or change in land use of any water body. If unilateral action is sought to be effected by any party the LDA could resort to police help in this regard. The directives of the LDA may be considered as binding on the District Commissioners and BDOs and other agencies. Other powers to impose fines etc. could be elaborated subsequently. Chief Secretary, Govt. of NCT Delhi and Vice-Chairman, DDA may be directed to provide annual budgets sought by the LDA. Time Frame for establishing the LDA may be 2 months.

Components of Action Plan for Each Waterbody :

The following actions can be elaborated with regard to each water body in any combination after due consideration:

- De-siltation.
- Water Augmentation by linkage to canals, storm water drains or recycled water supply from Delhi Jal Board Sewage Treatment Plants or removal of water logging/floodwaters. (e.g. Model Town linkage to Jehangirpuri Marshes)
- Up-gradation of water through various bioremediation techniques including fisheries.
- Sustainable decentralized water supply in rural areas by shallow tube wells based on the recharge effected through water bodies followed by decentralized treatment [this would create a major stake in the sustenance of water bodies].
- Landscape and/or recreational facilities to be incorporated with water bodies to make for visual attraction as well as public interest.
- Revenue generation aspects should be considered. The historical water bodies are to be considered as sacrosanct and the concerned agencies are to draw up

action plans for improvements for submission to the LDA within next 2 months. These are Hauz Khas [DDA], Hauz Shamsi [ASI] and Old Fort Lake [DTDC, DDA and ASI]

The Large Lakes: Action Plans are to be submitted within next 4 months with regard to Sanjay Lake [DDA], Bhalaswa [DJB/DTDC], Naraina, Harinagar and Jehangirpuri Marshes by other concerned agencies. With regards to Najafgarh Jheel [most of which is lying on the Haryana side of the common border] the LDA would interact with the Haryana authorities to effect improvements. The action plans for these lakes should be prepared in 4 months.

Village Ponds: Consolidation of waterbodies within the revenue boundaries of a village:

- Water bodies located within urban area limits of MPD 2001 within village *abadi* areas and of less than 4000 sq.m surface area may be reclaimed as green areas. 50 percent of the reclaimed area is to be maintained as green and 50percent for public social amenities.
- Water bodies located within *abadi* areas in villages beyond the limit of MPD 2001 and of less than 4000 sq.m surface area may be reclaimed as green areas. 50 percent of the reclaimed area is to be maintained as green and 50% for public social amenities. However, simultaneously the reclamation has to be accompanied by the creation of a new water body of twice the reclaimed size within the revenue boundaries of the village.
- Where possible in rural areas the separate water bodies of small size should be merged (unless there are strong topographical reasons for existing siting) and consolidated with the larger waterbodies within the revenue boundary of the village. The following advantages would accrue:
- a larger water spread would create larger all round recharge potential.
- fewer water bodies would result in better management through more focussed effort.
- fewer water bodies would offer better engineering possibilities of sustaining these water bodies through linkages to storm water channels, canals and treated effluent plants.
- there would be greater visual interest.
- · richer bio-diversity habitats.
- larger water bodies would offer revenue potential.
- larger water bodies would offer greater possibilities of decentralized water supply.
- the above factors would generate greater public awareness and interest in the water bodies.

In the case of effecting such consolidation the sourcing of waters for round the year maintenance of water spread would be a prime consideration. Fresh sitings can also be based on the recharge characteristics of the proposed location.

- Diversion of sullage inflow from village ponds has to be ensured.
- Village ponds are to be focussed village-wise and village specific solutions are to be sought in each case.
- Village-wise action plans are to be framed over the next two years and the implementation program is to be spread over 5 years.
- Beyond the 20 km arc of the Delhi Airport air funnel [mainly in north and northwest Delhi] larger water bodies are to be developed as bio-diversity habitats especially for migrant birds. This would help in generating public interest in these water bodies.

New Water bodies

Delhi has faced severe loss of water bodies in the last four decades (e.g. half of Bhalaswa Lake, part of Jehangirpuri Marshes and depressions in Dhirpur) and an attempt be made to create new water bodies as a replacement for lost water spread.

These water bodies are suggested as follows:

- Reviving Najafgarh Jheel in collaboration with Haryana Government.
- The depression in master plan green in Dwarka can be linked to Najafgarh Drain and recycled water from Dwarka STP to create a 2.5 km long lake to build up the aquifer at Dwarka.
- Bhatti mines have been scarred with several abandoned quarry pits. Of these four pits (No.s 2, 10, 11, 12) having a storage capacity of 2.2 MCM, can be modified, linked together and be filled with rainwater as well as treated effluent from Mehrauli STP.
- Creation of reservoir in Yamuna floodplains to store and recharge the monsoon flood flow.
- In ridge area south of Sainik Farms.
- On various storm water drains.
- On Mundela Depression in Najafgarh Block.
- Downstream of Satpula Dam in Saket Area.
- At Mehrauli east of Ali Quli Khan's tomb.¶

Self Help Groups : A Successful Alternative for Poverty Alleviation

JYOTIKA KHIMTA

ABSTRACT

The greatest challenge to any civilized society is the social deprivation it harbors in league with economic deprivation. It is inescapable that a collective war is waged to banish human deprivation from our midst. No other weapon can be more potent for this attack than building human capital amongst the deprived, through sustainable development initiation. This paper discusses the role of micro credit banking as an effective tool in poverty alleviation program in India with supporting case studies from the Himalayan State of Himachal Pradesh in India that sustains heavily on subsistence farming in ecologically sensitive remote parts of the region.

Indian scenario

Eradication of poverty has been one of the greatest challenges and primary objective of the welfare state of independent India. The government has induced a plethora of welfare schemes for eradication of poverty but the actual achievements could not conform to the expected benefits projected for the targeted populace. Indian experience of post independence era shows that non-involvement of people in development activity has led to an attitude of total dependence on Government; leading to a lack of pro-active behaviour and accountability that result into failure of many such development programmes. Subsidy oriented schemes have always allured the masses and plunge them into inactiveness. Majority of these schemes have a downward flow, that is to say, tailored by policy framers who overlook the ground realities and people-centric approach.

Jyotika Khimta is currently working as Project Officer for 'Women's Development Cell' of the Himachal Pradesh State Cooperative Bank Limited at Shimla. A theatre and radio artist, she is also a news presenter with Prasar Bharati at Shimla and is actively associated with NGOs, Integrated Child Development Schemes and with Agriculture Cooperative Staff Training Institute as a resource person

Indian Financial System

The poverty alleviation schemes are mainly of two types; one the total grant schemes and other the schemes with the financial assistance from banks in terms of loans or working capitals. After the nationalisation of banks in 1969, banking services witnessed a total reform shifting from economic/ financial banking to *social banking*. But it is also a fact that despite having enhanced their activities in rural areas, the beneficiaries of these schemes were mainly the middle upper crest of society, large farmers, industrialists etc.

The poor masses specifically the marginal farmers/ tenant farmers/ landless laborers, rural artisans and the un-employed youth who were unable to furnish securities/guarantees for the loans/advances were mostly ignored. A particular feature of the Indian banking is that women, who constitute almost half of the population of the country, one third of the work force and one tenth of the wage earnings, have been left totally un-covered by banking services. The credit system being very formal and complex was inaccessible to this particular segment and hence the poverty alleviation programs with credit facilities from banks had lost in their outreach and essence. Micro credit innovation with special reference to Self Help Groups has come up as an adequate alternative for all these hurdles in implementing poverty alleviation programs.

Genesis of the SHG concept

Professor Mohammed Yunus of neighbouring Bangla Desh is honoured as the pioneer of the SHG concept but the structure and working of SHGs in India have been accepted as one of the best in the world.

The National Bank for Agriculture & Rural Development (NABARD) along with an NGO 'MARYADA' (a Bangalore based NGO) was the first to initiate a pilot project in India. After its successful implementation it launched this scheme nation-wide in the year 1992. Today more than 2,800 partners including NGOs, voluntary agencies and government organisations have blossomed into the fastest growing and most cost effective micro finance institution in the country. It currently enables 1.56 crore poor families to have access to sustainable financial services from the banking system through a network of 10.79 lakh Self Help Groups, financing to the tune of Rs.3904.20 crore.

Philosophy of SHG

An SHG is a small informal group of seven to twenty members of a homogeneous economic background who agree to thrift a small amount of money every month, week or day (a few exceptions) and the same is lent to one of the group members on an interest. After six months of uninterrupted deposit, lending and proper repayment, the group is termed as mature enough for credit linkage from a bank up to four times of its own deposit at a liberal rate of interest and nominal formalities.

The credit can be utilized for consumer products as well as for income generation activities. No *subsidy* element is involved in the program. During its formation - NGOs/ voluntary agencies and individuals facilitate the group. However, certain banks have now entered into the field through SHPI (Self Help Promoting Institute) Scheme and groups are being formed and nurtured by them. The groups can be men, women, or mixed but majority of them turn out to be from among the women. In northern India, 75 per cent groups are women's and in Himachal Pradesh almost 90 per cent women constitute these groups.

Objectives of SHG

The following can be characterized the broad objectives of an SHG:

- · To inculcate a saving habit.
- To facilitate finance for the marginalized and unreached sections through banking services.
- To facilitate rural communities in income generation and self-employment.
- To organize small socio-economic units.

SHGs in Himachal Pradesh

Himachal Pradesh despite being a region of hilly terrain, tough topography and low-density population has established itself in the second place next only to Rajasthan in SHGs linkage programme in North India. Since the inception of this scheme in 1995, a total number of 13,228 SHGs have been financed to the tune of Rs.31.93 crore till 31st March 2004. It is pertinent to mention here that unlike other states where commercial banks have taken a lead, in Himachal Pradesh the State cooperative banks and Regional Rural Banks (RRBs) have dominated the Self Help Groups credit link program. This concept is attaining a real success in tribal districts of Kinnaur and Lahaul - Spiti.

Relevance of SHGs in poverty alleviation

The significance of SHG concept lies in its ability to tackle poverty alleviation in a cost effective manner through financial products and services that are tailored to the needs of rural people. No program had ever ensured peoples' participation or the personal stake of the beneficiaries before the inception of the SHGs. The savings incurred by the group members work as an adhesive and also create peer pressure to ensure repayment. Unavailability of subsidy amount is another positive feature. In subsidyoriented programmes, the general tendency is to grab the subsidy irrespective of the ultimate objectives of the scheme. The major advantage of the SHG concept is people's involvement and the confidence reposed in them, who themselves perhaps are not aware of their capacities and capabilities. A fine example of the strength of an organized collective action by a group of motivated people is analogised as under:

Number of groups formed till 31.3.2004: 13,000 approx.

Number of members in one group	:	12	average
Deposit per member per month	:	Rs 20	average

ANALOGY

Monthly deposit of one group:	12x20	= Rs.240
Monthly deposit of 13000 groups:	13000 x 240	= Rs.31, 20,000
1 year deposit of the group:	31,20,000x12	R = Rs.3,74,40,000
3 year deposit:		Rs.11,23,20,000
	(Reference:	: Himachal Pradesh)

The above example illustrates the influence of grouping together for achievement of a common goal with collective responsibility- the factors underlying the principle of building social capital. That too, by those commonly referred as *poor masses* who may not have even *seen* a bundle of Rs.10,000 notes in their life time! The attraction of the deposit is that the said amount above is a '*thrift*' not a *saving*.

Financial assistance in terms of loans is given to groups up to a maximum of four times of their deposit which by and large, asserts that approximately Rs.44.00 crore have been given to various groups as loans. This implying that a magnanimous amount of Rs.56.00 crore is revolving amongst the members and the same is being utilized for consumption as well as productive needs. No other poverty alleviation program in India carries such a large amount with it. Further, no other scheme caters to the *consumption* needs of the borrowers and this very fact, *restricts* the diversion of loans to any other purpose. Where as it is a common feature in most of the other schemes that the loan amount is diverted from its specified purpose. The idea highlighted in this method that the members are *free* to utilize the money according to their requirement ensures the right use of the funds and



definitely improves their *satisfaction* level. If the universality of the Maslow's Need Hierarchy is to be relied upon, it is unavoidable that the consumption needs are fulfilled first and thereafter the resources are managed for productive needs.

Another positive aspect of SHG is that unlike other schemes, it allows flexibility to the members to choose the income generation activity according to their taste, skill and productivity leading towards perfectionism. This helps in solving the marketing problems too as the members produce goods for which easy market is already available. Local market places usually referred as *bazaars or haats* serve this purpose very well.

The success of the program can be determined by the fact that the groups come ahead for repeat loans indicating rising income as well as production levels.

Social upliftment

Whenever we talk about a poverty alleviation programme the general tendency is to understand the concept as an economic activity and enhancement of income through skill development or financial assistance. This often leaves the social uplift an untouched aspect, whereas social and economic



development are like Siamese twins, hard to separate. According to the well known Maslow's Need Hierarchy principle - people attempt to satisfy their physiological needs (food, shelter and clothing) first and only thereafter they shift towards safety and social needs. Lower level needs must at least partly be satisfied before higher level needs emerge. Maslow separated the five needs in to lower and higher levels. Physiological, safety and social needs were described as lower order and esteem and self-actualization higher order needs. But in contrast, SHG concept has been credited for its twin benefits of gratifying lower and higher level needs simultaneously. The consumption needs are satisfied by the corpus of group saving or Bank loan and the desire to belong, to associate, to gain acceptance, affection etc. are attained by the group dynamism. In this way, economic and social benefits are attained at the same time. The Kangra district of Himachal says it all. The contribution of SHGs in eradicating social evils like eve-teasing, intoxication, women's suppression, foeticide etc. cannot be ignored. In addition SHGs have given such a platform to members where they converse and discuss their personal and social problems. Nâsha Nivaran Abhiyan (anti-alcoholism), Sakshârâta Abhiyan (literacy campaign) and family planning program are some of the success stories of many groups. The deep-rooted menace of untouchability has started loosing its clutches, as members from all parts of the society constitute a group.

Psychological Gains

At first appearance, the SHGs seem like a small economic unit with a common interest of thrift and credit, but on further analysis of the actual working system of SHGs, the said economic unit sparkles as the custodian of an *Indigenious Knowledge System*. Indigenous knowledge (IK) is generated by local people through their day today experiences in facing challenges of society, nature and economic deprivation (Warren, D.M. & B. Rajasekaran). In the race for economic development, indigenous knowledge (IK) has come almost at the verge of extinction.

SHGs revive this concept in the sense that the responsibility of an animator/facilitator is limited to help members of the groups in understanding the system of thrift and credit whereas the rules, regulations and the working system are planned and implemented by the group itself without any interference of the animator. More interesting is the fact that all these rules are not formulated in one sitting, instead they are a result of knowledge acquired by people through accumulation of experiences, informal and intimate understanding of the problems and their solutions.

Imposing a fine on coming late or absence from meetings and on delayed payment of thrift are the finest examples of Indigenous Knowledge (IK) in such self-regulatory bodies. Formulation of these rules also implies that the decision-making capacity is enhanced and freedom is exercised amidst the groups, making them more confident in their day today dealings even outside the ambit of SHG. This very fact is more relevant to women as within family boundaries they are not allowed to exercise their power of decision-making probably due to male dominance. Freedom to handle the money independently and easy access to money (which very often is used for consumption needs of the family) has raised the status of women in many families. The role of women has shifted from a mere implementing agency to an active partner in the decision making process at home as well as at the social front. That is why SHGs are also considered synonymous to Women's Empowerment, Gender-Sensitization and of course the Poverty Alleviation Program.

There was a need for a welfare program wherein the amount of assistance (financial or non financial) must reach the beneficiaries in totality, without any leakages in the pipeline. SHGs have established themselves as a unit of ideal administration resulting in the optimum use of funds flowing in. Federations of SHGs in Andhra, Karnataka and Maharashtra have set fine examples. The cooperative societies that were failing due to various reasons were rejuvenated with the help of SHGs. The banking services have been extended through Farmer-Clubs and various training centres which impart vocational training to group

Case Study

Mohini Rana, a housewife in village Barsu, Tehsil Mandi felt the need for employment when her husband lost his temporary job way back in 1998. But Mohini was not allowed to go away from her village, as women of her family were not supposed to work outside. In the meantime she came to know about SHG concept from Gian Vigyan Samiti and later from the then Manager of the H.P. State Cooperative Bank (H.P.S.C.B). Branch Office Ner Chowk, District Mandi (H.P.), the nearest bank in the area. With their help she formed a group called Jai Bhole Shankar in July 1999 with a total of 14 members collecting Rs.20 per month per member. The first loan raised from the bank was Rs.8000, which was distributed amongst three members including Mohini. She bought a cow and started earning Rs.400/- per month by selling the milk. Inter loaning from the group was another source of financial support for very small activities like vegetable growing, knitting, mat making etc. The second loan was given for Rs.50,000 and four members bought high bred Jersey cows for them. To ensure cost effectiveness, a system was evolved to collect all the milk from the village and every day one member went to the nearby market for selling it. Two members bought sewing machines and the other members made it a point to give all their tailoring work to them.

Inspired by the success of this group, the people from adjoining villages also got interested in the SHG formation. Mohini Rana took a lead and formed four new groups all linked with HPSCB Ner Chowk. Such overwhelming response inspired the Bank and NABARD to form a Farmer's Club. Finally the *first women's Farmer club* of the State was formed in the year 2000 named as Mahila Kisan Club, Badsu with Mohini Rana as its Chief Volunteer. Formation of this club was a turning point for the area. The club came up with various developmental activities, literacy campaigns, gender sensitisastion issues, community development activities and so on. Initially the women faced opposition from men as they tried to influence the decision when they shifted from traditional crop structure to modern technology but after the fruitful results the male population also started supporting them.

Today the club has become an icon and the pivotal point for all government agencies working in that area for welfare schemes. Free demonstrations for plantation of trees from Forest Department, Horticulture Department, new technology for crop system from Agriculture Department, free hybrid seeds, latrines on subsidized cost, soil conservation, afforestation; a non-ending list of occulted benefits is there to honour the club. In Himachal Pradesh, when the polythene bags were banned in March of 2004, the club saw it as a business opportunity. A one week workshop of paper and cloth bag making was organized with the help of NABARD and HPSCB under the spot & support programme and today every trainee earns approximately Rs.15,000 per month on an average The volunteers of the club are invited by other clubs all over the State for inspiration and guidance and these are the women who were once denied the opportunity to work outside the village. The said change has taken place within a short period of four years.

members and thereafter extend them financial assistance for setting up their own micro self employment units.

NGOs and Voluntary Agencies have been getting grants from various quarters to form and nurture SHGs They implement their developmental activities with the help of these groups, especially in rural areas.

However, certain safeguards are required to prevent this system from getting misused. NGOs in particular have been given a lot of financial assistance for the formation of SHGs and this grant allures them to enter the field without perfect know-how and experience, resulting into poor nurturing of the groups. Further, certain influential people specially Gram Pradhans (village chiefs), people from upper castes, mahajans (money-lenders) and politicians influence the groups and exploit them for vested interests. Inspired by the success of the SHG-concept, various government departments have started implementing their schemes through SHGs that may again result into haphazard formation under target-oriented approach. Since there is no upper limit fixed for SHG saving, some affluent people are joining the groups for easy and cheaper loans. Such issues require serious consideration so that the very essence of the SHG concept is not polluted.

Despite all, it would not be an exaggeration if SHGs can be credited for, 'INCLUDING THE EXCLUDED'.¶

Notes and References

Maslow, A. 1943 "A Theory of Human Motivation". Journal of Humanistic Psychology

Warren, D.M.;Rajasekaran, B. 1993 "Putting Local Knowledge to Good Use". International Agricultural Development, Vol.13 (4)

Sustainable Solutions



Post Earthquake Rehabilitation

YATIN PANDYA

THE PROJECT

The project aimed at post earthquake rehabilitation of the entire village in a holistic, sustainable and participatory manner.

The development included housing, infrastructure, amenities, craft rejuvenation, education and employment generation as well as resource management.

The physical structures to be built included 455 traditional circular dwellings called *bhungas*, three schools, a bank, community structures, production centres, religious shrines, provision for house-to-house sanitation, electricity network and water harvesting through ponds and check dams.

CONTEXT

On 26th January 2001, a devastating earthquake measuring 6.9 at Richter scale struck the state of Gujarat in India. The worst hit was the desert region of Kutch and it left more than 20,000 people dead and millions homeless.

A hot arid climate and a desert like terrain mark the region of Kutch leaving a very limited natural resource base for sustenance. However, the people of Kutch are full of resilience, self-esteem and dignity. They are endowed with rich skills and engage in handicrafts such as embroidery, weaving, carpentry, leatherwork, clay work and metal craft. The hamlets that spread over the remote areas of this desert have an exotic culture with a unique way of life. The houses are generally circular in plan, built with

Yatin Pandya is an architect who worked as Project incharge and Principal designer in the Ludiya Rehabilitation project at Vastu Shilpa Foundation, Ahemdabad.



Outdoor view of the settlement

adobe blocks and a conical thatch roof and are richly embellished with clay and mirror work relief. Thus, it sets a complete milieu of art, culture and architecture symbiotically interwoven with each other and hard to break apart. It was therefore imperative that any redevelopment effort was holistic and did not disrupt these established systems or break the chain of sustenance. Continuum of long established traditions yet introduction of the element of "new" for progressive change was the need of the situation.

A number of government and non-government organizations took up the initiative to adopt and sponsor the rehabilitation of these villages. Gandhi nu Gam at Ludiya was one of the sixteen villages where Vastu Shilpa Foundation was involved with the rehabilitation process. The other development partners included the Manav Sadhna (an NGO) and Gujarat Mineral Development Corporation (Government department).

PROJECT DESCRIPTION

The Philosophy and Approach

As a rehabilitation effort, the project had definite constraints as well as opportunities. One of the key responsibilities was to ensure a holistic rehabilitation that encompassed socio-cultural, economic as well as shelter systems. A living environment is a sum total of these. Appropriateness of each system to its inhabitant's way of life is vital for a sense of belonging and sustenance. The other aspect was to ensure and maintain the continuity of traditions, which, once functional, was disrupted overnight due to external forces. The development process had to be participatory involving end users in all key decisions concerning choice of relocation site, settlement pattern, clustering, choice of dwelling location, dwelling type, its construction, provision of amenities as well as environmental management. On the other hand, as a new development, there were opportunities for becoming an agent of change especially upgrading the infrastructure and environmental conditions. At Gandhi nu Gam, Ludiya, a decent balance of all these was ascertained through intense interaction with the beneficiaries as well as an in-depth understanding of the context.

DEVELOPMENT SEQUENCE

Initial Survey

The Village of Ludiya was evaluated following the earthquake not only for the damage and the general living conditions but also the social and physical infrastructure that exist there. Plans for action were rapidly established.

Social Structure

- The village was essentially found to be clusters of different communities, with varying family size and different degrees of interaction.
- The occupation of people was mainly craft based. Some were agriculture labourers and others cattle breeders.
- Due to the calamity, employment was badly affected. For craftsmen to go back to their trade, they needed assurance of livelihood and other facilities.

Economic Structure

- Building industry itself could become an employment source.
- The craft industry required networking for provision of raw materials and marketing of finished goods.
- Training of artisans and craftsmen.

Amenities

- Inadequate and sometimes unavailable amenities and facilities - Multi- purpose community space/ school/ primary health care/ craft training institute/ women and child welfare activities.
- Needed to identify facilities that help villagers enrich their economic and social standing -Water supply, rainwater harvesting/ treatment and recycling wastewater.
- New technology and equipment to assist and augment occupational production capacity and lifestyle Well-equipped workshops, smokeless stoves, solar lamps.
- Provision of basic amenities for health and medical

care in an appropriate and informed manner -House to house sanitation

Water Shed Management

There existed potential for watershed management by constructing check dams over Ludiya, Mepai and Gova rivers, deepening existing ponds, digging wells, and building underground water tanks and creating a water management committee for repair and maintenance of it all.

TRADITIONAL EARTHEN DWELLINGS

Bhunga as Earthquake Resistant Structure

The circular house known as a *bhunga*, is traditionally built with adobe walls and a conical thatch roof. Over the years the villagers have mastered the technique of building this unique typology of dwellings using local resources for its construction. The dwellings show traditional wisdom in a number of ways. The thick earthen walls keep it cool in the harsh desert climate, while the circular form renders it cyclone and earthquake resistant, the compound clusters suit the rural life style and use of local materials make it sustainable. Each dwelling consists of a cluster of two to three such circular bhungas over a plinth compound. The clay and mirror work decor on the walls render them an aesthetically pleasing vernacular architecture.

Unfortunately, in recent past, in the name of modernization the younger generation of villagers has discontinued with this traditional dwelling type in favour of more urbane rectilinear stone and concrete houses. Ironically, after the earthquake, the newer/ modern rectilinear structures were destroyed while the traditional circular ones withstood the thrusts of earthquake and stayed on mostly unaffected.

These traditional houses have outlasted the earthquake due to its engineering wisdom. The circular form, low slenderness ratio through low height and thick walls, small openings, plinth buttressing, organic reinforcement as ties, light weight conical thatch roof with ring and radial ties and homogeneity of material (mud) with earth all contributed towards rendering this dwelling type as earthquake resistant.

Social Rapport

Establishing a relationship with the people on a social front to develop a rapport and sense of fraternity was necessary to facilitate an open working-relationship



Bhunga community

and understanding. Setting up an office in the village and living with the villagers gave them an assurance of commitment to the cause of rehabilitation creating a bond of trust and also gave us a first hand experience of the nuances of their lifestyle and the intricacies of the context.

Discussions and consultations have been a part of a two way education process.

Such exercises helped in motivating people and brought us an understanding regarding the requirements of the relocated settlement. These also led to establishing the parameters of the area and extent of the site, the number of plots needed and the facilities required both on paper as well as on-site.

Site Selection

The site selection was based on several key factors that helped with the development of new community infrastructure and improvement in the communities' physical and social relationships. For instance, 1) The Harijan community had reached the physical

limits of its allocated land, as a result further growth had to take place on a separate site. This resulted in the fragmentation of the community into Juna-Vaas, the old land and Nava-Vaas, the new land. During site selection this was taken as an opportunity to bring the community closer together.

- 2) The Muslim community donated land to the Harijan community so that they could expand and be more comfortable.
- 3) The new site was located closer to the existing road for better access.
- The topography was taken into account for selection of the site. An existing depression in the land close to the selected site was used effectively for water harvesting.
- 5) The new hamlet was located centrally among the existing settlements to make a more connected and coherent village.

INTERACTIVE SITE PLANNING PROCESS

Many steps went into the site planning process to ensure a thorough and responsive result. This included -

 Conducting a reconnaissance study to ascertain and understand the existing conditions in the community: the physical layout, demography, socio-cultural and economic aspects and any unique or characteristic features of the place or people.

Discussion between architect Yatin Pandya and the community



- 2) Motivating the people and discussing their needs, aspirations and requirements.
- Translating the requirements and aspirations in terms of elements in the built environment, determining the parameters of the required area, number of plots and facilities required.
- 4) Identifying and acquiring the land for resettlement, and assessment of its site features.
- 5) Proposing a site plan based on an understanding of the rural built environment-clusters organized around open spaces. This was done taking into account the relationship between the people of each plot, the road and site features.
- Discussion of the initial proposal with the end users and gathering reactions and feedback. Communication was facilitated by the use of a simulation kit.
- Analysis and understanding of the feedback to ascertain the priorities and necessities so as to establish a basis for the layout design.
- 8) Reorganization of the layout with the feedback incorporating reactions, and also introducing community open spaces, respecting the relationship of plots/spaces and the sequence of arrangement of the plots on the site.
- The process of feedback reorganization continued till the satisfaction of the end users.
- 10) The layout simulation kit was taken to the site for reconfirmation and better visualization of the layout and on- site improvisation.
- 11) Pegging and laying out of typical plot corners for estimation of actual plot size in reality, shape and orientation.
- 12) After finalization of the layout to the community's satisfaction, the experiment of the simulation kit was frozen and then translated to a scaled drawing, ready for execution.

THE RESULTS

The resultant outcome of the participatory process of incorporating the feedback from the users in the evolution of the layout at a schematic level took into

DETAILS OF A TYPICAL UNIT

consideration the internal relationships and proximity of the people, at the same time evolving a holistic and totalitarian settlement.

The Simulation kit

The apparatus used as the experimental kit for simulation of the layout consisted of a Styrofoam base with the scaled extents and features of the site demarcated on it. Coded pieces of cardboard scaled to the ascertained size of the plots were kept handy. Three-dimensional scaled simulations in Styrofoam were also used for public institutions based on the design. Paper of the same colour was used for demarcation of roads, organized open spaces etc.

The entire setup was then held in place on the base with the help of tag-pins. The pins facilitated their being anchored to the base without getting blown away in the wind, but at the same time were free enough to be moved around and shifted to different places on the base. This helped in getting the villagers' feedback on the design layout. Thus, this simple but practical simulation kit not only helped the villagers visualize the layout and relationship network, but also catalyzed their involvement in the process.

Local Materials and Construction Techniques

Due to the quantum of *bhungas* to be built at one time, a large quantity of material was needed at once. In order to accommodate this, a material bank was set up collecting wood, grass, earth and cow dung necessary for the construction of the *bhungas*. Although much of the earth with specific properties and cow dung was brought in from surrounding areas, the only cost incurred was that of transportation. The remaining earth was excavated from areas adjacent to the site.

Various combinations of materials were combined to create blocks and building components with different properties. Appropriate technology from such studies was adopted to manufacture the blocks on site.

Self-help Construction Process

The inhabitants themselves carried out the labour work for the construction at site. The sponsors provided a fixed amount of funding for each family for the process.

There were several steps involved in the construction process, and all members of the family and community participated.





- 1) **Mud block fabrication**. The sun-dried blocks were made in bulk using the ram and these contributed to the materials bank.
- 2) **Setting out**. Each family was responsible for setting out the unit on their plots, and began foundation excavations. Their familiarity with the process of doing it helps them to execute it intuitively.
- 3) **Wall Construction**: The walls of the *bhunga* were constructed, using the blocks from the materials bank and mud mortar prepared on site. The other components, such as windows and doors were also made on site. Familiarity with the

construction method helped each inhabitant participate in his or her own way.

- 4) **Wall plastering and finishing.** The walls are finished using a composite plaster of cow dung and mud and the layers then applied by hand. The last two layers are done with Banni mud chosen for its unique characteristic that gives a better finish.
- 5) Thatch roof assembly. The roof is constructed with a bamboo frame and wild grass top layer. Clumps of this grass are tied and braided into the framework. The specific characteristic of this grass makes it impermeable to water yet helps the space within, to be well ventilated.





- 6) **Plinth Construction**. A raised platform is constructed around all the buildings that make up the dwelling compound. It is built of stone rubble, mud or block and finished in plaster.
- 7) **Personalization and Ornamentation**. In the last step, inhabitants decorated their *bhungas* in their individual style and preference. Relief work as well as coloured patterns ornament the interior and exterior of the *bhungas*.

ACHIEVEMENTS AND INNOVATIONS

Participatory Design and Development: Users were involved in key decision areas such as selection of

site, location of plot on site, neighbourhood planning; plan configuration, provision of amenities and house construction. Thus appropriateness of the built form resolution and sense of belonging was extremely high.

Continuum of Tradition as well as Opportunity of Change: Culturally and environmentally, appropriate aspects of built form and neighbourhood were retained, i.e. clustering within settlement, dwelling forms and materials; while the opportunity for introducing newer dimensions for improved living conditions was seized. For example, provision of smokeless stove for healthier kitchen environment, solar lighting and house-to-house sanitation for comfort and hygiene were included.

Sustainable Development: The settlement is rendered sustainable through design by way of its sociocultural appropriateness; through construction technology by way of its favourable climatic performance in hot dry dessert climate; and through resource management by way of water harvesting ponds, check dams agricultural cultivation as well as solar lighting.

Integrated - Holistic Development: As a rehabilitation effort it was important to reinstate the entire living environment and recreate the networks that sustained it. Hence, not only the houses but through their clustering their social interaction was reinforced, clustering also provided for their occupational and economic work activity provisions and requirements, water needs were supported through rainwater harvesting and check dams, solar lighting provided for the decentralized self sustaining electricity. In addition, infrastructure and amenities were also provided to cover house-to-house sanitation, grass bank for cattle, schools, health centres as well as shrine and community hall. Craft tools and marketing support was also provided for economic sustenance.

View of Achar courtyard





Interiors



Interiors

Appropriate Technology: The technology employed relied on local resources and traditional wisdom. It not only ensures its subsequent maintenance by users themselves but also remained earthquake resistant as well as climatically most efficient. Earthen walls, round shapes, thick and dwarf walls, conical roof, small openings, five layer plastering and homogeneity of material all render them earthquake resistant as well as cool in hot dry climate.

All said and done, it is this intervention, which prevented the people, who troubled by successive droughts and then their only shelter devastated by the earthquake, from migrating to areas near the city. It has, due to the retention of their unique habitat, resulted into it becoming a tourist destination. It has again rekindled hope in them regarding the area and the potential it has for them an oasis in the desert.

Replicability and Wider Impacts

Participatory approach to design, idea of holistic development with water harvesting and adequate infrastructure as well as the concept of using local material and know-how has been applied to a number of resettlement projects.

Even adobe houses (circular *bhungas*), which were not recognized by the authorities as permanent dwellings until then have been accepted now, as well as promoted by the authorities as earthquake resistant structures.

The project had initially begun for twenty families with 60 traditional *bhungas* but after the first successful demonstration it was extended to cover 455 dwellings.¶

Notes and References

Vastu-Shilpa Foundation for Studies and Research in Environmental Design is a non-profit, non-government organization registered as a Charitable Trust and Society. Founded in 1978 by Balkrishna Doshi it is actively involved in research and application of architectural theory and design for sustainable development.Vastu-Shilpa Foundation has received a number of National and International Awards for its pioneering work and societal concerns. Manav Sadhna is a Charitable Trust and an Ahmedabad based NGO involved in the development and upliftment of the poor and downtrodden of the society following the philosophy of Mahatma Gandhi.

Council for Advancement of People's Action and Rural Technology (CAPART) & Gujarat Mineral Development Corporation (GMDC) were the financial partners in the project.

A Partnership Approach to Local Energy Management between European and Asian Cities

PETER WEBBER, VASCO FERREIRA, MANUEL PARDO, DON LACK, LUIS CASTANHEIRA

Abstract

In Europe, several local areas have years of experience in implementing local energy and greenhouse gas management policies, addressing national and international climate change targets. For example, in Leicester, UK, local strategies and measures have been implemented over several years to improve energy efficiency of the Council's own operations and to manage city-wide energy consumption and greenhouse gas emissions. Recently, Leicester participated in a European Commission funded project in India.

The project aimed to provide support at the local level with developing a framework to minimise energy-related contributions to climate change and air pollution, while giving quality of life benefits. It has used a partnership approach between Leicester, Vila Nova de Gaia municipality in Portugal, and Rajkot Municipal Corporation, India. The role of each local agency in energy management has been investigated. This included a baseline assessment of local energy use, renewable energy options and climate change issues in each partner city. The most locally relevant energy technologies were selected and their implementation discussed in the local workshops involving a range of organisations and individuals, with actions being identified to improve the local management of energy, such as raising awareness and ensuring easy access to information.

Peter Webber, Manuel Pardo and Don Lack are working with Leicester Energy Agency (Leicester City Council), UK Vasco Ferreira and Luis Castanheira are working with ENERGAIA (the energy management agency of Gaia), Rua Cândido dos Reis, Nova de Gaia, Portugal

Introduction

There have been an increasing number of energy and greenhouse gas emissions targets at national and international levels and frameworks to support measures to meet these targets have been developed. For example, the European Union has a target to reduce greenhouse gas emissions by 8 percent of 1990 levels by 2008-12, under the Kyoto climate change agreement. At national level, within Europe, strategies and policies have been developed further in recent years to address climate change and sustainable development issues. Also, action on managing energy consumption and greenhouse gas emissions at the local and regional level in Europe and elsewhere has been increasing and making a contribution to national and international targets.

A recent European Commission supported project helped to address issues related to climate change and sustainable development, particularly those connected with meeting increasing energy demand in Europe and Asia and the consequent impacts on the environment. The aim of the project was to develop a framework for minimising energy-related contributions to climate change and air pollution while improving the quality of life and developing partnerships through the use of renewable energy in cities in the UK, Portugal and India.

The objectives of the project 'Partnership support for renewable energy between European and Asian towns' were:

- To develop an appropriate framework to undertake renewable energy initiatives.
- To promote sustainable development through partnerships and the involvement of the public and local business.
- To reduce negative environmental impacts related to energy through good practice, increased awareness of alternative energy and energy efficiency.

The project draws from the experience of two local areas in Europe - the City of Leicester, Vila Nova de Gaia municipality, Portugal) and the local government of Rajkot, Leicester's twin town in Gujarat, India.

Methodol ogy

Initially, the project partners undertook background research into local energy supply and use in their towns in order to establish a baseline for the project, giving a better understanding of the local energy situation and possible requirements in each town. Information was gathered on existing areas of energy use and supply, use of renewable energy, energy efficiency and on climate change issues in the partners' local areas. Also consideration was given to the perspectives of local residents and businesses to renewable energy, and the local potential for different renewable energy technologies, and possible social and other non-technical barriers for renewable energy and energy efficiency were also considered.

An important part of the project was to contribute to raising public awareness on the potential for new and renewable energy projects at the local level. Recognising the value of practical examples of local implementation of the technologies a number of local energy-related case studies were developed and training material was made available, for example for use by workshop participants.

Seminars/workshops were arranged in each of the partner towns discussing strategies for the selected energy technologies. It was intended that the workshops be based on those in the European Commission funded SIREN project (e.g. Bilderbeek, 2002), which used a highly participatory approach involving delegates from local government, business representatives, energy technology experts and local community representatives/residents. This workshop approach helped with establishing a locally agreed future vision for renewable energy or energy efficiency and identified actions to address obstacles facing the uptake of individual energy technologies or projects.

Local energy management in Leicester

Under the Kyoto climate change agreement the UK has a greenhouse gas emissions target of reducing emissions to 12.5 percent below 1990 levels by 2008-12. Leicester is a city in the East Midlands region of the UK. It covers an area of 73 km², has a population of almost 300,000, and has an ethnic minority population of about 29 percent. The textiles industry has been a significant manufacturing sector in the city while other major industry sectors have included engineering, food and drink, and printing and publishing. 27 percent of employment has been in the public administration, education and health sectors with 24 percent in the manufacturing sector (1999). Leicester has several years of experience with implementing local energy and greenhouse gas

management policies, addressing climate change targets. In 1990, Leicester became Britain's first Environment City, with the aim of promoting sustainable development in the city.

A range of local strategies and measures have been implemented in Leicester to improve energy efficiency in the Council's own operations and to manage citywide energy consumption and greenhouse gas emissions (e.g. Fleming and Webber, 2004). The City Council developed an Energy Action Plan, and produced its city-wide energy strategy in 1994 (LCC, 1994) which considered both energy supply and demand and means of working towards the City Council's target of reducing energy consumption in the city by 50 per cent of 1990 levels by 2025. Leicester also has a target for 20 per cent of Leicester's electricity to be obtained from renewable energy sources by 2020. In 1996 the Leicester Energy Agency was set up with support from the European Commission's SAVE II programme, to implement the strategy's recommendations.

To contribute to existing strategies and targets Leicester City Council carried out a number of activities to improve energy efficiency and manage energy consumption in the domestic, non-domestic and transport energy end use sectors. Energy advice and information has been made available, opportunities for improving the local management of energy through the planning system have been considered. Also, specific measures have been carried out in support of renewable energy. For example, the City Council has set up renewable energy demonstration projects (solar water heating panels, passive solar lighting techniques, and the use of photovoltaic panels), and the Council has purchased a share of its electricity requirements from renewable energy sources.

Energy management in Vila Nova de Gaia

The Portuguese Government has a National Energy Strategy to support a sustainable economic growth. Portugal is increasingly dependent on imports of fossil fuels (especially oil) and on the other hand the energy intensity of the economy is significantly higher than the average of the EU-15 member states (CM, 2004). Therefore the Government decided to launch an action plan that is aimed to reduce the energy consumption of the economy for the same level of production, and at the same time reduce the importance of oil in the primary energy. The action plan sets a 20 per cent reduction target for energy intensity by 2010.

Gaia is the largest municipality of the Porto metropolitan area. It has a population of more than 287,000 and covers an area of 171 km². Major industries in the area are retail, food and drinks, automobile components, services and tourism. It contains a mixture of urban and rural areas. Over 329,000 tonnes of oil equivalent (toe) are used in Gaia, with about 1.2 tonne per capita energy consumption. Energy demand has been rising and has increased at a rate of 7 per cent per annum in the last decade. While energy supply relies heavily on fossil fuels about 9 percent of total energy supply is met by renewable energy sources (Energaia, 2000).

In 2000 ENERGAIA, the energy management agency of Gaia, was set up with the support of the municipality and European Commission's SAVE II programme. Since then, there have been a number of local policies and measures in Gaia to support the implementation of energy efficiency and renewable energy technologies. For example, energy management support has been provided to private sector companies, education on sustainable energy and energy management training has been available, and activities have been carried out to raise public awareness of energy-environment issues.

Energy in Rajkot

In India, as industrialisation and the standard of living has increased, energy demand has increased rapidly, e.g. from 8,000 petajoules (PJ) in 1984, to over 12,000 PJ in 1994 (RMC, 2003). However, the role of renewable energy in meeting the energy demand was recognised within India some time back when a separate Ministry of Non-conventional Energy Sources was set up. Though initially it was concerned with research, development and demonstration it has now become more involved with the commercialisation of renewable energy. Grid connected renewable energy provides 1 per cent of total electricity generation capacity in India (RMC, 2003). Climate change has begun to be included in national government policy, and energy efficiency and renewable energy are recognised as part of development activities in India.

Gujarat has an energy development agency which runs a number of subsidy programmes for renewable



energy and energy conservation, for example for a range of solar energy technologies and for energy audit studies in industry.

Rajkot is located in the west of India, has a population of about 1 million, and covers an area of about 105 km². Total annual per capita power consumption at the state level is 952 kWh (2001-02) (RMC, 2004a). There are a range of industries in Rajkot including the production of diesel engines and machine tools, foundries, engineering and automotive industry, and jewellery manufacture (RMC, 2003). Also, there is significant agricultural activity in the Rajkot area, and there are many shops and commercial establishments in the city.

Rajkot Municipal Corporation is the local government and is concerned with infrastructure in the city, while electricity supply is the responsibility of Gujarat State Electricity Board. The main sector of electricity consumption in Rajkot is industry (just over 50 per cent), with a third being residential, and just over 10 per cent being commercial uses (RMC, 2004a).

The Rajkot Municipal Corporation purchases

electricity for use in streetlighting, water supply and drainage, pumping stations, gardens, crematoria and Corporation building (RMC, 2003). Rajkot Municipal Corporation, recognising the increasing need for the efficient use of energy, regarded the project as an opportunity to promote sustainable energy and reduction in local pollution by raising public awareness and social networking (RMC, 2004a).

Key energy technologies identified in each town

It was intended to focus on a limited number of locally appropriate renewable energy technologies throughout the project and in the workshops that were held in each town. Information obtained on the local potential for different renewable energy technologies, local knowledge, and information gathered from discussions with workshop participants helped in the selection of energy technologies.

Leicester

The technologies in focus in Leicester were selected with help of consultation with workshop



participants, discussions, and the use of previous research (e.g. LUC and ITP, 2001). The renewable energy technologies with relatively large resource potential in Leicester were identified as:

• Solar energy, constituting passive solar design techniques, solar water heating panels and solar photovoltaics. There are some examples of the use of solar energy technologies in Leicester (e.g. the use of natural ventilation at De Montfort University's Queens Building, the use of solar water heaters on some of Leicester City Council's office buildings) and elsewhere in the East Midlands. However, there was found considerable potential for the further uptake of the technologies, such as the increased use of passive solar techniques in new housing and in new nondomestic buildings and those undergoing major refurbishment.

• Biomass energy. Some use is made of biomass energy in the East Midlands region, for example some wood is used to contribute to heating in housing and there has been an anaerobic digestion scheme operating at a sewage treatment works at Wanlip near Leicester. There is scope for further uptake of energy from biomass, locally. • Wind energy. Although there are no existing wind energy projects in the city of Leicester and the potential for this technology in the city environment is limited there is some potential in the wider East Midlands, for example for the application of small scale wind turbines at acceptable locations. It is considered there is some potential for further promoting the technology locally.

The renewable energy technologies selected for consideration in the project and workshop for Leicester, were:

- passive and active solar energy,
- · biomass energy,
- wind energy,

Solar and biomass energy were technologies identified as being particularly relevant locally in Vila Nova de Gaia and Rajkot also.

Vila Nova de Gaia

The potential for different renewable energy technologies in Vila Nova de Gaia were investigated in a recent European Commission funded OptiRES project. It is considered that renewable energies with particular potential in Gaia are solar energy and biomass energy. Within Europe, Portugal is one of the countries with higher annual solar radiation and a large number of sunlight hours setting the right conditions for the use of photovoltaic systems. There have generally only been small scale applications of photovoltaic, with very few photovoltaic systems being connected to the grid. It was considered that there is some local potential for the use of micro combined heat and power, for example for public buildings and sports halls with a high demand for heat and electricity or which can be supplied by the same power plant in a district heating scheme.

Portugal has a large potential for energy production using biomass. Biomass for heat and electricity production can be collected from woodlands, public gardens and parks and wood waste from paper and furniture industries. In Gaia there is a significant amount of biomass use for space heating, though it is hard to quantify it precisely because transactions of biomass for domestic use are carried out away from the marketplaces. Bio-fuels (such as biodiesel and bioethanol) also have a great unexplored potential for fuel and electricity production, (ENERGAIA, 2003).

The technologies that have been selected for consideration in the workshop in the project are as follows:

- · solar water heating,
- photovoltaic,
- energy from biomass and waste (wood, biodiesel and biogas),
- micro combined heat and power.

Rajkot

There is considerable potential for solar energy, tidal energy, wind energy, and biomass energy in the state of Gujarat, as shown by figures from the Gujarat Energy Development Agency (RMC, 2003). Given Rajkot's inland location it was considered that solar energy and biomass energy were particularly relevant energy technologies and so it was decided to focus on these two in the workshop.

Local Energy Workshops

The workshops which were held in each partner town were based on the approach used in a previous European Commission funded SIREN project. The SIREN project included the selection of new/ renewable energy research and development projects, and the development of four future scenarios in partner cities, based on the European Awareness Scenario Workshop approach. It involved a scenario workshop in each of the partner cities involving four role groups (e.g. 6-8 people per group) looking at the development of a future vision, and theme groups concerned with the development of ideas to support the technologies and contribute to the agreed future vision (Bilderbeek, 2002). While the project has been based on this approach it is recognised that it is necessary to adapt the workshop to ensure its relevance to the local situation, for example to account for the local cultural context.

In this project a local energy seminar/workshop involving a range of organisations and individuals was held in each partner city. As part of the preparation for the workshops- case studies and training material were developed to help with raising awareness of the potential for different energy technologies at the local level.

Case Study and Training Material Development Some existing case study, information and training material has been exchanged between the partners in the project, including a renewable energy toolkit and an energy education pack for schools, which has been built on by the partners in this project and made relevant to the local contexts.

In Leicester, background information on renewable energy and case studies showing applications of renewable energy have been made available for participants at the workshop. This has included the use of a renewable energy toolkit (developed in a previous EC ALTENER funded ENTHUSE project). This contained information on renewable energy (e.g. policy and financing), a renewable energy matrix (which enables organisations to identify stages they can progress through in order to have a good management approach to renewable energy), and case studies showing the application of different renewable energy technologies. Also a local future renewable energy vision, based on existing local and regional energy strategies was drawn up for the workshop participants. Additionally, information on renewable energy was available through the East Midlands Community Renewables Initiative webpages, which have been managed by the Agency.

In Vila Nova de Gaia, ENERGAIA have used the ENTHUSE toolkit to help with the preparation of case studies and training material for their town's local energy workshop. For example, the toolkit's renewable energy matrix has been adapted for Portugal and
renewable energy case studies have been prepared and made available over the internet. Some consideration has been given to local renewable energy scenarios/strategy.

In Rajkot, RMC has published an educational pack for schools on renewable energy in English and the local language (Gujarati), with the intention of distributing the packs to schools in the city. Also, the ENTHUSE toolkit has been translated to Gujarati, and can be accessed in the municipal library. Some other energy information booklets have been produced, providing information on renewable energy and electricity to help with raising general awareness and promoting renewable energy. Some case studies on renewable energy have been prepared.

Outcomes of the Workshops

In the workshops, obstacles to renewable energy were identified in the partner towns and actions to support the uptake of energy technologies were also identified. A common obstacle that was recognised for renewable energy was a lack of awareness. Other frequently occurring comments were - a need for funding for renewable energy technologies and a lack of education and insufficient knowledge of benefits of the technologies. The importance of communication was a common theme arising from the workshops.

Result from the project partnership

Leicester

Since the workshop, results of the workshop groups have been provided to the Leicester City Council environment team and the East Midlands Regional Assembly to help with the implementation of the Leicester climate change strategy and the East Midlands regional energy strategy respectively.

Vila Nova de Gaia

ENERGAIA investigated local renewable energy and energy efficiency projects. They have followed up contacts and project ideas from the local energy workshop.

Help was provided to implement renewable energy projects, including specific solar energy projects. An assessment of the technical and economic potential for the installation of photovoltaic systems was carried out for 12 locations (water treatment and pumping stations). The grid connection process and electricity export licensing for the installation of photovoltaic systems in 6 locations was underway. *Rajkot*

Following the seminar, Rajkot Municipal Corporation arranged a public exhibition on renewable energy, which raised public awareness of renewable energy applications and provided support for local renewable energy businesses. A large number of people, including school children, visited the exhibition that was also covered by the media.

The Municipal Corporation developed plans to establish an Energy Park, that would further help in raising public awareness of energy.

Since March 2004, the General Development Control Regulation made it necessary to install a solar water heating system in new buildings in other Municipal Corporations in Gujarat. Rajkot Municipal Corporation recognised the potential for encouraging renewable energy uptake through enforcement of this regulation. It applied to the Government Ministry for Non conventional Energy Sources for financial assistance to help with capacity building and technical assistance to ensure compliance with the renewable energy regulation (RMC, 2004b).

Partnerships and Exchange of Experiences

Key success factors for the partnership approach in the project included a strong commitment to the aims and objectives of the project by the project partners, and agreement by the project partners on the methodology based on a previous SIREN project. Also, this European Commission funded project provided a strong motivation factor for activities in each town and between the partners. It communicated the benefits of the project in each partner area and the exchange of experience that played an important role in the partnership approach.

Experience and knowledge was exchanged between the partners in a number of ways, for example, through presentations, the exchange of publications, the use of a common methodology, participation in local workshops, discussions between the partners, site visits to local sustainable energy projects, and meetings with local energy technology businesses.

Future Developments

Future developments to build on this specific project have been under consideration. For example, there were a number of potential local actions that were identified in each partner city which need to be carried forward. There is potential for a related partnership approach, to enhance capacity, exchange experiences and knowledge, information and ideas that could be used for other projects in other energy/environment areas, including energy efficiency. There is potential for exploring further local partnerships within individual countries and regions, which can help to develop the knowledge and skills of the participants through the exchange of expertise.

Also, this approach has the potential to be relevant to the utilisation of opportunities for improving energy efficiency arising from the Joint Implementation and the Clean Development Mechanism under Kyoto protocol.

Conclusions

The workshop approach in the project enabled key local stakeholders, such as local political decision makers, business representatives, residents and technology experts, to participate in the development of strategies and the identification of policy measures to support the implementation of renewable energy or energy efficiency technologies at the local level. The workshops raised renewable energy awareness locally, helped identifying obstacles to renewable energy at the local level and actions to support the uptake of renewable energy/ energy efficiency technologies.

For an effective partnership of this kind it is considered important to build a strong commitment to the aims and approach of the project by the project partners, and clear benefits from the project outlined. There is potential to replicate the approach for energy efficiency technologies and for it to be used in other local/regional areas. There is the possibility of exploring further related partnerships in the energy/environment field at the local level between European countries and developing countries, and also more local partnerships within individual countries and regions.¶

Notes and References

- Bilderbeek, R., 2002, Scenarios: designing, shaping the future. SiREN 2002 Renewables for Urban Sustainable Development, Brussels, June 21st 2002 (http://www.techroad.com/siren)
- Conselho de Ministros, 2004, Programa de Actuação para reduzir a dependência de Portugal face ao Petróleo. Resolução do Conselho de Ministros aprovada em 4 de Novembro de 2004, Lisboa.
- DTI, 2003, Energy White Paper. Our energy future-creating a low carbon economy, TSO.
- East Midlands Regional Assembly, 2004, The East Midlands Energy Challenge, EMRA.
- Energaia, 2000, Matriz Energética de Vila Nova de Gaia, Energaia, Gaia.

- Energaia, 2003, Asia Pro Eco Background report for Vila Nova de Gaia. September 2003.
- Ferreira, V. Castanheira, L. Gouveia, J. B. e Estrela, A., 2004, Plano de Acção para o Desenvolvimento das Energias Renováveis
 Caso do Município de Vila Nova de Gaia, Simpósio sobre Energias Renováveis em Portugal ENER'04, Figueira da Foz.
- Fleming, P.D. and Webber, P.H., 2004, Local and regional greenhouse gas management, Energy Policy, 32 (6): 761-771.
- Land Use Consultants and IT Power, 2001, Viewpoints on sustainable energy in the East Midlands: A study of current energy projects and future prospects. Final Report, Land Use Consultants, London.
- Leicester City Council, 1994, The Leicester

Energy Strategy, Leicester City Council, Leicester.

- Leicester Environment Partnership and Leicester Partnership, 2003. City of Leicester. Climate Change Strategy, Leicester City Council, Leicester.
- Rajkot Municipal Corporation, 2003, Background Report. Asia Pro Eco Programme.
- Rajkot Municipal Corporation, 2004a, Asia Pro Eco Programme – Rajkot. Partnership Support for Renewable Energy between European and Asian Town, Brussels, November 15th 2004.
- Rajkot Municipal Corporation, 2004b, Proceedings of the Rajkot Renewable Energy Seminar. Sunday 6th of June 2004.

Heritage Album - 1

Text and Photographs: Kamalahasan Ramaswamy

Architect, trained in documentation with the Historic American Engineering Record, Washington DC and worked on various conservation projects with the Indian National Trust for Art and Cultural Heritage, Pondicherry. Presently practicing in Coimbatore, Tamilnadu . The above data are part of his academic thesis on the 'Conservation of Gingee Fort'

GINGEE FORT

Spread across a rocky terrain of 435 acres, the fort circuit stretches over 5 kilometres enclosing a cluster of hills and hillocks with a maximum altitude of 250 metres.

The magnanimous scale and sophisticated fortifications are an outcome of the defence strategies adopted by various dynasties spanning eight centuries - ranging from the cattle-rearing Konar community of the 13^{th} century to the Nayak chieftains of the Vijayanagara Empire in the 15^{th} and 16^{th} centuries and later. the Khans of Bijapur Sultanate and Marathas in the 17^{th} century to the French in the late 18^{th} century.





The most enduring rule was that of the Nayaks (deputants of the Vijayanagara Rayas of Hampi) who established an independent regime with Gingee as their capital for a period of about 150 years from the early 15th century.

This was the golden age of Gingee when the fortifications were lengthened and strengthened besides the construction of several courtly buildings and monumental temples with a sophisticated watermanagement system.



- 2. Pondicherry gate and the lengthy outwork of the east side
- 3. Ruins of the Royal quarters and Venkataramana temple





The major factors influencing the design of a fort are the directions of threat, nature of site and techniques of warfare. Gingee is an outstanding example of military architecture reflecting the above-mentioned influences.

Sealed on the north and south by flowing hills the site is gifted with dramatic contours, cliffs, plateaus, water basins and springs marking it ideal for a retreat. Originally guarded against cavalry, archers and trekkers the fort later had to be defended against artillery besides housing magazines for gun powder and towers for canons.

The fort has withstood the ravages of time and the weapons of war mongers. However today, it is yielding to the wild vegetation taking root from the mud infills of the ramparts and creeping out through its walls splitting the dry-jointed stone masonry.

- 4. Drawbridge across a natural ridge leading to the eighth gate of Rajagiri
- 5. Tiers of fortifications rising above the steep rocks and wild vegetation



While the 800 ft high Rajagiri served as a retreat fort, the 500 ft high Krishnagiri was more like a pleasure fort with its ensemble of mandapas, temples, water tanks, mahals and granaries. The site offers stunning views of the environs with a salubrious weather beating the heat of the place.

The picture would be complete with a procession of the king on elephantback, accompanied by his regalia on horses with hefty soldiers manning the uninterrupted ramparts of the fort gleaming in sunlight and reflected from the filled waters of the broad moat below.



6. Venugopala and his consorts – a fine 14^{th} C relic carved on a rock outcrop.

7. The royal bathing tank with a sophisticated water management system.





8. 9. Ensemble of mandapas, temples and a mahal on top of Krishnagiri View of Krishnagiri across the 13 metres wide rampart and an equally wide moat

Heritage Album - 2

Text and Photographs: Bulu Imam

Director, Sanskriti Centre, Hazaribag, Jharkhand Sanskriti Centre was brought into being by Bulu Imam and his family as a continuing process in the last decade. The Centre has a very good Museum and Art Gallery. The Museum contains the complete archaeological record of the Hazaribagh region from the Lower Palaeolithic to the present. The Art Gallery contains fifteen styles of painting in the Khovar and Sohrai schools and over three hundred paintings are exhibited

PAINTED HOUSES OF HAZARIBAGH

The Hazaribagh District originally covered the entire North Chotanagpur plateau, which is the northern tract of the massif divided by the Damodar River from east to west, with the Ranchi plateau lying to the south. Hazaribagh has always been a tribal settlement, the picture being confused by de-notification and extinction of tribes, and their anthropological definition by experts. These people were of indigenous ancestry, evidenced by the archaeological heritage of the region and their folk traditions.



The Moghuls referred Hazaribagh as Kukrah (meaning cockerel) and the British as the Junglebury District. The prehistoric heritage of Hazaribagh is one of the richest in the world. It has displayed a consistency of cultural character and tribal continuance of great tenacity in the face of continuous destructive development, dams, industry and coal mining.

Today the region is part of the new tribal state of Jharkhand (meaning Forest Land). This is an area rich in archaeological deposits, megaliths and dolmens, and rivers that are considered sacred such as the Damodar River, and hundreds of sacred groves (*sarna*).

The mural painting tradition found in the Hazaribagh villages trace their source back to the pre-historic rock art of the region, which goes back to 10,000 BC.



1&2 Prajapati House, Kharati







The village mural painting tradition is a matriarchal one, and for that it is a sacred tradition followed in an essentially original matriarchal indigenous order. Married women practice the art and use it to decorate houses especially during the marriage and harvest seasons. Young girls learn the art from their mothers and aunts.



This particular art form is called *Khovar* after the room of the bridegroom, and relates to an ancestral cave dwelling origin (*kho*=cave, *var*=bridegroom) related to the painted caves of the Mirzapur, Vindhyan, and Jharkhand complexes called *Khobar*. It is full of plant forms and fertility symbols which are related to the Chalcolithic *mandalas* in the rock art, and wild animal forms tracing their genesis to an earlier Mesolithic period found in the rock art. The *godna* or tattoo motifs are found in the prehistoric rock art made by the women of the Malhar tribe (*Godnakari*) - the metal casters, and symbolize a protective emblem. The highlight of *Khovar* art is the painted walls of the house to welcome the bridegroom who is sometimes compared to Indra on an

3&4 *Sohrai* animal wheel, *Sohrai* art5 Ghatwal house, Bhelwara

6 Kurmi house, Jorakath



elephant, with decorations of the wild animals of the forest who are the companions and plants symbolizing fertility.

The harvest art of Sohrai derives its nomenclature from the Mundaric word soroi, meaning 'to whip or beat', relating to cattle, and finds its root in soro meaning 'to close the door', and thus points to the first domestication of cattle in a Mundaric society. Its manifestations directly derive from the rock art in which the 'Tree of Life', a favourite West Asian and Indus symbol, may be traced to the rock art of pre-Mesolithic origin. The highlight of Sohrai art is the welcome of the cattle, which are taken to the jungle on the morning of the festival day, and at noon brought in over the aripans made on the floor with rice gruel. The head consists of a clay cone with a sprig of latlatiya grass representing Devi, and the welcome aripan is drawn in the form of cattle hooves similar to the pre historic rock art. We see here the earliest worship of cattle dating back to the beginnings of agriculture in India.

A song goes,

"Where was the cow born ? Under the Sakhua tree the cow was born. Why was the cow born ? The cow was born to give strength to the earth."

7&8 Traditional symbolism derived from pre-historic rock art9,10,11,12 Interiors of village dwellings

Reviews

THE CASE OF THE INTACH CHARTER

By Vishakha Kawathekar, Paromita De Sarkar and Gurmeet S. Rai

The *Concise Oxford Dictionary* defines 'charter' as 'a written grant of rights, by the sovereign or legislature'; 'a written constitution or description of an organization's functions etc'.

According to Herb Stovel (formerly in ICCROM) "No rules, but generally charters contain principles, which provide guidance for professionals and practice, helping clarify how historic buildings and sites should be treated. Principles may be translated as 'guidelines'- applied principles- in local jurisdiction and practice" In other words, charters lay down the guiding principles for appropriate response to specific conservation issues and, as Jack Gillion (Conservation Officer, Edinburgh City council) has observed, are not meant to be taken as "instant and all-inclusive perfect prescriptions".

'The Charter for the Conservation of unprotected architectural heritage and sites in India' has been recently adopted by the members of the Indian National Trust for Art and Cultural Heritage (INTACH) at its national convention for adaptation. Rather than a 'grant of rights' the charter seems more like 'a description of the function of the organization'. It purports to draw upon the experience of INTACH in conserving the unprotected architectural heritage and sites of India within an institutional framework for last two decades.¹

The need for such a charter is justifiable for various reasons. It is rooted in to the history of conservation in India, the positive developments that have taken place in the field of conservation around the world, the need to respond appropriately to the concerns of a range of unprotected heritage along with recognising the uniqueness of the Indian culture and traditions.

UNESCO provides a platform via ICOMOS (International Council on Monuments and Sites) for experience and knowledge sharing between From this issue onwards, the Review section of this publication will provide a neutral platform for debates on national and international policies/charters for heritage conservation. This issue initiates the debate on the recently introduced *'Charter for the Conservation of unprotected architectural heritage and sites in India'*. A Copy of the Charter is also enclosed with this issue. Feedback on the charter can be emailed to : *Chief Editor, Context dronah*@redfiffmail.com

conservation professionals worldwide. The UNESCO conventions relating to cultural heritage ratified by the member states, are legally binding on the national governments. These address complex issues emerging at different points in history of the world with concern for the safety and preservation of cultural heritage. Some examples relate to the protection of heritage from armed conflict between nations² and massive public works projects³, restitution and return of cultural objects that are stolen or illegally exported⁴, prevention of illicit trade and transfer of ownership of cultural property⁵etc. It also helped to establish international cooperation for the conservation of world heritage sites of cultural and natural significance considered to be of outstanding universal value⁶. In 1964, through the Venice Charter a new philosophical approach towards heritage conservation was conceptualized. The Venice Charter was formulated by ICOMOS. Since then the formulation of new charters has continued to be one of the prominent activities of ICOMOS.

These charters are flexible doctrinal texts for specific sectors of cultural heritage. Over the years they have dealt with principles of conservation, restoration, renovation and replacement, principles of maintenance, repair and stabilization, rehabilitation and modernization, reconstruction and relocation, principles for the preservation of archaeological heritage, historic areas (ensembles), and other categories of monuments and sites. Charters have been instrumental in determining standards for the preservation, restoration and management of cultural heritage that could be adapted worldwide. For example the Burra Charter⁷ developed the principles detailed in the Venice Charter to suit local Australian requirements.

The charters also highlight key developments in contemporary thinking about conservation of cultural property. For example the Nara Document on Authenticity, 1994 conceived on the spirit of the Venice Charter broadened conventional thinking in conservation at that time to give greater respect to cultural and heritage diversity in conservation practice on the basis of authenticity.

'A Charter is meant to result from long periods of inclusive debate; many of the ICOMOS charters took 10 or 12 years to develop (in case of the Vernacular Architecture Charter, 15 years). The goal is not just the 'product" (the Charter) but forms of participatory debate which brings the ideas discussed into mainstream understanding and use'⁸. In no case have they ever had legal status unless governments adopt them. In the history of charter making each of the charters have brought forward a new / fresh philosophical base which differentiates them from other parts of the world or a definite concern that which addresses, contributes and expands the area of concern of the profession.

Today the Venice Charter and the Charter of Krakow⁹ are the documents that set down the principles guiding our management of the historic environment. However, though there is much good in these documents, locked into their philosophy are assumptions about the relationship between architecture, society and history, which, not only undermine the character of our historic environment but damage the very relationship between built heritage and the community that they seek to protect. ¹⁰ Robert Adam expresses concern regarding these documents, which revolves around the lack of reference to age, time or the passage of time, generality of definitions of heritage and the lack of any indication to just how a community identifies its heritage in practice. He has cited a lack of clarity in the aim for conservation of heritage where there seems to be a central role for archaeological and historical methodology. The idea of buildings or places as 'evidence' or representations of historical 'moments' is an archaeological or historical concept. However in places of continuous habitation where there is still a piling up of evidence, history has not stopped.

Therefore, as the definition of monuments extends charter by charter until it becomes an all-embracing heritage and encompasses so much of our every day built environment, the above principles just do not fit. These aspects highlight the fundamental concerns for the conservation of 'heritage' in India.

'Heritage' in India spans plural cultural traditions. This diversity as also the economic, political and social disparity creates circumstances where conservation can potentially cause conflicts. Therefore the approach to conservation could vary, depending on the, geographical and socio cultural context. Given that traditions are dynamic, ensuring *continuity* in the processes of material/ building conservation could be the underlying rationale for a charter for India. This approach to conservation presupposes active participation of the community..

To develop a charter there is a need for a wider participation of conservation professionals to arrive at a common framework that would nevertheless keep evolving while debating and resolving the complexities that make up the conservation scene in India. Further, with the inappropriate existing legislations and inadequate infrastructure and finances for conservation, there is a need to formulate a framework of guiding principles within which all these institutions, bodies and individuals work towards making conservation decisions sensitive to the Indian context. A lot of work has already been undertaken by the conservation professionals and today there is a greater understanding of the vocabulary to guide the future of conservation in India.

The 'Charter for the conservation of unprotected architectural heritage and sites of India' authored by INTACH comprises four sections namely

Part I:	Principles
Part II:	Guidelines
Part III:	Management and Education
Part IV:	Professionalism

As the name suggests the key words in the title of the

charter are "unprotected", "architectural heritage" and "sites" (in India). It appears to imply that 'unprotected sites' are those that have tangible architectural heritage and may or may not have associational value. The fundamental question here is; Are sites that have only associational significance (i.e. sites of intangible significance for example battle fields) fall under this category?

As explicitly stated in the document, the charter has emerged out of INTACH's experience of twenty years in the field of conservation. However in the absence of any reference to review and/or assessment of works undertaken by various conservation practitioners this claim remains unsubstantiated.

A list of definitions of terms used in the charter is needed for removing ambiguity about certain expressions for example 'heritage', 'protected', 'unprotected', 'site', 'indigenous practices', 'living heritage' etc. In the case of 'living heritage' the charter recognizes the unique resource of master builders, stapathis, sompuras, raj mistris and does not mention crafts persons such as potters, weavers, inlay workers, painters etc. The concept of 'jeernodharan', has been listed in what can be understood as the 'preamble' of the charter 'as the symbiotic relationship binding the tangible and intangible architectural heritage of India as one of the traditional philosophies underpinning conservation practices'. Conservation pre supposes imbibing multi cultural practices that transcend castes, communities etc. Reference to any one such practice is not desirable in a national document.

Though the charter has been adopted by the members of INTACH, it has not been specified to whom it applies. If it is applicable to all professionals working in conservation of 'unprotected architectural heritage and sites' in India, it seems that the charter has not emerged out of a dialogue among a sufficiently representative forum. One of the programs that illustrates this process is the method followed by the Getty Institute to develop the 'Chinese Principles for Conservation' where conservation professionals and other stakeholders deliberated over considerable period of time, studying various context and subjects of concern to arrive at the principles.

Part I: Principles

The first section provides a background for an approach. The charter includes some concepts and

parameters, which have been defined in the international charters. In article 1, on 'why conserve?'- it describes 'unprotected architectural heritage as embodying values of enduring relevance to contemporary Indian society, thus making it worthy of conservation.' It looks at 'building skills' as the living heritage that needs to be protected and recognizes revival of building skills as an opportunity for employment.

In its article on 'what to conserve?', the article 2.1 states 'the process of listing must determine the characteristics of significance and prioritise them'. This needs clarity as it seems to say that value judgement is being made on significance. The parameters on which 'significance' would be 'graded' for the purposes of prioritizing have not been spelt out. An attempt is made in article 2.2 to explain what comprises 'living heritage'. Concepts such as 'contemporary logic under pinning conservation practice so that it retains the meaning for the society' in article 2.3 can cause much confusion in the minds of the readers. While the concern of the author can be appreciated on one hand on the other it must be recognized that it is the timelessness of the cultural values that needs to be the logic for conservation and not contemporary logic. In other words the threat lies in interpretation of the articles. Changing the use of a historic fort for example the Quila Mubarak in Patiala into a shopping mall or fashion shows at Humayun's Tomb could be interpreted as 'contemporary logic'.

In this charter it has been recognized that conservation practice is 'a multi cultural activity' and states that 'indigenous knowledge practices vary regionally and cannot be considered as a single system operating all over India' however the author/s have over simplified the western ideology to only a single 'ideology of minimal intervention' in article 2.6. It is inappropriate to attribute all complexities to ourselves and simplicities to the 'others'. Many of us in the conservation profession do recognize the contributions of the 'western minds' to conservation through the various international charters. The architectural heritage has been recommended to be seen under three categories, Ia, Ib, and II. The recommendation finally is to use the 'indigenous practices' in the conservation of the unprotected architectural heritage.

In article number 2.7 it notes that the 'overarching objective for undertaking conservation of unprotected architectural heritage and sites is to establish the efficacy of conservation as a development goal'. The challenge here is how we understand 'development', there is a need to qualify this statement as what does 'development' mean. It is felt by many conservation planners that 'values of conservation' should determine development thereby ensuring better quality of life, conservation of man made and natural resources as explained in the article 4.6 on 'Integrated Conservation'.

In the articles on authenticity, conjecture and integrity (article 3.1, 3.2, 3.3) efforts have been made to define these concepts from the perspective of continuing traditions. Article 3.3.2 states 'the concept of an evolving integrity accepts the introduction of new architectonic elements, materials and technologies when local traditions are insufficient or unavailable'. The introduction of new elements may reflect contemporary aesthetic ideals as modern additions to old buildings'. The aspect of compatibility of materials and application of science in understanding materials and making sympathetic choices of materials has not been included. This is a very important aspect governing use of modern materials so that the historic built fabric is not damaged in the course of 'conservation' or 'repair'. For example in the case of Sri Harimandir Sahib in Amritsar cement plaster has been applied on the external surfaces of the historic walls while undertaking repairs of the historic masonry. Sulphates from the cement plaster can be seen on the inner surfaces of the shrine due to this application. These sulphates are now causing decay in the frescoes. Vinyl stickers have been used in places to replace frescoes (in the absence if continuity of tradition). It is important to examine the values and attributes of materials herein, to decide the choice of materials being examined to replace historic materials.

Articles 3.5 and 3.6 which relate to rights and sensibilities of communities are highly meaningful. 'Conservation ethics' (articles 3.8, 3.9, 3.10, 3.11) have been prescribed without explaining to which 'grade' of buildings these are applicable (as graded in article 2.6). This information is extremely critical.

The article 3.12 titled 'Demolish/ Rebuild' would undermine the efforts of many conservation practitioners and activist amidst communities who have been striving hard for the past many years for the preservation of their heritage. In the given clause the assumption is that what will replace the historic building will be built in traditional materials and techniques. The critical question here is at what point of time can it be assumed that, 'all strategies to conserve the unprotected architectural heritage and site are inadequate, then the option of replacing it should be examined' and to then allow for demolition and rebuilding. This clause gives immense scope for interpretation and allows for possible demolition of heritage.

Allowing a 'historic structure to decay gradually once it has outlived its significance' is a very misleading article (3.12.3). The meaning of 'significance' is not consistent in all articles. While in 2.1 the charter clearly states that 'the objective of conservation is to maintain the significance of the architectural heritage or site' it further rightfully states in 3.8 that 'interventions should not compromise significance of the structure under consideration', in 3.12.3 significance seems to imply contemporary usefulness or association. These contradictions in the concept of 'significance' across these sections are alarming.

Since conservation ethics are self regulatory in nature, therefore it is assumed that they are applicable to the conservation professionals. In article 3.13.1 on 'Relationship between the conservation architect and the community' it is stated that, 'it may become necessary to temper the role of the conservation architect as an expert professional by taking into account the desires and aspirations of the local community and the traditional practices of raj mistris'. The question here is who will 'temper the role' and how 'will it be done'? Since ethics are self regulatory should the conservation professional himself/ herself be sensitive to the communities and roles of the traditional practitioners. Hence this 'tempering' has to done by the parties concerned and not by a third. This understanding rightly so would be the basis for sustainable conservation practices.

Part II: Guidelines

Article 4, titled 'conservation objectives', deals retaining of visual identity, adaptive reuse, approach to restoration/ replication/ rebuilding, employment generation through revival of traditional building skills, application and advantage of using local materials and traditional technology. It is stated in 4.6, 'Integrated conservation', needs the engagement of a multi disciplinary team and in 4.7 it is stated that 'the objective of conservation should be to sustain the building and/or the traditional skill and knowledge system...' 'Integrated Conservation' (4.6) and 'Sustainability' (4.7) are mutually reinforcing concepts. It is necessary to have a principle that integrates the two concepts.

Article 5 is an elaborate section on 'Listing' and it lays down the format for listing. The article makes implicit that listing is an activity that INTACH has undertaken in the past and proposes to continue doing so in more coordinated manner. It also proposes to prepare an inventory of crafts persons. It states that the buildings and sites must be included in the listing to merit conservation. In its 'criteria for selection' of a 'property worthy of listing', one of the three following attributes need to be present in the building; historic significance, historic integrity or historic context.

Although clear in most aspects, this article contains a glaring contradiction vis-à-vis article 2.6 and the section on 'Grading' (5.13). While 2.6 recommends that a 'comprehensive inventory (see article 5) of extant heritage, both tangible and intangible, and separate it into two categories... namely Ia, Ib, and II' (interventions are proposed based on this categorization); 5.13.2 recommends 'that buildings and sites be classified as Grade I *, I, II and III in descending order of importance'. While cross references have been made with article 2.6, discrepancies between the two articles need to be corrected.

In the article 6.1 the charter recommends that the technical guidelines formulated for INTACH by Sir Bernard Fieldon in 1989 are followed albeit to the extent that they are in consonance with the imperatives of this charter. It further recommends the need for region specific guidelines. However it neither specifies who will develop these guidelines and nor the process that will be followed.

International experience and the experience of INTACH and others, clearly reveals that urban conservation can only be successful through the participation of all stakeholders- government, planning agencies, local communities etc. This area is challenging and complex where concerted efforts are needed. While INTACH has adopted listing as an important area of its work, it would be a great service to heritage of India if INTACH were to make urban conservation its mandate as well.

In article 6.4, 'Role of Conservation Architects', conservation has been described as a 'multi disciplinary activity', which could perhaps be replaced to read 'inter disciplinary activity'. The scope of work of the conservation architect has been explained as inclusive of advocacy and awareness generation among stakeholders.

Part III: Management and Education

In this part clearly describes the role of INTACH in management of heritage through its elaborate network of chapters. In article 7.2.5 it is stated that 'To further facilitate its goal of protecting architectural heritage; INTACH should establish inter disciplinary advisory committees at the regional and national level. These committees should act as clearing - houses for conservation plans, assessment reports, scientific studies, funding proposals, legal and administrative measures for conserving the unprotected architectural heritage' this article severely undermines the spirit of the article 7.1.1 on role of local communities where in 'local communities or individuals must be entrusted with responsibilities to conserve their own heritage. Where outside expertise is necessary, local stakeholders must be made active participants at all stages of the conservation process. All decisions regarding the conservation and management of heritage must be taken in consultation with local communities in consonance with the 73rd and 74th Amendment to the Constitution of India'. The recommendations should be based on a synthesis of the two articles whereby the role of the community is institutionalized via 'local and regional committees'. Sadly the tenor of the article 7.1.1 is patronizing in the extreme. Assuming as it does that the local community has no connection with 'their own heritage'.

The tone of the charter is at times instructional (till articles 6). 'Role of INTACH' (7.2 and few of 7.3) reads more like the recommendations of another party rather than a statement of INTACH's own agenda for action. Other articles in 7.3 deal with the scope of work of government institutions and establish the 'Role of INTACH' as recommendatory.

In article 8, 'Education and Public awareness' emphasizes the need to 'entrust' the responsibility for care and maintenance of heritage to local community and how heritage education should be incorporated at all levels of formal education. The article also stresses the need for awareness generation and training of all groups of society. It recommends that the conservation professionals be trained to appreciate and integrate traditional and western practices of conservation. Various measures are outlined to achieve this. It is however not clear who these recommendations are targeted at?

Part IV: Professionalism

The Article 9 includes the 'Code of professionalism commitment and practice' for the conservation professionals. Has this code emerged from an appropriate representative body of conservation practitioners like in other disciplines of architectural practice? Whether the code addresses the issues faced in the profession is debatable.

Article 9.1.8 prescribes that conservation professionals 'observe and uphold INTACH's conditions of engagement and scale of charges, which will be prepared, in the due course, in consultation with conservation professionals'! This tantamounts to signing on a blank sheet of paper, for terms and conditions of engagement and scale of charges can only be agreed to once these have been arrived at through a consultative process reflecting experience from the field.

Often clients who cannot afford to pay exorbitant fees need reports for fund raising for a project. Thus saying that conservation professionals 'Not prepare project reports in competition with other professionals for a client without payment or for a reduced fee (except in a competition conducted in accordance with the competition guidelines approved by INTACH' (article 9.1.14) and similarly asking them to 'Comply with guidelines for project competitions and inform INTACH of their appointment as assessors for a competition' (article 9.1.17) where INTACH itself is a competitor is not entirely reasonable. INTACH as an NGO advocating heritage conservation at various levels (including government and the community) has a potential to provide the perfect platform for a participatory process for addressing the concerns of the profession.

Conclusion

It is implicit in the adoption of the charter by INTACH members that they are committed to the articles mentioned in the charter. Assuming that this charter is for concerted heritage conservation and allied activities, aspects such as code of professional commitment and practice (for conservation architects) need not be included in this document.

The Charter is thought provoking, but its many ideas and thoughts have not been woven into a cohesive whole. Also, there are several contradictions that need to be reconciled. The range of aspects included in this document is extremely vast- from theoretical framework, technical guidelines, functions of INTACH chapters, recommendations to governments on matters related to fiscal measures etc. Thus it would be useful to rework the document into sub documents, which address the various user groups while the Charter confines itself to theoretical framework and principles for conservation in India.

The process of developing the charter should have been more participatory with extensive dialogue between the conservation professionals, INTACH's chapters, Government etc. Involvement of INTACH's regional chapters in a dialogue with conservation professionals would have been a unique and a valuable way of understanding the discipline in the context of regional settings. Dialogue with organizations such as the Archaeological Survey of India and State Department of Archaeology would enrich the principles and bring about a better understanding between the practitioners both within the government as well as outside the government.¶

Notes and References

¹ Refer to the INTACH charter which states, "Drawing upon the experience of the Indian National Trust for Art and Cultural Heritage (INTACH) in conserving the unprotected architectural heritage and sites of India within an institutional framework for two decades")

² The 1954 Convention for the Protection of Cultural Property in the Event of Armed conflict (Hague Convention)

- ³ The 1968 Recommendation concerning the preservation of Cultural property endangered by Public or Private works.
- ⁴ The 1995 Unidroit Convention on Stolen or Illegally Exported Cultural objects.
- $^{\scriptscriptstyle 5}$ The 1970 UNESCO Convention on the
- Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property
- ⁶ 1972 the Convention for the Protection of the World

Cultural and Natural Heritage (World Heritage Convention)

- ⁷ The Burra Charter of the Australian ICOMOS for the conservation of places of cultural significance 1981
- ⁸ Herb Stovel, formerly in ICCROM
- ⁹ The Charter of Krakow on the Principles for Conservation and Restoration of Built Heritage of 2000 was an EEC initiative
- ¹⁰ Adam, Robert "Does heritage dogma destroy living history?" in Context 79, May 2003



Complete Solutions for

Landscape, Golf and Turf Irrigation (With RAINBIRD, USA Technology). Rain Water Harvesting and other Water Management Projects with HDPE piping system.

WE UNDERTAKE ALL TURNKEY

HALLMARK AQUAEQUIPMENT PVT LTD 208 Rashbihari Avenue, Kolkata - 700029. Dial: -91-033-24650465 : Fax: -91-033-24646262 Email:- sales@hallmark.co.in

We Provide The Following Services

- Consultancy for restoration of heritage buildings and structures.
- Detailed study report of heritage building with estimates.
- \diamondsuit Restoration and repair services for heritage buildings using traditional skills and techniques.
- \diamondsuit Rehabilitation, adaptive reuses and up-gradation of heritage buildings to suit modern needs.
- Repair of traditional roof terraces, domes, tiled roofs, using traditional techniques.
- $\ensuremath{^{\diamond}}$ Supply of custom made traditional lime mortar and natural additives for repair and restoration projects.
- * Art plaster repair for decorative elements and motifs.
- $\ensuremath{^{\diamond}}$ $\,$ Repair, restoration, recreating of wooden carvings and period furniture.
- Structural consolidation of weakened structures.
- Stained glass repair and restoration.
- Annual maintenance services for heritage buildings.
- \diamond . Water repellent lime based paints in white and colour shades compatible with heritage buildings.
- Heritage landscaping.
- $\ensuremath{\diamondsuit}$ Stone sculpturing and stone work restoration.
- $\ensuremath{\stackrel{\mbox{\tiny \ensuremath{\oplus}}}$ Valuation and appraisal of heritage property.

RAVI GUNDU RAO & ASSOCIATES Specialists - Architectural & Structural Conservation of Heritage Buildings

1070, G&H Block, 1st Cross, Gange Road, Kuvempu Nagar, Mysore - 570 023. 2: 0821-2414187
E-mail: preserve@eth.net Website: www.saveheritage.com Mobile: 09342101552



Events

- Biennial Conference of the European Association of South Asian Archaeologists
 Date: 4 – 8 July 2005, Location: London There will be a series of panels with subjects ranging from prehistory to palaces of the colonial period.
 Dr. Robert Harding, saa@ucl.ac.uk
- Children's World Summit for the Environment Date: 26 - 29 July 2005, Location: Japan The Summit will bring together children from all over the world to discuss important environmental issues and air their own concerns on the state of the environment on both local and global levels. <u>info@children-summit.jp</u>

■ Green Building Congress – CII - 2005 Date: 14 – 17 September 2005, Location: Delhi International Conference on Green Building: Experts and

Professionals from across countries assemble to discuss the latest in Green Buildings. It is an excellent opportunity for networking and learning latest concepts in Green Buildings. Contact: gbc@ciionline.org / s.srinivas@ciionline.org

Hope 2005

Date: 3 – 5 November 2005, Location: Mumbai Hope 2005 is the third International conference, being organized by DAIRRC, in association with the Ministry of Health, Government of India, to address the 5 main issues threatening the survival of our planet today. This mega conference will be held at twin venues and will have simultaneous, concurrent sessions on Environment, Population & Sustainable Development, HIV/AIDS, Alcohol Abuse, Drug Abuse, and Human Rights. International experts from Health and Medicine, Environment Conservation, Environment Restoration, Environmental Legislation and Enforcement, Human Rights Information, Education & Communication Agencies, Population, Information, Trade and Industry, Help lines and Adjuvant Groups, Youth and Social Workers' Organizations will convene and share their expertise at this conference.<u>drmerchant@hopeconference.org</u>

World Water Congress of IWRA (International Water Resources Association)

 Australia ICOMOS (International Council on Monuments and Sites) Conference 2005 Corrugations: The Romance and Reality of Historic Roads Date: 25 – 28 November 2005 Location: Australia

The corrugations conference aims to explore a range of themes, and facilitates discourses on the emerging issues of historic roads and their conservation. <u>www.corrugations.net.au</u>

■ Gulf first Urban Planning and Development Conference Date: 12 – 14 December 2005, Location: Kuwait Gulf first Urban Planning and Development Conference offers a unique opportunity for professionals and researchers to meet with industry leaders in urban planning development. <u>www.gulfurban.com</u>

Dronah	Context	Name
	▲ ■ ħ	Organisation
	Context	Designation
"Context : Built, Living and		
Natural" does not only record and		
evaluate documentation and	2015/10 1 1011 1 - August 1 0000	Tel
natural heritage, but also relates	Journal of the Development and Research Superscripts for Notes, Ariz and Notinge	Email
people's role in the process by		Website
recording community activities and involvement It encompasses the	Journal	2 years 4 issues USD 50 Rs.800 1 year 2 issues USD 28 Rs.450
complete milieu of people, place and	of the	(the above rates includes the postage and handling charges)
built form within the Indian scenario		Enclosed please find a cheque of RS/USD drawn in favour of "DRONAH". Dated
professionals, NGO's, donors/	Development	(Please add Rs.50 extra for outstation cheques, payment in
funding agencies, government	and Research	USD remains as shown above)
officials and academicians to express their views. The journal is	Organisation	Send your cheques or queries to:
specifically relevant for architects,		
conservationists, environmentalists, NGO's social scientists historians	for Nature, Arts	A-238, South City-1, Gurgaon-122001, Haryana Tel:(0124)2381067/(0124)5082081,
academicians, researchers and	and Heritage	Mobile: 9810658782, 32576831, E-mail: dronah@rediffmail.com http://www.dronah.org
planners.		



Rs 750/US \$49 (postage free) Size 7.25 × 9.5 inches Hardbound/pages 510 Published in 2005 ISBN 81-7993-067-X

WEALTH FROM WASTE

Taking on from the success of the first edition, TERI Press now introduces *Wealth from waste* (second edition).

The title takes a closer look at the need to recycle waste. Papers included here highlight the tremendous business potential that well-placed systems of waste management could offer. At a time when the world is confronted with the twin challenges of fossil-fuel depletion and environmental degradation, the book emphasizes how addressing the latter could contribute to mitigating the former. It also underlines the various aspects of biofuel production and cogeneration.

Wealth from waste is a must-read for policy-makers in the developing-countries, environmentalists, development practitioners, researchers, waste management experts, and decision-makers in corporate organizations.

CONTENTS

- Technological options for municipal solid waste management
- Industrial solid waste
- Methanogenesis from agro-industrial residues: potential and prospects
- Utilization of agricultural wastes/by-products in treatment of water and waste water
- Biomass gasifier-based power plants: potential, problems, and research needs for decentralized rural electrification
- Bioethanol production technologies: economics, environmental impact, and policy issues
- Bioethanol: a status review on metabolic pathway modification of certain ethanologenic bacteria through genetic engineering
- Bio-hydrogen: technology status and future prospects
- Biofuels
- Industrial effluents: bioreactors for treatment of wastes
- Technological trends and opportunities in cogeneration
- Environmental regulations in India for waste management



All orders and enquiries to

TERI Press The Energy and Resources Institute Darbari Seth Block IHC Complex, Lodhi Road New Delhi – 110 003, India

Tel. 2468 2100 or 2468 2111 Fax 2468 2144 or 2468 2145 India +91 • Delhi (0) 11 E-mail teripress@teri.res.in

www.teriin.org/pub/



P R E S E N T I N G INDIA'S FIRST EVER GLOBAL EXPOSITION FOR THE BUILDING INDUSTRY.

From the 14th to the 18th of December 2005, India's leading innovators and producers in the architecture, engineering and construction sector will converge to transact business, exchange information and showcase their products and services to over 40,000 trade visitors. At the AEC World Expo & Conferences at the MMRDA grounds, Bandra Kurla Complex, Mumbai. To book your space or for further information, visit **www.aecworldexpo.com**



World Expo & Conferences DECEMBER 14 - 18, 2005 MMRDA GROUNDS, BANDRA

BUILD ON IT.

Jasubhai Media Pvt Ltd., Taj Building, 4th floor, 210, Dr. D. N. Road, Fort, Mumbai - 400 001 T: 91-022056311425-29 Direct Line: 91-022-56311434 F: 91-022-56310525



Homeland - The A 2 Z of Home & Office Dynamics



Homeland will have unique features that promise to make shopping a pleasurable experience with an attractive, inviting internationally designed facade.

This Mall will not only be beneficial to consumers but will also be a sound business proposal for people setting up shop at Homeland.

Homeland will have features like a Resource Café where one can sip coffee with cookies and at the touch of a finger get information on any and everything related to Home and Office products. Whether it is information about architects or builders or designers or for that matter finer tips on Vastu & Feng Shui.

H D M E LAND

18B, Asutosh Mukherjee Road Kolkata 700 020 Contact: Mr. S.D. Gupta Phone: 30943397, 98306 24335, 98310 88758, 32139746, 98312 78456, Fax : 2465 9754



Quality Homes. By Quality People.

Merlin House, 79 Shambhunath Pandit Street Kolkata 700 020 Ph : 2455 6702 (8 lines) E-mail : info@merlinprojects.com Website: www.merlinprojects.com

India's First One Stope Shopping Mall for Home & Office Products

DRONAH is an all encompassing, interdisciplinary organisation that involves highly motivated professionals from various disciplines. We share a vision for a better quality of life for present and future generations - without foregoing the links from the past. In this pursuit, it is our aim to actively promote conservation and traditional practices in lieu with modern technology for sustainable development. We recognize the need for knowledge sharing and mutual interaction for this purpose. The idea of the organization is to understand and document the complex matrix of our environment including traditions, art, architecture and people. The organization aims for conservation and development in Built Heritage, Ecology and Environment, Community Participation, Arts & Crafts and Education.



Cover Photo: Traffic crossing near Balban's Tomb, New Delhi