April 2015 | Volume 16 No. 1

ISSN 2347 - 4912

SHELTER

Theme Paper | Policy Review | Case Studies

hudco Publication

Theme: RESILIENT CITIES

India at the 25th Session of the Governing Council Meeting of UN-HABITAT, Nairobi, April 17-23, 2015

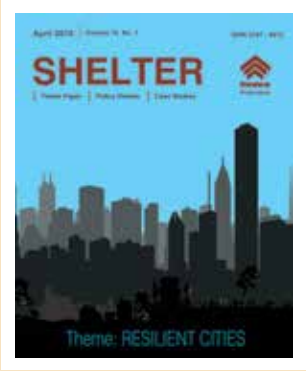
UN-Habitat is the global agency in the UN system for urban affairs. In the context of rapid urbanization in India, with India's active association in UN-Habitat, there is a significant potential for information sharing and learning for achieving sustainable development of human settlements in India. The Governing Council is an intergovernmental decision – making body for the United Nations Human Settlements Programme (UN-Habitat). It meets biennially and reports to the General Assembly of the United Nations through the Economic and Social Council, particularly on programmatic issues.

The 25th session of the Governing Council of UN-Habitat was held at Nairobi from 17-23 April 2015. 59 member countries participated in this meeting. During the event, an exhibition was organised by Government of India, Ministry of Housing and Urban Poverty Alleviation through HUDCO. The exhibition had 14 panels highlighting various initiatives of the government in the field of housing and urban development. The initiatives for Housing for All by 2022, National Urban Livelihood Mission, Smart Cities, Development of Heritage Cities, inclusive planning initiatives, investment opportunities in the housing and urban infrastructure sector in India, institutional initiatives and contribution by HUDCO, BMTPC, HPL, CGEWHO, etc. were on display.

The exhibition was inaugurated by H.E. Mr. Yogeshwar Varma, High Commissioner of India in Kenya at Nairobi, in the distinguished presence of Dr. Nandita Chatterjee, Secretary (HUPA), Ministry of Housing and Urban Poverty Alleviation, Government of India; Dr. M. Ravi Kanth, Chairman and Managing Director, Housing and Urban Development Corporation Limited; and Shri Sanjeev Kumar, Joint Secretary, Ministry of Housing and Urban Poverty Alleviation, Government of India, among other important dignitaries.

The exhibition was visited by a large number of dignitaries and distinguished personalities from various countries.

INSIDE



Theme

RESILIENT **CITIES**

The word "resilience" typically describes a material's ability to recoil or spring back into shape after bending, stretching, or being compressed. In ecology, resilience has been described as the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state. Thus, a resilient ecosystem is considered to be one that can more effectively withstand external shocks and rebuild itself after experiencing those shocks.

In line with this understanding, the idea of resilience when applied to urban areas, refers to the capacity of our communities and cities to bear the future shocks and stresses associated with climate change, environmental degradation, social and economic turmoil etc. and to continue to function, instead of collapsing. This places an important responsibility on urban planners, architects, social scientists and city administrators, to plan and manage our cities as resilient systems that will be able to cater to the needs of today and the future as well as withstand any forces which may impact its functional efficiency.

With the rapid growth of urban areas there is greater concentration of people, economic activities and assets in urban areas, and therefore the impact of any hazard or disaster would also be many times greater. The urgent need for shift in social and economic paradigms, improved technologies, and efficient energy solutions can hardly be overstated, as also, the need for involvement of all stakeholders in developing the resilience of communities.

IN THE BOX

SHELTER

Vol 16 No.1 April 2015

www.hudco.org

ISSN 2347 - 4912

SHELTER is an official publication of HUDCO/HSMI, distributed free of charge. It deals with issues related to housing, urban development and other themes relevant to the habitat sector. Contributions, comments and correspondence are most welcome and should be forwarded to:

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FROM THE CHIEF EDITOR

The impacts of climate change are expected to create numerous challenges for cities Any effort at building the resilience of our cities must work towards helping communities prepare for increased climate risk not only in ways that allow a quicker, safer return to normalcy after an event but also an ability to thrive going forward. Critical issues for urban adaptation that have emerged include, the need for political commitment at multiple levels of government, information and data as a basis for understanding potential risks and vulnerabilities, meaningful and effective stakeholder engagement shaped by local contexts, and sustained financial and staff resources that are sensitive to urban variability. Through careful land use planning, wise investment in infrastructure, and smart building design, we can protect the value we've created in our cities and be more robust when facing adverse events. The role of the community as a key stakeholder in how to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events is extremely important.

A resilient city is prepared to face the threats posed by natural and man-made threats, thereby reducing the risk for the city's population. The vulnerability of the population can be reduced by building its capacity to respond to climate change challenges, disasters and economic shocks. Instances of cities being caught off-guard are frequent, and the consequences are there for all to see in the aftermath of the many disasters, such as the devastating floods in Uttarakhand in 2013, or Ladakh floods in 2010 or even the tsunami in the economically advanced Japan in 2004. However it is heartening to see that during the cyclone which hit Odisha and Andhra Pradesh in 2014, the loss to life and economy was substantially reduced due to the preparedness of the government machinery.

Planning for urban resilience, and specifically adaptation, is well under way in a number of cities around the world. These programmes include not just creating resilience to natural hazards like earthquakes, floods, etc., but also to the stress that weakens the fabric of a city like unemployment, endemic violence, drought, crop failure etc. The United Nations office for Disaster Risk Reduction (UNISDR) has launched a Making Cities Resilient programme, aimed at providing support to cities, improving city to city cooperation, promoting local action planning and monitoring the progress of cities. At the Rockefeller Foundation, the 100 Resilient Cities project is highlighting urban hardiness around the world by helping 100 cities in the world to become more resilient to physical, social and economic challenges. Also, more and more institutions are getting into the act along with organizations like the World Bank, Asian Development Bank, European Union etc. The resilience movement is a global attempt to address two of the long-standing and most vital questions facing theorists, planners and leaders, viz. what is the purpose of society, and what is a society's responsibility to its citizens.

In this publication of Shelter, authors from all over the country have attempted to put forward their views on different aspects of resilient cities. The theme papers by AK Jain and Deepak Kumar Pandey, provide a multi-pronged strategy to make cities resilient to disasters. These papers also highlight a transformative action plan towards creating climate resilient, safe and gender sensitive cities.

The paper by Dr. Priyanjali Prabhakar emphasizes the importance of gender equity in city planning, while Dr. Pawan Kumar has linked the Japanese experience of an improved public transport system to the making of a resilient city.

Shri PB Salim (et. al) has recognized the need of a district level model for elimination of open defecation in India and the case studies on Gurgaon provide an answer to the ongoing criticism of this suburb. Learnings from the residents of Dharavi slum in Mumbai about how improving their well-being is a pre-requisite to provide a citizen oriented and transparent model of governance are illustrated in the paper by Ankita Chachra. Social capital credit model could be used as a tool in instrumentalising the same. Mansi Sahu (et. al) has suggested various ways of preparing plans which are bound to go beyond the present landuse plan to urban economic development.

Arun Bhandari and Sarang Goel have addressed the need for energy conservation in conventional buildings and city neighbourhoods. Prof. Chetan Vaidya lists the challenges being faced by Indian cities and cites examples from Melbourne to make them resilient. Deependra Prasad home the need to redevelop the derelict mill land in Mumbai by formalizing the voice of community in the process.

Arjun Kumar argues that certain sections of society still face deprivation of basic services in urban India and calls for developing new cities to accommodate growing population. Debolina Kundu has drawn a road map of smart cities, which talks of increasing the penetration of mobile and internet usage for more meaningful connectivity.

Hope you enjoy this issue of Shelter.

Gender Equity in City Planning

DR. PRIYANJALI PRABHAKARAN

Many traditional Indian cities are characterized by high density mixed use development where women are also part of income generating activities. Women actively take part in family business, agriculture, horticulture, animal husbandry, handicrafts, and small scale manufacture. New cities in India, i.e., Chandigarh, Gandhinagar or Naya Raipur, have less land use mix and are functionally more fragmented than many old Indian cities. It can be argued that women living in these cities have less chances of participating in the many activities of the city.

KEYWORDS

Gender Equity, City Planning, Safety of Women.

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City planning is based on presumed needs of citizens. Citizens in a city are not a homogeneous group with homogeneous needs. City systems and resources are experienced by women and men differently. Such difference in the needs of the user groups is not reflected in the allocation of city resources. Women as a user group have specific needs and constraints in accessing the city. The way a city is planned can change the lives of various user groups positively. This paper examines how the gender roles of women create different needs and how such needs are addressed in city space, infrastructure and other resources.

INTRODUCTION

City planning is the judicial and equitable allocation and use of resources for the benefit of society as a whole. Spatial planning is the spatial manifestation of such allocation. Different user groups- men, women, the aged, children, people with special needs - experience space differently. It is essential for spatial planners to recognize this, so that they are able to allocate resources without consciously or unconsciously denying any user group, the opportunity to enjoy the fruits of planning.

GENDER AND PLANNING

Gender identifies the social relations between men and women and is different from sex, which identifies the biological difference between men and women. (Moser 1993, Bitton et.al 1996, Rendell 2000) Gender roles are culturally determined. Gender relations have been studied in different societies, which have shown the variability of gender roles and the near universality of gender subordination (Mayoux 2005).

The actions and experiences of men and women in the built environment and their attitude towards it differ. These differences vary culturally and historically and according to age, class and many other circumstances.

An urban planner or designer is concerned about how the different user groups have different needs, how existing built environments meet the needs of these different groups and how stereotype assumptions affect design and planning.

ASSUMPTIONS OF STEREOTYPE USER GROUPS

Planning has the smallest unit as a family- the stereotype family has a young male breadwinner, female homemaker and children. In reality, families are very diverse, with an increasing proportion of female headed households and single women households. Different families have diverse needs of housing, livelihoods, education, transportation, recreation and community support.

Women are seen as a minority category existing in the private

realm. The concept of women's domestic roles in separate homes and residential neighborhoods are the basis of restrictions on their access to the wider resources of the city (Mackenzie 1988, Greed 1994). Some sociologists are of the opinion that women are considered a problem and even sometimes a symptom of disorder in urban space. A woman is considered as temptress, as whore, as fallen woman, or virtuous womanhood in danger. Respectable woman's movements in urban space are a subject of regulation (Wilson 1991). Women users of public space are often seen and see themselves as illegitimate users of public space. (Viswanath and Mehtrotra 2007). Women are held responsible for their own safety and are advised not to venture into the public space without adequate safety precautions. Thus, society at large advises women not to participate in the public realm. Women are allowed to use public spaces only when they have a purpose to be there on their way to work or study, dropping or picking up children, walking in a park, shopping etc.

LAND USE AND DENSITY

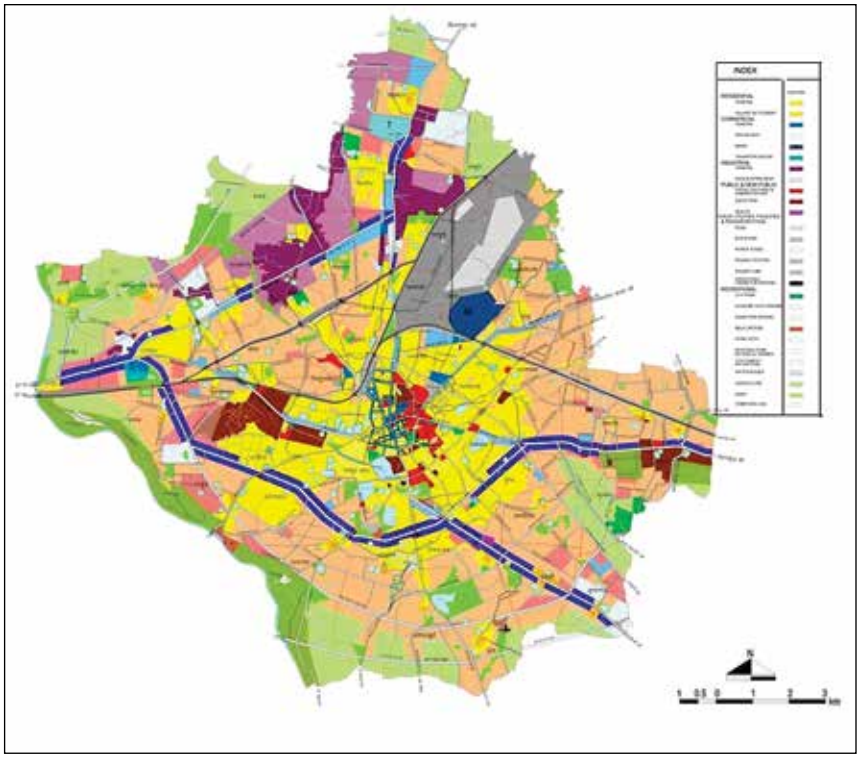
Conventional urban planning has cities divided into zones for specific activities with houses, markets and factories in separate locations. Such planning envisages male breadwinners traveling across town to work and women as housewives caring for children and the elderly. Studies show that widespread suburbanization in the American cities have excluded a large number of women from the labor force. Job centers were too distant and required commuting only by privately owned vehicles. Housing areas did not offer any alternatives to their domestic responsibilities (Friedan 1963, Hayden 1984). Such single-use zoning discriminates against persons who want to combine many tasks and particularly reduces the chances of women participating in economic activities.

In a study of land use impact on transportation, Litman (2015) argues that land use patterns affect accessibility and people's ability to reach desired services and activities. Proximity between different land uses (housing, commercial, institutional) tends to reduce vehicle travel and increase use of alternative modes of travel like walking, cycling etc. Increased density tends to increase land use mix and transit accessibility. People living in central areas of cities with high land use mix are more likely to walk or use public transport than people living in far flung single use sprawling neighborhoods.

It may also be true that women who live in denser and high land use mix areas have greater chances of combining many activities with their domestic chores. They get more opportunities to participate in economic activities.

Many traditional Indian cities are characterized by high density mixed use development where women are also part of income generating activities. Women actively take part in family business,

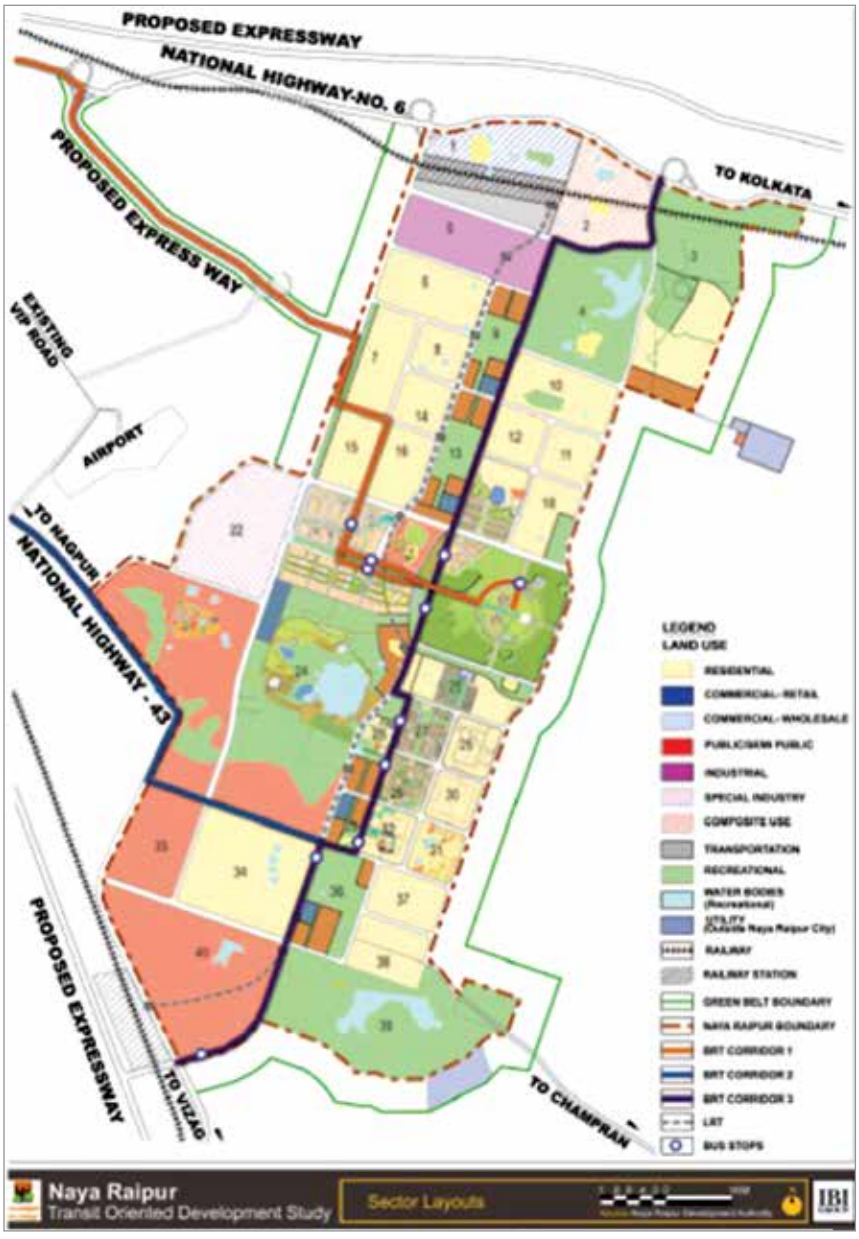
Fig. 1 Land use Plan of Raipur



Source: *Department of Town Planning, Chattisgarh*

agriculture, horticulture, animal husbandry, handicrafts and small scale manufacturer. If we examine the land use plans of new cities in India, i.e., Chandigarh, Gandhinagar or Naya Raipur, they have less land use mix and are functionally more fragmented than many old Indian cities. It can be argued that women living in these cities have less chances of participating in the many activities of the city. Figures 1 and 2 show the land use plans of Raipur and Naya Raipur respectively. The old city shows a better mix of land uses than the new one.

Fig. 2 Plan of Naya Raipur shows less land use mix than Raipur. More land use mix may help residents to combine many activities together while reducing travel distances.



Source: *Naya Raipur Development Authority*

Nohn (2011) contends that 18 per cent of male urban workers and 25 per cent of female urban workers are home based. Hence it is important to recognize home based production activities and retailing as permissible uses in residential areas. The "National Policy on Urban Street Vendors" recognizes the right to livelihood of street vendors in cities. However, most cities are yet to initiate the registration of street vendors and demarcation of vending zones. Street vending provides livelihood to a large number of women (Fig. 3). Demarcation of street vending zones has to be in coordination with land use plans of cities.

Fig. 3 A street vendor: Strict land use controls may reduce the chances of many women employed in the unorganized sector like street vending.

NAVIGATING THE CITY

Functionally fragmented cities create travel patterns difficult for women. It is proven that women are more reliant than men on public transport to meet their travel requirements.

Women have to regulate their travel according to the availability of public transport. Women's work, recreation and shopping options are very much reliant on the availability of transport

Women own and use less number of private vehicles as compared to men. Better transport facilities in a city will facilitate women's access to the public realm and women's economic participation. (Pickup 1988, Greed 94)

Women are more likely to be pedestrians and are more likely to move with children and elderly due to their traditional role as caregivers. Hence, all efforts to improve pedestrian environments benefit women and help them to participate more in the public realm. Proper detailing of footpaths, curbs, drains, manholes, wide zebra crossings, traffic calming measures and proper management of all these facilities ensure good pedestrian environment. Pedestrian areas (particularly footpaths) are often encroached by various users making it difficult for women and children to navigate them.

Women need safe toilets in the public realm. The non availability of toilets drives them home early. The fear of not being able to find a convenient toilet forces them to avoid long journeys and navigation in the public realm. Pregnant women, menstruating women and women of older ages need to use toilets more often, so do children.

Breastfeeding mothers need feeding areas in public spaces. In many railway stations and bus stations, most often no facilities are provided for feeding or nappy changing for children. In crowded trains and buses women have to breastfeed children in the public. Our public spaces are not suitable for pram users. Mothers usually carry infants in their hands. Waiting areas never have facilities for sleeping children; mothers carry them throughout their journey in the public space. Public spaces not safe enough for children, put mothers on high alert. Water bodies without fencing, staircases, balconies and other overlooking areas with handrails which children can climb or might fall through are common. When public space is safe for children the accompanying adults, mainly women are also benefitted.

Investment in roads in many cases is limited to betterment of carriageway and parking facilities. Road widening is invariably carriageway widening with no consideration to improving pedestrian facilities. Even the areas with highest pedestrian flow, like transit stations and shopping streets lack continuity of footpath, proper width of footpath and road crossing facilities (See Figures 4 & 5).

Many cities in the developed world are trying to adopt traffic calming measures to make their streets more pedestrian friendly. The New York Pedestrian Safety action plan (2010) recommends "Slow Speed Zones",

Fig. 4 Pedestrian areas are encroached by many users. Women and children find it difficult to navigate through footpaths.

Fig. 5 The attention given to carriageway is not given to pedestrian areas. Absence of continuity of footpaths makes them less attractive to pedestrians

"Safe Routes to School", "Safe Streets for Seniors", and "Speed Reducers" among other programs. The National Complete Streets Coalition of USA calls for a "Complete Streets Policy" to create facilities for all users travelling along the roads including pedestrians, cyclists and public transport users.

SAFETY

Women's safety in public space has been a matter of serious public discourse in the recent past. City planners and designers also have a role in shaping the physical environment which will ensure safety and will support women's access and inclusion in the public space. Women are vulnerable to violence in urban areas. They are the primary victims of rape or sexual harassment and attacks committed by strangers. Such vulnerability ends up controlling women and restricting their social activities (UNCHS 2000). Safety of public space is identified as an important factor affecting enrolment of girl children to school. (Bhan 2001)

High density areas with adequate natural surveillance (for example streets with lot of doors, windows and balconies of adjoining houses opening into them) and adequate lighting evoke a feeling of safety. Crime Prevention Through Environmental Design (CPTED) strategies can be incorporated into planning and design of public spaces. Safety in public transport can be ensured by proper management of resources and use of technology.

The gender inclusive cities program funded by the United Nations Trust Fund to End Violence Against Women was implemented in some cities including Delhi. Under this program 'Jagori' organization conducted a "Safe Delhi Campaign" in 2005 and found that poor lighting, poor infrastructure and crowded public transport are some of the key factors that affected safety or fear of safety in cities. Improving lighting and providing adequate infrastructure can immediately improve safety in most cities. The study in Petrozavodsk, Russia also concluded that women found poor lighting and crowded vehicles and non conforming uses (like beer outlets) near bus stops as the main factors affecting safety. Crowding in public transport (buses, metros, trains) can be reduced by proper planning and management of these facilities. Similar findings were reported in Rosario, Argentina. In Dar-es Salaam people reported that poor management of urban spaces, in the form of lack of street lighting, narrow paths, unnamed streets, old/ unfinished or dilapidated buildings, lack of open spaces, unlit bus and taxi stands, unfenced public facilities, lack of signage etc., create fear. The above findings point to the important fact that fear of violence can be reduced by better planning and management of urban facilities. (Women in Cities International)

HOUSING AND BASIC FACILITIES

Adequate housing is most essential to the safety and well being of women. Since women spend relatively more time within houses, the inadequacy of houses can seriously affect their physical and mental health. Women are poorer and own lesser resources. It is harder for women headed families to acquire adequate housing and proper tenure rights than for male headed families.

Provision of food and drinking water is the traditional responsibility of women. When cooking fuel and drinking water are not readily available, it is the role of women and girls in the family to fetch them. The non-availability of toilets forces women to wait until dark to ease themselves, which pose a serious health and safety hazard. Availability of health infrastructure is crucial in maintaining maternal and child health. In households which lack these basic facilities, priority is often given to television, mobile phone

or motorcycles than to toilets or to safe drinking water provision. It could be seen that the provision of basic facilities is more important to women.

TRADITIONAL ROLES OF WOMEN

Women's traditional roles as caregivers and home makers can be aided by many city systems. Women with young children benefit a lot from community facilities like crèches and community kitchens. Crèches should be made mandatory in all workplaces with female employees and also in neighborhoods. Taking care of the aged and the disabled also can be incorporated in civic planning which will ease the burden of the women caregivers.

CONCLUSIONS

Gender equity in planning can be ensured when the resources of the city are equally accessible to men as well as women. Participation of women in the public realm, by enjoying it, travelling through it, learning from it and taking part in leisure and all activities which others are able to, ensures them the right to the city. City systems should be able to facilitate and supplement women's traditional gender roles.

If constraints in the urban area can be removed, more women can contribute towards economic production and wage employment and can become empowered. In India urbanization is expected to increase in the coming decades. Policies for creating employment opportunities for women and men should be tied up with measures to remove constraints for the rightful participation of women in the urban area. Adequate housing, proper land use mix, adequate density, safe public spaces, and urban infrastructure such as water supply, sanitation, waste disposal, public transport, improved pedestrian facilities, adequate street lighting and intelligent management systems are very crucial in making cities equitable. Policymakers should plan to make gender sensitive cities where women too can enjoy all the fruits of planning.

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ACKNOWLEDGEMENTS

This work is part of the literature study of the doctoral thesis titled "The Influence of Physical Space on Gendered Participation in the Public Realm: The case of Hyderabad" completed in January 2010 under Dr. Padmavathi Pervar, Vice Chancellor, Jawaharlal Nehru Architecture and Fine Arts University. Hyderabad. The research was conducted under the QIP programme of AICTE.

Housing Amenities in Urban India

Issues and Challenges

ARJUN KUMAR

"As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities also increases. A neo middle class is emerging which has the aspiration of better living standards. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unliveable. The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernising the existing mid-sized cities."

KEYWORDS

Housing Amenities, Development, Slums, Smart Cities.

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The need for access to basic amenities — drinking water, sanitation, electricity, and drainage — to ensure a decent quality of life has been internationally and nationally recognised and acted upon in the form of Millenium Development Goals (MDGs) and various policies and programs in India. Deprivation and disparities in access to basic amenities in urban India have been highlighted in this paper. Despite improvement over time, many households in urban India still face deprivations of basic amenities and hence have a low standard of living. Disparity among the households located in slums and small and medium towns/cities and those belonging to poor (lower strata of consumption expenditure classes), Scheduled Tribe, Scheduled Caste and Wage Labourers (casual labourers) were observed to be increasing. Findings suggest the need for attention towards basic amenities with special focus on slums, small and medium towns/cities and for group-specific measures, to raise the overall quality of life and well-being.

INTRODUCTION

Adequate shelter and housing amenities are crucial to ensure a dignified life with physical, psychological, social and economic security for the people of a country and to raise their standard of living. The importance of housing and basic amenities has been internationally recognized by the United Nations, since the Universal Declaration of Human Rights in 1948, and in Millennium Development Goals (MDGs) pledged by 189 nations in 2000. In India, the Technical Group on Urban Housing Shortage, 2012-17 (TG-12) estimated the number of urban households to be 81.35 million and the urban housing shortage to be 18.78 million, in 2012. Households from economically weaker sections and lower income groups accounted for around 96 per cent of this shortage, mainly on the account of the congestion factor (Kumar, 2014 c).

The urban housing needs have changed drastically over the past few decades. Issues such as economic competitiveness of cities, provision of easy access to housing/ affordable housing, empowerment of Urban Local Bodies (ULBs) / Para-Statal agencies, provision and pricing of quality infrastructure / amenities / other municipal services, slums redevelopment, formalisation/regularisation of unauthorized colonies, congestion & overcrowding, migration & mobility and steep rise in vacant houses have cropped up in the recent past. These are additions to the prevailing issues such as temporary/katcha houses, obsolete condition of houses, homeless households and shelter camps, delivery of basic amenities to every household, and challenges of urban planning and development like equal access and opportunity, inclusiveness, decentralisation, sustainability, protection of the environment and security.

'Housing and Basic Amenities for All' has been a dream long envisioned and worked upon, but 'All' are far from attaining housing as well as access to housing amenities, leading to dire consequences on the development of our country and rendering the MDGs unfulfilled. Various programmes of the Government of India such as Jawaharlal Nehru National Urban Renewal Mission (JnNURM), aimed at improving and augmenting the economic and social infrastructure in select cities as well as at providing affordable housing and basic services to the urban poor (BSUP) through planned interventions. Other schemes like Rajiv AwasYojana (RAY), Affordable Housing in Partnership (AHP) Scheme and Interest Subsidy Scheme for Housing Urban Poor (ISHUP) etc. are also functioning for the provisions of various housing needs and services. Further, the Government of India has set a target of building 20 million houses by 2022 to replace urban slums and provide affordable housing for all.

Cities are referred to as the engines of economic growth.It is in this context that the new government has decided on developing 100 "Smart Cities" in the country. Accordingly, in his budget speech of July 2014, the Finance Minister has stated as follows:

"As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities is increasing. A neo middle class is emerging which has the aspiration of better living standards. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unliveable. The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernising the existing mid-sized cities."

There is a crying need for the cities to get smarter to handle this large-scale urbanization and find new ways to manage complexity, increase efficiency, reduce expenses, and improve quality of life. The key feature of a smart city is in the intersection between competitiveness, capital and sustainability. Smart cities should be able to provide good infrastructure and quality of life such as water, sanitation, reliable utility services, health care; attract investments; transparent processes to run commercial activities; fast online building approval system and simple online citizen centric services.Institutional Infrastructure (including Governance), Physical Infrastructure, Social Infrastructure and Economic Infrastructure constitute the four pillars on which a city rests. The centre of attention for each of these pillars is the citizen. In other words a smart city works towards ensuring the best for its entire people, regardless of social status, age, income levels, gender, etc.

In developing nations like India, where an increasing share of population resides in urban areas and faces various institutional, social and financial challenges to gaining adequate housing, amenities and services, it is crucial to understand the needs and dynamics of the demand-side of the situation, so that the supply-side can be effectively planned and implemented.

Over the years, various policies and actions have positively stimulated the urban housing condition and access to amenities in India, in terms of the type of dwelling structures, access to housing amenities such as drinking water, sanitation, electricity, etc. by the households. However, as the literature points out,there are still a large proportion of households that fail to have adequate housing and the essential basic amenities, especially the households located in slums, small towns/cities and backward states, and those belonging to the lower strata of consumption expenditure (poor), scheduled tribes, scheduled castes and wage labourers.

This paper aims to give an overview of the situation of the availability of housing amenities (like drinking water, sanitation, electricity and drainage arrangement) to the urban households. It also tries to show the gaps in the provision of housing amenities, for which targeted focus is required, and it shows the urban spaces where attention is required immediately. Based on various policies, schemes and literature, this paper also tries to list the challenges involved in and the steps required on how to go ahead in providing access to housing amenities for all, so that the well-being and standard of living of the people in urban India can be raised.

DEPRIVATION IN ACCESS TO HOUSING AMENITIES IN URBAN INDIA

Data for housing amenities have been used from House listing and Housing Census data, Census of India (2001 and 2011) and Housing Conditions Round[1], National

Sample Surveys (NSS) (1993 and 2008-09). The indicators[2] of housing amenities–drinking water, sanitation, electricity and drainage arrangement—used in this paper are deprivation measures[3], which highlight the households not having access to the corresponding housing amenities.

Aggregate

The total number of urban households was 78.9 million as per Census, 2011, which were 25.2 million households (46.9 per cent) more than the corresponding figure of 53.7 million households in 2001. (Table 1)

As per census 2011, the proportion of urban households deprived of the availability of drinking water within the premises, latrine facility within the premises, electricity in the house and closed drainage connectivity to a waste water outlet were 28.8 per cent, 18.6 per cent, 7.3 per cent and 55.5 per cent respectively.

There was an improvement in access to housing amenities by urban households, in percentage terms, during 2001-11. However, when we analyse the absolute number of households deprived of these amenities, we find that despite the decline in the proportion of deprived households, there has been marginal increase in the numbers of households deprived of the availability of drinking water within the premises, latrine facility within the premises and closed drainage connectivity to a waste water outlet, while there has been a decline in the number of households deprived of electricity in the premises.

The number of households not having availability of drinking water within the premises witnessed an increase of 4.1 million, from 18.6 million in 2001 (34.6 per cent of urban households) to 22.7 million in 2011 (28.8 per cent of urban households). In case of no latrine facilities within the premises, there was an increase of 0.5 million households, from 14.1 million in 2001 (26.3 per cent) to 14.7 million in 2011 (18.6 per cent). The number of households not having electricity in the house witnessed a decrease of 0.9 million, from 6.7 million in 2001 (12.4 per cent) to 5.8 million in 2011 (7.3 per cent), and those not having closed drainage connectivity for waste water outlet witnessed an increase of 8.6 million, from 35.2 million in 2001 (65.5 per cent) to 43.8 million in 2011 (55.5 per cent).

The compounded annual rates of decline in the percentages of deprived households, during 2001 to 2011, were 1.82 percent, 3.40 per cent, 5.16 percent and 1.64 per cent for no availability of drinking water within the premises, latrine facilities within the premises, electricity in the house and closed drainage

Table 1 Deprivation in Access to important Basic Amenities by the Household during 2001 and 2011 in Urban India (numbers are in millions)

	Levels		2001 – 2011 (Changes)		
	2011	2001	Numbers (millions)	as proportion of total households during 2001 (in %)	Annual compounded (in %)
Number of Households (in millions)	78.9	53.7	25.2		
in %				46.9	
Number of Households Not having Availability of Drinking Water within the premise (Near the premise and Away) (in millions)	22.7	18.6	4.1		
as proportion of total HHs (in %)	28.8	34.6		22.3	-1.82
Number of Households Not having Latrine Facility within the premise (Public and Open latrine use) (in millions)	14.7	14.1	0.5		
as proportion of total HHs (in %)	18.6	26.3		3.9	-3.40
Number of Households Not having Electricity in the house (Kerosene, Other sources and no lighting) (in millions)	5.8	6.7	-0.9		
as proportion of total HHs (in %)	7.3	12.4		-13.5	-5.16
Number of Households Not having Closed Drainage Connectivity for Waste Water Outlet (Open drainage and No drainage) (in millions)	43.8	35.2	8.6		
as proportion of total HHs (in %)	55.5	65.5		24.4	-1.64

Note: Annual compounded growth rate is calculated based upon percentage in 2011 over percentage in 2001 of levels of deprivation of corresponding housing amenities.

Source: House listing and Housing Census Data, Census of India, 2001 and 2011.

connectivity for waste water outlet respectively. The compounded annual rate of decline in the proportion of deprived households was the highest for the availability of electricity in the house, which in turn can be seen in terms of fall in the absolute number of households deprived of electricity in the house. Even as per NSS, improvement in the access to housing amenities was observed between 1993 and 2008/9. There was, in fact, acceleration in the rate of decline in deprivation in access to housing amenities by the households during 2002–2008/9. (Kumar: 2013, Kumar: 2014 a)

Slums

The 2011 Primary Census Abstract for Slums reveals that the slum population in India increased during 2001-2011, with urban slum[4] households constituting 17.43 per cent of the total 78.87 million households in urban India (Table 2). Households in urban slums reported higher level of deprivation in access to basic amenities as compared to the levels of deprivation in urban India as a whole in 2011. However, as can be seen from Table 2, the access to important basic amenities has improved significantly during the 2001-2011 census.

'While public spending on slum improvement has increased on a modest scale, exclusionary practices such as evictions have increased, partly to 'cleanse' the cities and enhance their image among prospective investors.' (UN- Habitat: 2014)

Various Class Sizes of Towns/Cities

In urban India, growth in small towns has been slower than that in medium and large towns. As a result, there has been a decline in the share of small towns and an increase in the share of medium and large town households in this period. This phenomenon has also been highlighted in earlier literature as 'dualism in urbanization' or 'top-heavy structure of urbanization' (Kundu: 2006).

Households in smaller towns have been noticed to have the lowest annual rate of improvement (decline in deprivation) in availability of housing amenities, followed by the improvement rates in medium towns and then larger towns and cities, between 1993 and 2008-09, from NSS data, resulting in high levels of deprivation in access to housing amenities in smaller towns, followed by deprivation in medium towns and then larger towns and cities. (Table 3)

Thus a reinvigorated focus on smaller towns and cities, while making provisions of housing amenities in urban India, would go a long way in ensuring inclusive urban growth.

State-Wise Distribution

Backward states like Assam, Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal, North-Eastern and hilly States were found to have slow rates of improvement in access to housing amenities during 2001 to 2011, as per Census data, and as a result, they had high percentage levels of deprivation in 2011, among all the indicators in urban areas. The rise in the absolute number of households deprived of housing amenities during this period can mostly be attributed to backward states like Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh, West Bengal and others. This shows that 'Inequity' in the provision of basic services across states and various size categories of urban centres is extremely high. Investments for the development of infrastructure and provision of basic services have not been spatially balanced during the past few decades. More specifically, state governments and para-statal institutions did not exhibit sensitivity towards small and medium towns and backward

Table 2 Deprivation in Access to important Basic Amenities by the Household in Urban Slums and Urban India during 2011 (in %)

	Urban Slums	Urban India
Number of Households (in Millions)	13.75	78.87
Households Not having Availability of Drinking Water within the premise	43.3	28.8
Households Not having Latrine Facility within the premise	34.0	18.6
Households Not having Electricity in the house	9.5	7.3
Households Not having Closed Drainage Connectivity for Waste Water Outlet	63.1	55.5
Source: Primary Census Abstract for Slums, Census of India, 2011.		

states. Unfortunately, privatisation, partnership arrangements and community-based projects that are being projected as alternatives have not been able to fill the vacuum created by the withdrawal of the State, taking place under the new system of governance.' (Kundu et al: 1999, Kundu: 2006).

Socio-Economic Groups

A major failure of city governance has been the inability to meet the needs of the poor and the apprehension is that this is a manifestation of an exclusionary urbanisation in the country, prohibiting or discouraging in-migration of persons in the low social and economic categories from gaining a foothold in cities and a stifling dynamics of development at the lowest level of the urban hierarchy (Kundu: 2011). A detailed study on the deprivation in access to housing amenities in urban India across various socio-economic groups brings various forms of exclusions to the forefront, throwing light on the issues like insensitivity towards inclusion of the poor (economically weaker), caste-based exclusion and elite capture.

As per NSS data, economic category-wise study showed high percentage of deprivation in access to housing amenities by households and very low annual rate of decline in this deprivation among poor households, as compared to non-poor households, thus resulting in high levels of deprivation among the poor (Kumar: 2013, Kumar: 2014 a). Across caste and ethnic groups, Scheduled Tribe (ST) and Scheduled Caste (SC) households had remarkably higher levels of deprivation and lower annual rate of decline in deprivation, as compared to the households belonging to other social groups. Interface of caste-based and economic categories show that in every economic class category, ST

Table 3. Deprivation of Few important Basic Amenities by the Household among Various Size class of Towns/Cities during 1993 and 2008-09 in Urban India (levels are in % and changes in annual compound growth rate)

	Small Towns	Medium Towns	Large Towns	Urban Areas
No Facility of Drinking Water in the House				
Levels in 1993	44.6	41.0	28.4	39.2
Levels in 2008-09	31.6	22.5	15.6	22.9
Annual Change, 1993 to 2008-09	-2.2	-3.7	-3.7	-3.3
No Latrine Facility in the House				
Levels in 1993	42.7	36.0	29.9	36.6
Levels in 2008-09	26.5	14.7	15.3	17.7
Annual Change, 1993 to 2008-09	-3.0	-5.5	-4.2	-4.5
No Electricity Use for domestic Purposes in the House				
Levels in 1993	25.2	18.7	8.9	18.4
Levels in 2008-09	7.0	3.6	1.4	3.9
Annual Change, 1993 to 2008-09	-7.8	-9.9	-11.3	-9.4
Open, Katcha and No Drainage Arrangement in the House				
Levels in 1993	51.7	40.5	18.5	38.8
Levels in 2008-09	34.1	22.0	5.2	20.6
Annual Change, 1993 to 2008-09	-2.6	-3.8	-7.7	-3.9

Note: The classifications used here for the analysis of different size classes of towns/cities, from NSS data during 1993 and 2008/9, are: Small towns- population less than 50,000; Medium towns- population more than 50,000 and less than 1 million; and, Large towns- population more than 1 million.

It should be noted here that the reference time for arriving at the year differences between two surveys is the mid-point of the NSS Housing Conditions rounds. The NSS 49th round (January to June 1993) was completed in six months while the 65th round (July 2008 to June 2009) was completed in a year. Thus, the overall period under study is 15.75 years, from 1993 to 2008-09.

Source: Author's Calculation using National Sample Survey, Household Conditions Rounds, unit record data for the respective years.

and SC households experienced higher levels of deprivation and lower annual rate of decline in deprivation vis-à-vis other households. Among livelihood categories, casual labourers' households were found to have high levels of deprivation, followed by households belonging to self employed and then regular wage/ salary earners and others. Among religious groups, Muslims followed by Hindu households were found to have high levels of deprivation, as compared to other religious minorities' households. (Kumar: 2013)

Achieving the goal of an 'inclusive society' calls for immediate corrective measures having legal sanctity, along with other complimentary anti-poverty, non-discriminatory and economic and social development programmes. Besides socio-economic exclusions, there has been a stark lag in the policy-making efforts, coupled with the inefficient top-down policy implementation in India. 'The big city bias of the mission (JnNURM) is very evident. India's developed states and big cities have been able to take advantage of the mission and improve their infrastructural requirements of water supply, sewerage and transportation. Spending for the urban poor has declined over the years and they are partners in the programme in a very cosmetic sense. The small towns and poorer states have taken little advantage of this programme because of their limited capacity to understand and implement reforms, and to prepare city development plans and detailed project reports which are contingent for qualifying for funds.' (Kundu, D: 2014)

CONCLUDING OBSERVATIONS AND THE WAY FORWARD

Availability of housing amenities such as drinking water, sanitation, electricity and drainage arrangement, etc. by the households has improved substantially in proportion terms during the last decades in urban India. However, the deprivation has starkly risen in terms of absolute numbers (except for access to electricity in the house, where there was a fall in the absolute number of deprived households) due to the increase in urbanisation and in-migration. Households located in slums, in small and medium towns and cities, in backward regions and those belonging to the poor (lower strata of consumption expenditure classes), scheduled tribe, scheduled caste and wage labourers (casual labourers) were found lagging in the availability of amenities in the house in urban India.

The findings suggest that availability of housing amenities that are highly crucial for ensuring a better quality of life in urban India, require immediate attention and recent policies relating to these provisions need to be strengthened with inclusive and socio-spatial perspective. This would help to deliver an equal access to basic housing amenities and services.

While the focus is required to extend the effective delivery of housing amenities and services where it is unavailable, additional efforts are also required for affordable pricing or user fee charges of these housing amenities and municipal services in transparent, accountable, efficient and sustainable manner.

The state governments should take the overall responsibility of ensuring housing amenities to all sections of population in different size/class of urban centres, irrespective of their income or affordability. For this purpose it would be important to set up the 'minimum standards' for the amenities in realistic terms. The government may, however, fulfil this responsibility by engaging/ supporting private organisations, NGOs and CBOs or by strengthening the local bodies (Kundu et al: 1999).

To reduce the top-down implementation of policies, planners and policymakers have, in recent years, made a strong case for para-statal agencies and local governments to mobilise finances from their internal resources or borrow from financing institutions with the objective of 'bringing in efficiency and accountability in their functioning' (Kundu et al: 1999, Kundu: 2006).

Constitutional amendment for decentralisation of financial powers is not sufficient for augmenting resources of the local bodies. This must be backed up by actual devolution of powers and responsibilities and their use by the local bodies. The management capacities of these bodies need to be strengthened by giving more technical personnel, training the existing staff and capacity building. They should be able to organise their affairs better, including mobilisation of tax and non-tax resources (Kundu et al: 1999).

The new paradigm[5] of participatory governance, backed up by area and social group targeting can help the lagging states in preparing and implementing a comprehensive plan for infrastructure, basic

amenities and social development in collaboration with the major national and international partners (Kundu& Varghese: 2010).

Also, decisions on the funding of 65 mission cities under JnNURM were based on the Census 2001. This resulted in disparities in the creation of urban infrastructure across India, as smaller towns were at a disadvantage vis-à-vis large cities in access to the funds. Thus, the funding for the well-off cities (like the state capitals and million-plus cities) needs to be scaled down as they have the capacity to generate resources of their own. The extra available funds could be directed towards making special provisions for addressing the infrastructure needs of the economically backward states and smaller towns (D. Kundu: 2014).

There is an urgent need for a Mission, specifically targeting the small and medium towns, including the newly identified urban centres for urbanisation process in the country to acquire a non-exclusionary character (Kundu A 2014).

The idea of smart or developed cities often stays limited to the affluent sections of society. Even though various low-cost/ low-income housing projects and schemes and provisions for housing amenities are under planning or implementation, but the question remains whether population in low income category will be able to afford these houses & services. These are certainly not affordable by the income levels of the households belonging to the weakest sections, which mostly live hand-to-mouth on daily-wages, in cities and towns, where even bare sustenance is ridiculously expensive.

The major challenges in providing basic amenities to households are of implementation and monitoring and of constraints with ULBs, as highlighted in earlier literature. Development of smart cities and steps towards the achievement of MDGs require smart and empowered urban local bodies and para-statal institutions.

There is a need of carrying out effective and stringent legal and administrative reforms and of enforcement of second generation reforms on priority basis, by ULBs. In order to deliver affordable and efficient housing amenities and municipal services, the ULBs need to work in an expansion or exponential mode, with continuous capacity building and revitalisation of administrative and financial energy, which will require roping in of specialised institutions and para-statal agencies. These institutions need to be people friendly and should make optimum utilisation of local resources, and choose appropriate actions learning from past experiences across urban spaces, for arriving at apt decisions.

Local-level governments and institutions should also have periodic, real-time comprehensive database of services available to each house and household (information such as house number, availability and usage of quantity and quality of various amenities and services, such as water, electricity, LPG, etc., along with their connection details) using latest technology and coordination with all the stakeholders, to efficiently monitor the households' demand and requirements, as well as supply-side leakages and to pace up the delivery of such services in timely manner. The paradigm shift in urban development from 'urban renewal' to 'resilient cities' necessitates specialised urban institutions with continual vigour. Smart and Empowered Urban Local Bodies and Para-Statal Institutions will cater to our current needs and challenges and also help to meet our future requirements and planning judiciously.

NOTES

[1] Data on the indicators were extracted and tabulated from the NSS household unit record data by applying the weights provided by the NSS.

[2] Indicators Used:

Census of India

[i] Households not having availability of drinking water within the premise: It refers to households having availability of drinking water near the premises and away from the premises.

[ii] Households not having latrine facility within the premise: It refers to households having public and open latrine use, meaning no latrine facility within the premise.

[iii] Households not having electricity in the house (as a source of lighting in the house): It refers to households having kerosene, other sources of lighting in the house and no electricity.

[iv] Households not having closed drainage connectivity for waste water outlet: It refers to households having open drainage and no drainage connectivity for waste water outlet.

National Sample Survey

[i] No facility of drinking water in the house: It refers to the community use of the drinking water facility by the households.

[ii] No latrine facility in the house: It refers to Public or community use of latrine facilities, and non-availability of such facility in the house.

[iii] No electricity used for domestic purposes.

[iv] Open katcha and no drainage arrangement: Here, underground and

pucca arrangement for drainage are excluded.

[3] The indicators were created based on the information from Census and NSS. These are the recoding of the variables as available from the same. The focus here is to include those indicators which significantly capture the unavailability and no access to the corresponding housing amenities.

[4] A Slum, for the purpose of Census, has been defined as residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health. For the purpose of Census, Slums have been categorized and defined as of the following three types- Notified (All notified areas in a town or city notified as 'Slum' by State, UT Administration or Local Government under any Act including a 'Slum Act'), Recognized (All areas recognized as 'Slum' by State, UT Administration or Local Government, Housing and Slum Boards, which may have not been formally notified as slum under any act) and Identified (A compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities).

[5] The paradigm shift in the formulation and implementation of the Eleventh Plan is reflected in the greater role being assigned to the state and local governments, along with civil society organizations. Detailed guidelines have been issued to the states for preparing district plans and sub-plans through the district/block level committees and other Constitutional bodies created for this purpose. In fact, these plans are a pre-requisite for accessing funds in many of the new central sector schemes.

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ACKNOWLEDGMENTS

The author would like to acknowledge Prof. Amitabh Kundu, Prof. Sukhadeo Thorat, Prof. P. M. Kulkarni, Prof. Amaresh Dubey, Prof. Sachidanand Sinha, Dr. Debolina Kundu, Dr. Himanshu and the Indian Institute of Dalit Studies' research team for their insightful comments on the earlier versions of this paper.

ICT Preparedness of Indian Cities

Can We Become Smart?

DEBOLINA KUNDU

The key feature of a Smart City lies in the intersection between competitiveness, capital and sustainability. The smart cities should be able to provide good infrastructure such as water, sanitation, reliable utility services, health care; attract investments; transparent processes that make it easy to run commercial activities; simple and on line processes for obtaining approvals, and various citizen centric services to make citizens feel safe and happy.

KEYWORDS

Smart Cities, ICT, JNNURM, Urbanization, PPP, E-Governance,

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Cities have been recognised as engines of growth contributing to high share of GDP. Although the level of urbanisation is only 31 per cent in India, Indian cities contribute to over 60 per cent of the GDP. In fact, the JNNURM was launched in 2005 to make cities competitive and economically self-reliant by addressing the issues of massive investments required for infrastructure development and reforms that are required to sustain investments. Taking forward the urban development Mission, the new Government is preparing to launch the ambitious Mission of creating at least 100 smart cities in the country. Given this background, this article attempts to analyse the preparedness of the Indian cities to become smart, based on the secondary data brought out by the Census 2011. The findings show that in the Indian cities, the access to internet connection and mobile ownership is still far from desirable and uneven across towns & cities within the same class. The small towns have much lower access to these facilities and also suffer from the higher deficiency of basic minimum services. Even available evidence shows that the 65 Mission cities have to go a long way to attain "Smartness". Moreover, there has been an addition of 2532 new census towns in the country where urban governance is totally lacking. Given this scenario, Indian cities need concerted effort on several fronts to realise the Smart agenda within a given timeframe.

INTRODUCTION

Urbanization has been recognised as a global feature with the future being projected to be more urban. The neo-liberal world is expected to witness a scenario where the city replaces country as a unit of competition. In such a scenario, in order to attract global and domestic capital, ICT application becomes enhancers of city competitiveness. The global big cities contribute high percentage of GDP. The top 5 cities in the US and Japan contribute 70-80 per cent of the country's GDP. The biggest city in the United Kingdom and France contributes 20-30 per cent of entire country's GDP. Smart city is the vision of most of the future cities. More than 1,000 cities around the world are going for the smart city plan. Importantly, India has also launched a smart agenda for its cities, with a mission to develop at least 100 such cities.

India has shown lower levels of urbanisation than expected. As per 2011 Census, India was 31.16 per cent urban although such areas contributed to over 60 per cent of the national GDP, the metropolitan cities contributing to about 49 per cent of the national GDP (HSMI & HUDCO Chair-NIUA 2012-13). In fact, it has been projected that urban areas are expected to contribute over 75 per cent of the national GDP in another 15 years' time.

'Urban' as an entity received focused attention of the government for the first time when the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched on 3 December 2005 earmarking an investment of Rs 500 billion during the mission period of seven years.

The mission was the single largest initiative of the Government of India for planned urban development that integrates the two pressing needs of urban India: massive investments required for infrastructure development and reforms that are required to sustain such investments. The Eleventh Plan document envisaged the government strategy to "establish the macroeconomic preconditions for rapid growth and support key drivers of this growth". It further added that the strategy must also include sector-specific policies to ensure that the structure of growth and the institutional environment in which it occurs, achieves "the objective of inclusiveness in all its many dimensions".

To counter the exclusionary trends in Indian cities, the Eleventh Plan was launched with an ambitious "inclusive agenda" in order to bring about major improvements in urban governance which sought to make government-funded programmes in critical areas more effective and efficient. The strategy for inclusive growth has been introduced not just in a cosmetic sense, where some elements aimed at inclusion have been added to the conventional strategy for growth. Rather, "it is a strategy which aims at achieving a particular type of growth process which will meet the objectives of inclusiveness and sustainability" (Kundu and Samanta 2011).

Urban renewal, with a focus on inclusive development of urban centres, was one of the thrust areas in the National Common Minimum Programme of the UPA government and it aimed to encourage reforms and fast-track infrastructure development with a focus on efficiency in urban infrastructure and services delivery mechanism, community participation, and accountability of ULBs towards citizens. The primary objective of the JNNURM was to create economically productive, efficient, equitable and responsive cities. To achieve this objective, it focused on integrated development of infrastructure services; securing linkages between asset creation and maintenance for long-run project sustainability; accelerating the flow of investment into urban infrastructure services; planned urban development; renewal of inner-city areas and universalisation of urban services to ensure balanced urban development. These objectives were to be achieved through compliance of reforms, 10 at the state level and 13 at the urban local body (ULB) level, over a period of 7 years.

Given this background, the present paper attempts to analyse the preparedness of the Indian cities to become smart based on the secondary data brought out by the Census 2011. Following the introductory section, the second section briefly describes the Smart Cities Mission of the Government of India. The third section analyses the access of urban households to mobiles and computers with internet facilities at the size class levels based on the 2011 Population Census to assess the ICT preparedness of the cities. The fourth section assesses the performance of the Mission cities with regard to reform compliance of only those reforms which have a bearing on 'smartness'. The final section concludes this thought process.

THE SMART CITIES MISSION

In India, the concept of smart cities has begun to gain currency in recent times. The present government has announced its ambitious Mission of creating at least 100 smart cities in the country. The Mission is expected to be launched shortly. The Ministry of Urban Development, Government of India has pointed out in the concept note on smart cities that "the key features of a Smart City is in the intersect between competitiveness, capital and sustainability. The smart cities should be able to provide good infrastructure such as water, sanitation, reliable utility services, health care; attract investments; transparent processes that make it easy to run commercial activities; simple and on-line processes for obtaining approvals, and various citizen centric services to make citizens feel safe and happy" (MOUD 2014-15). While the wish list is quite long, the key is clearly adequate access to physical infrastructure and utilities like electricity, water supply, sanitation, solid waste management and drainage by all sections of the population.

The concept note is clear enough on the selection of 100 cities. One satellite city from each of the cities with a population of four million or more (a total of nine); most cities with a population ranging between one and four million (35 out of 44); all State/ Union Territory capitals with a population that is less than one million (17); cities of tourist, religious and other importance (10); and cities with a population of between 0.2 and one million (25). In fact, this is not a list of whether a specific city qualifies for that category of 100 cities. The criteria indicate what kind of coverage the 'Smart' counterparts of cities are likely to have. The implicit intention was to avoid duplication of cities covered under the JNNURM. Like

JNNURM, several conditions have to be satisfied before a city can be included in the 100 smart cities. Also, cities should be competitive enough to have access to smart city funding. Importantly, the Ministry is yet to decide on the final concept note and the list of cities which would get the attention of the government to become smart. Correspondingly, several versions of the concept note have been put up on the Ministry's website.

However, the basic question that arises here is how far are Indian towns and cities equipped to introduce smartness. As per the 2011 Census, we have 7933 towns and cities across the country which contribute to 31.16 per cent as level of urbanisation. Of these, 4041 are statutory towns and 3892 are census towns. Specifically, a town is statutory if the state government has notified it as a municipality, a corporation, a cantonment board or a notified town area committee. The census towns, 2532 of which got this status for the first time in 2011 do not fall under any urban governance framework. These are basically rural panchayats which have satisfied the census definition of a population that is more than 5,000, at least 75 per cent of male workers engaged in non-agricultural pursuits and the population density of at least 400 per square kilometre.

The access to basic amenities in Indian towns and cities is far from satisfactory. 70.6 per cent of the households have a source of drinking water supply within their premises. The percentage of households having access to safe drinking water from the tap situated within premises is 62.0 percent for urban India on an average; while for metropolitan cities, it is 68.1 percent as per census 2011. Though 81.4 percent of the households in urban India have toilet facilities within premises, only 32.7 percent of the households have access to flush latrine facility with piped sewer within the premises. In terms of the household access to waste water outlet connected to closed drainage, 44.5 per cent of the households in the urban India have such access, whereas the coverage is high in metropolitan cities to 62.1 per cent. The access to electricity for the source of lighting is better, as 92.7 per cent of the households in urban India have access to electricity. However, there are frequent power cuts in most cities.

Table 1: Percentage of households owns computer/laptop with internet and mobile phone in 2011 by size class

Size Class	Percentage of HHs with computer/ laptop with internet	Percentage of HHs having mobile phones
Class IA (1 million plus)	14.5	66.2
Class IB (500000-999999)	10.2	64.3
Class IC (100000-499999)	6.4	65.4
Class I (100000 plus)	11.1	65.7
Class II (50000-99999)	4.4	64.9
Class III (20000-49999)	4.1	62.0
Class IV (10000-19999)	3.2	61.3
Class V (5000-9999)	2.8	59.2
Class VI (Less than 5000)	3.8	58.9
Urban India	8.3	64.3

Source: *Census of India, Household Tables 2011*

THE ACCESS OF URBAN HOUSEHOLDS TO SMART TECHNOLOGY

In urban India, on an average 64.33 per cent of the households have mobiles phones. The highest proportion of households owing mobile phones are found in Andaman & Nicobar Islands, where 81.22 per cent of the households own mobile phones. The lowest proportion of households owing mobile phones is found in Lakshadweep where only 43.78 per cent of the households have mobile phones. At the city level, in Gulmarg (MC) in Jammu and Kashmir state, all the households have mobile phones; whereas none of the households in Maghdall (INA) in Gujarat state own a mobile. Tangdhar (CT) in Jammu and Kashmir has the lowest proportion of households possessing mobile phones (1.38 per cent). At the size class level, the households mobile phones follows a hierarchical pattern with highest number of connections in Class I cities.

In urban India, only 8.27 per cent of the households own computers with internet connection. Chandigarh has the highest share of such households (19.29 per cent), while Tripura has the lowest share (2.61 per cent). At the city level, Reliance Complex (INA) in Gujarat state has the highest proportion of households having computer/laptop with internet connection. Alang-Sosiya (INA) also in Gujarat state has the lowest proportion. In urban

India there are 37 towns where none of the households owns a computer with internet connection. At the size class level, the households owing computer/laptop with internet are maximum in the Class I cities and decline in the smaller towns (Refer Table 1).

PERFORMANCE OF THE MISSION CITIES WITH REGARD TO REFORM COMPLIANCE

The JNNURM cities were supposed to adhere to several reforms over the 7 year period both at the state and ULB levels to become competitive and self-sufficient. In fact, several reforms had the inherent roots of smart governance embedded in them. This section looks at the compliance of reforms for all the 65 Mission cities at the end of the extended Mission period.

E-Governance

The implementation of e-governance in ULBs aims to improve system of governance through use of information technology. There were eight modules to be implemented by the ULBs. The status of implementation of e-governance, particularly the registration of birth and death and redressal of grievances has been quite successful. So far only 26 mission cities (40 per cent of the UIG cities) have been able to implement all the eight modules. Smaller ULBs do not have enough resources and capacity to implement this reform.

Property Tax

Property tax reforms were expected to increase the coverage and efficiency of property tax collection in the Indian cities. So far 40 cities have been able to bring more than 85 per cent of the properties under the coverage of property tax and 34 cities have been able to achieve more than 90 per cent of the total demand. Only 33 mission cities (51 per cent) have been able to achieve all the milestones of property tax reform.

User Charge

Recovery of user charges is critical for achieving self-sustainability of services and for improving the financial strength of ULBs. Cities have started to levy user charges to recover part of the O&M cost of water supply and solid waste management but not to the extent of 100 per cent, as stipulated in reforms. Only 7 cities (11 per cent) have been able to achieve this reform.

Public Private Partnership

This reform was required to be handled at both State and city levels. While, the role of the State was to create an enabling environment with an aim to expand, broaden and deepen private sector investments in infrastructure, the role of the city was to develop and implement PPP projects in a process oriented approach. Most of the ULBs have engaged private sector in the solid waste management sector followed by the transport sector. Out of 65 Mission cities, 45 cities (69 per cent) have achieved this reform. In 13 cities though the PPP cell and policy framework are not in place but the projects have been initiated.

Computerization of the Process of Registration of Land and Property

The implementation of this reform needs coordination of ULBs with revenue department. So far, 48 cities have achieved the reform. The ULBs of Madhya Pradesh and Chhattisgarh are yet to initiate this reform. Some of the ULBs have undertaken this reform under e-governance.

Revision of Building Bye-Laws to Streamline the Approval Process

The reform on revision of building bye-laws to streamline the approval process includes streamlining procedures for obtaining various permits, easing monitoring during construction, and improving compliance, with emphasis on clarifying procedures, making them time-bound and addressing all eventualities. As many as 53 ULBs have made changes in the process of approval for site development and construction of buildings and have reduced the time for sanction. Some of the ULBs have already adopted the automatic system of Auto DCR. Auto DCR is a unique and innovative e-governance solution for automation of building plan scrutiny and approval. It reads the building entities from the drawings and maps them to the development control regulations for approval by ULBs and approving authorities. It helps the authorities to automate the process of scrutinizing building plans, mapping them as per the development control rules and regulations and finally approving them.

CONCLUSIONS

Indian cities suffer from the lack of basic minimum services. There is a strong relationship between the size of the cities and availability of civic services. The access to civic services is much lower in smaller cities as compared to larger cities. Even, the 65 Mission cities have to go a long

way to become 'Smart'. The access of cities to smart technologies is a new concept altogether. The access to internet connection and mobile ownership is uneven across size class of towns. The small towns have much lower access to these facilities. Moreover, there has been an addition of 2532 new Census towns in the country where urban governance is totally lacking. The state of local finances in Indian cities is also in a pitiable condition. Given this scenario, Indian cities need hand holding on several fronts to launch the smart agenda,which can make them prosper in an inclusive manner.

NOTES

[1] Modules include property tax, accounting, water supply and other utilities, birth and death certificate, citizen grievance monitoring, personnel management system, building plan approval and health programmes.

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ACKNOWLEDMENTS

The author is grateful to Ms. Pragya Sharma for her assistance in the development of arguments and Ms. Sangeeta Vijh and Mr. T.C. Sharma for data analysis.

Amendments to "The Real Estate (Regulation and Development) Bill, 2013

Currently, the real estate and housing sector is largely unregulated and opaque, with consumers often being unable to procure complete information, or to enforce accountability against builders and developers in the absence of effective regulation.

The Union Cabinet chaired by the Prime Minister, Shri Narendra Modi, gave its approval to amendments to the Real Estate (Regulation and Development) Bill, 2013 pending in the Rajya Sabha, and approved amendments proposed in the Bill on 7th April 2015. The recommendations of the Standing Committee of Parliament on Urban Development and suggestions of various stakeholders (consumer organizations, industry associations, academia, experts etc.) have also been included after extensive consultations.

The Real Estate (Regulation and Development) Bill is a pioneering initiative to protect the interest of consumers, to promote fair play in real estate transactions and to ensure timely execution of projects.

The Bill provides for a uniform regulatory environment, to protect consumer interests, help speedy adjudication of disputes and ensure orderly growth of the real estate sector. The Bill contains provisions of registration of real estate projects and registration of real estate agents with the Real Estate Regulatory Authority; functions and duties of promoters and allottees; establishment of Real Estate Regulatory Authority; establishment of fast track dispute resolution mechanism through adjudication; establishment of a Real Estate Appellate Tribunal; offences and penalties etc.

These measures are expected to boost domestic and foreign investment in the sector and help achieve the objective of the Government of India to provide 'Housing for All by 2022', through enhanced private participation.

The Bill is expected to ensure greater accountability towards consumers, and to significantly reduce frauds and delays. The Bill is also expected to promote regulated and orderly growth through efficiency, professionalism and standardization. It seeks to ensure consumer protection, without adding another stage in the procedure for sanctions.

The Bill proposes to cover both residential and commercial real estate and envisages:

- Establishment of Real Estate Regulatory Authority:
- Registration of Real Estate Projects and Registration of Real Estate Agents:
- Mandatory Public Disclosure of all project details:
- Compulsory deposit of 50 percent:
- Adherence to declared plans:
- Fast Track Dispute Settlement Mechanism:
- Establishment of Central Advisory Council:
- Establishment of Real Estate Appellate Tribunal:
- Punitive Provisions:
- Bar of Jurisdiction Courts:
- Power to make Rules and Regulations:

Source: *www.pib.nic.in*

Urban Design Principles for Resilient Cities

To address the changes in urban design and planning, the following principles for resilient urban planning and design are required.

1. Density, Diversity and Mix

Creating resiliency and reducing the carbon footprint of urban development requires us to maximize the active use of space and land. A single use low density residential neighbourhood or suburban business parks, are typically underutilized during long periods of time. A vibrant and sufficiently densely populated urban environment, by contrast, is well used round-the-clock, all days of the week, and during all seasons. Dense mixed use neighbourhoods also allow for the effective functioning of all types of business, social and cultural activities with very low inputs of energy for transportation and logistics, thus increasing the resilience of these neighbourhoods.

2. Pedestrians First

Reducing car-dependency is a key objective and imperative. Luckily, the alternative modes of transportation – namely walking, cycling, and transit – result in more sustainable urban environments, and in an improved quality of life.

3. Transit Supportive

Resilient cities will need to re-orient their way of thinking, by shifting from car oriented urban patterns (e.g. cul-de-sacs and expressways) to transit oriented urban patterns and developments (e.g. mobility hubs, intensified corridors, and TODs). Not only will pedestrian, and mass transportation friendly planning increase the quality of life of a cities, but less dependence on the car will also have the best chances of economic and social success.

4. Place-Making

Resilient cities and neighbourhoods will focus energy and resources on conserving, enhancing, and creating strong, vibrant places, which are a significant component of the neighbourhood's structure and of the community's identity.

A resilient post-carbon community, which reorients city-life to the pedestrian scale (a 500 m radius), must focus its efforts to creating a number of local destinations, which attract a critical-mass of users and activities.

5. Complete Communities

Resilient communities, will reduce their carbon footprint by ensuring people opt to walk or cycle, instead of using a car. To achieve this, destinations must be accessible within a pleasant walking distance. Longer distances should be achievable through transit.

Connectivity is central to making an area pedestrian oriented. Streets and pedestrian walkways must be enjoyable to walk, must link key destinations, and must operate at a fine scale.

6. Integrated Natural Systems

Cities and neighbourhoods need to develop in a way that conserves and enhances the quality of the water flow and supply, likewise for the quality of air and land. The health and integrity of wildlife and vegetation are also a priority. Protecting existing biodiversity, indigenous or endangered species, wetlands, the tree canopy, connectivity, are all a necessary aspect of securing healthy natural systems.

7. Integrated Technical and Industrial Systems

The economic health and vitality of Resilient Cities and neighbourhoodsis inextricably bound up with the effectiveness, efficiency and safety of their technical and industrial systems and processes, including their manufacturing, transportation, communications and construction infrastructure and systems to increase their energy efficiency, and reduce their environmental footprint.

8. Local Sources

Resilient regions, cities, and neighbourhoods will grow and produce the resources they need, in close proximity (200 kilometer radius).

The same principle that applies to food, also applies to the manufacture of goods, the production of energy (e.g. district energy, district heating), recreation needs (i.e. 100-mile tourism), waste disposal, water management, and any other resources which we consume.

9. Engaged Communities

From the seemingly trivial activities of everyday life (e.g. using a plastic bag) to the overtly transformational (e.g. growing the city), citizens have a role to play and a responsibility. It is only through the sum total of individual actions, that change will come about. Hence, residents and stakeholders must be part of planning and designing their cities and their communities.

10. Redundant and Durable Life Safety and Critical Infrastructure Systems

The physical, social and economic health of the Resilient City and its citizens is directly connected to the city's ability to maintain the effective functioning of its key life safety and critical infrastructure systems – especially during episodes of intense environmental stress (such as during severe storms, floods, or other weather related events). Key infrastructure systems such as drinking water supply, electrical power, and residential heating in winter, and key life safety systems, such as police, fire, and emergency response services and their support systems, must be planned and designed for a level of redundancy and durability that will allow them to resist present and future environmental stresses, as well as remain operational and able to provide the necessary outputs or services.

11. Resilient Operations

Urban sprawl is extremely expensive to service and maintain – the amount of land, roads, pipes, and infrastructure required per capita is disproportionately large. Resilient cities will not subsidize inefficient forms of development (e.g. building roads and assuming operating costs) and instead prioritize city patterns and built forms that have a reduced footprint on the environment and a reduced burden on municipal resources (e.g. directing growth to where services exist: infill).

Source: *www.resilientcity.org*

Planning For Resilient Cities

Key Imperatives

A.K. JAIN

In Indian cities, 30 to 60 per cent of the population lives in informal settlements. The major challenges for resilience lie in developing the necessary basic infrastructure for water, sanitation and drainage, improving roads and supporting housing improvements. Some of the cities are addressing these issues though upgrading projects and programmes. In addition to improving health and residents' quality of life, upgrading makes low-income settlements and cities more resilient to a range of natural hazards, including flooding, fires and diseases.

KEYWORDS

Resilient Cities, Gender Sensitive, Electricity Consumption, Sustainability

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The rapid urbanization, coupled with the increased intensity and frequency of adverse weather events, is posing challenges to deal with the consequences of climate change. The Indian subcontinent is vulnerable to droughts, floods, cyclones and earthquakes. The United Nations global assessment report on disaster risks (2015) estimates that India's average annual economic loss due to disasters is of the order of $9.8 billion. It is widely accepted that "natural disasters" are the product of human processes, raising the question of what society can itself do to reduce and withstand hazard risk, i.e. increase its resilience. Resilience may be defined as an idealized "state of being" or a dynamic process through which this state of being is improved through local environment planning and adaptation. Resilience is comprised of 6 interlinked Rs-Robustness Redundancy, Resourcefulness, Reformability, Recoverability and Rapidity. The resilience strategy targets achieving compound benefits through preparedness and focus on capacity, supports, information structures, institutions, agents, and multi-hazard measures.

INDRODUCTION

The pace of urbanization in the world today is unprecedented. An important issue in this regard is that while urbanization in the early 20th century was mostly confined to developed countries, the fastest rates of urbanization of the 21st century are taking place in the developing countries, which host nearly three quarters of the world's urban population.

The Indian subcontinent is vulnerable to droughts, floods, cyclones and earthquakes. Landslides, avalanches and forest fires also occur frequently. Among the 37 States/Union Territories in the country, 22 are multi-disaster prone. As much as 40 million hectares of land in the country has been identified as flood prone, and on an average 18.6 million hectares of land is flooded annually. About 57 per cent of the country is vulnerable to seismic activity. 18 per cent of country's total area and about 68 per cent of total sown area is drought prone, affecting approximately 50 million people. India has a long coastline of 8040 km, which is exposed to tropical cyclones and tsunamis. As such, almost the entire country is prone to disasters for which preparedness and prevention are necessary.

The United Nations global assessment report on disaster risks (2015) estimates that India's average annual economic loss due to disasters is of the order of $9.8 billion. This includes more than $7 billion loss on account of floods.

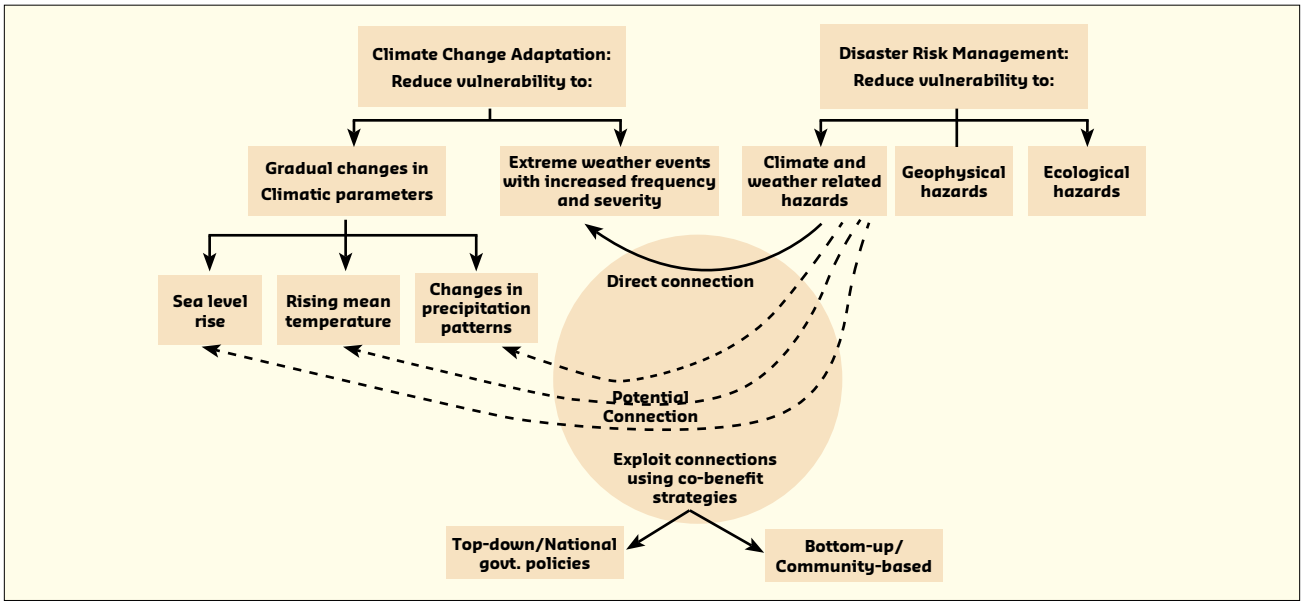
The report warns of a need to make adequate investments in disaster risk reduction (DRR) or it will hinder development.India has projected a $1 trillion investment in infrastructure in the next five years and unless adequate steps are taken to make them resilient to floods and other natural calamities, the investment runs the risk of going waste.While large population densities in urban areas create increased vulnerability,

they also create the potential for changes that can mitigate human impacts on climate.

CLIMATE CHANGE AND IMPACTS ON URBAN CENTERS

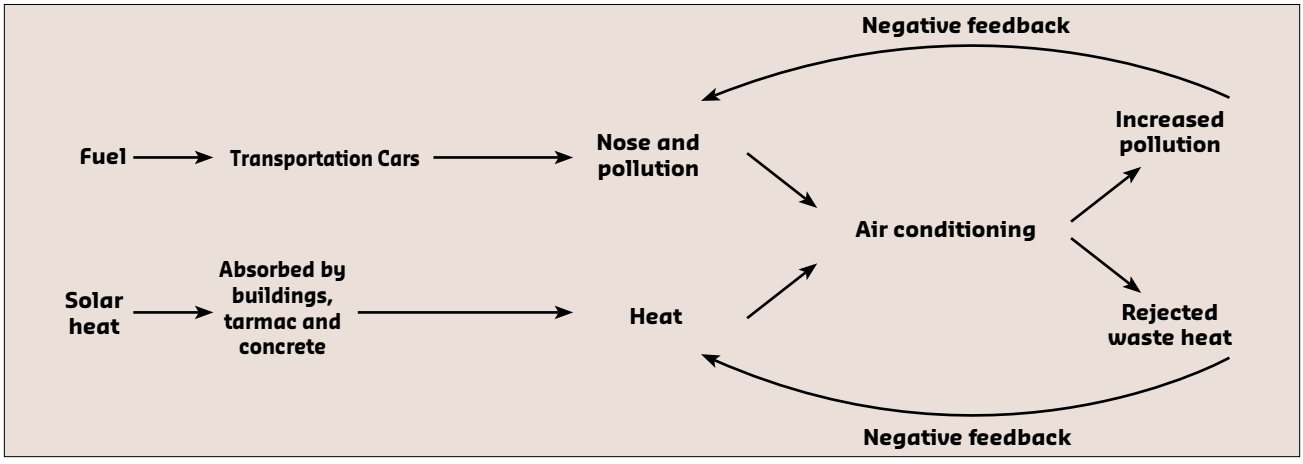
India with its diverse agro-climatic and morphological zones is particularly affected by climate change. According to the initial national communication to the United Nations Framework on the Convention on Climate Change, the predicted impacts of climate change in India include a surface air temperature rise up to 4° Celsius by 2100, up to 30 per cent decline in yield in rain-fed areas for some crops and an increase in incidences of extreme events, such as droughts, floods and cyclones. Since these impacts will strongly vary in their extent and form throughout the country, they require customized interventions in different states and regions

Fig.1: Conceptual linkages of climate change adaptation (CCA) & Disaster Risk Management (DRM)



Source: *www.planetaction.org/automne_modules_files*

Fig.2: The cycle of Urban pollution and rising temperature



to cope with these risks and to enhance the resilience of India's most threatened population.

Climate change can bring considerable changes in the hazard profile of the region by its type, intensity, magnitude and frequency. The intrinsic relationship of disasters and climate change are conceptually presented in figures 1 and 2 below:

The National Action Plan on Climate Change (NAPCC) and National Mission report on Sustainable Habitat are important landmarks on climate change debate in India. These reflect government responses to the challenge of climate change vis-a-vis habitat. These need to link more closely with poverty and India's variety of climatic zones, and cultures. India faces its own peculiar challenges such as pollution reduction, carbon emission, fuels, etc. for which the global approaches and priorities may be inadequate. India's vast geography is contrasting in terms of its morphology and climate and it would be naive to devise a national level generalized action plan without differentiating with the geography, climate and its impacts. (Refer Table 1)

MAKING CITIES RESILIENT

Resilience refers to the ability of a system to avoid suffering irreparable damage as a result of hazard impact. It is widely accepted that "natural disasters" are the product of human processes of vulnerability creation, raising the question of what society can itself do to reduce and withstand hazard risk, i.e. increase its resilience. Resilience may be defined as an idealized "state of being" (for instance "a resilient city") or a dynamic process through which this state of being is improved through learning and adaptation (as a governing strategy). Resilience is seen as necessary for Disaster Risk Reduction(DRR) – and increasingly also for climate change adaptation.

Resilience emphasizes adaptive

Table 1 Climatic Change and Potential Impacts on Cities

Climate change	Impact	Urban Planning Consequences
Increased Temperatures	Ground water depletion, Water Shortage	Water Shortage Distress migration to cities/towns due to droughts in rural areas
	Drought, Degraded air Quality (smog)	Interruption of food supply networks and higher food prices Potential energy price increases (e.g., from reduced hydro-electricity generation) Exaggerated urban heat island effect, increased energy demands for cooling Need for higher and/or additional wastewater Treatment Population health impacts, increased mortality due to heat waves, decreased access to food/nutrition
Increased Precipitation	Increased risk of landslides or mudslides on hazard slopes	Interruption of food supply networks Property damage Disruption of livelihoods and city economies Damage to infrastructure, not designed to standards of occurrences being experienced by rural areas Displacement and population movement from informal settlements, built on steep slope hazard lands, etc. More favorable breeding grounds for pathogens and disease vectors like mosquitoes, flies etc. Population health impacts (increased incidences of water-borne diseases like cholera)
Sea-level rise	Coastal flooding, Salt water intrusion into groundwater supplies in coastal area, increased storm surge hazard	Displacement and population movement Property damage Damage to infrastructure Increased disruption of livelihoods and city economies Health impacts (injuries, increased mortality and illness) Interruption of food supply networks Increased risk of landslides or mudslides, hazard slopes

Source: *Adapted from Developing Local Climate Change Plans, UN-HABITAT/international Institute for Environment & Development (2010) and Willbanks et al (2007)*

capacity, which is a vital determinant of a resilient city and an essential response to climate change. Adaptive capacity is defined as "… the ability to plan, prepare for, facilitate and implement adaptation options", and determinants include wealth, technology, infrastructure, information, knowledge and skills, commitment to equity and social capital. This definition reflects the fact that not all communities, sectors and households have equal access to risk-reducing interventions. Adaptive capacity is often included in definitions of resilience to encapsulate the importance of iterative approaches to resilience-building, which occurs through feedback cycles of planning, implementation and learning, and is informed by up-to-date risk knowledge.

The United Nations International Strategy for Disaster Reduction (UNISDR) has adopted Making Cities Resilient Campaign, which began in 2010. This runs concurrently with the Hyogo Framework of Action, which seeks attention to DRR. Among global initiatives, the campaign is unusual in its focus both on urban and on local governments, which are seen as the "front line" in DRR. The campaign promotes resilience-building in cities through many mechanisms, including raising awareness of DRR among local governments through high-profile events, providing tools, technical assistance and training to local authorities and facilitating city-to-city support networks and learning opportunities

According to UNISDR, the DRR-related activities comprise 10 essentials (Refer Table 2). These are considering DRR in new urban planning regulations, plans and development activities; setting up councils/committees/disaster management structures dedicated to DRR; constructing or enhancing hazard-mitigating infrastructures; and setting up education/awareness/training programmes.

Table 2 UNISDR's "10 essential" for making cities resilient

Institutional and administrative framework	Put in place organization and coordination to understand and reduce disaster risk based on participation of citizen groups and civil society; build local alliances; ensure that all departments understand their role in disaster risk reduction and preparedness
Financing and resources	Assign a budget for disaster risk reduction and provide incentives for homeowners, low-income families, communities, businesses and the public sector to invest in reducing the risks they face
Multi-hazard risk assessment-know your risk	Maintain up-to-date data on hazards and vulnerabilities; prepare risk assessments and use these as the basis for urban development plans and decisions; ensure that this information and the plans for your city's resilience are readily available to the public and fully discussed with them
Infrastructure protection, upgrading and resilience	Invest in and maintain critical infrastructure that reduces risk, such as storm water drainage is adjusted where needed to cope with climate change
Protect vital facilities: education and health	Assess the safety of all schools and health facilities and upgrade these as necessary
Building regulations and land use planning	Apply and enforce realistic, risk-compliant building regulations and land use planning principles; identify safe land for low-income citizens and upgrade the informal settlements, wherever feasible
Training, education and public awareness	Ensure that education programmes and training on disaster risk reduction are in place in schools and local communities
Environmental protection and strengthening of ecosystems	Protect ecosystems and natural buffers to mitigate floods, storm surges and other hazards to which your city may be vulnerable; adapt to climate change by building on good risk reduction practices
Effective preparedness, early warning and response	Install early warning systems and emergency management capacities in your city and hold regular public preparedness drills
Recovery and rebuilding communities	After any disaster, ensure that the needs of the survivors are placed at the centre of reconstruction, with support for them and their community organizations to design and help implement responses, including rebuilding homes and livelihoods

Source: *UNISDR (2013), "Toolkit for local governments – 10 essentials", accessed 9 December 2013 at http://www.unisdr.org/campaign/resilientcities/toolkit/essentials*

Table 3 Examples of specific adaptation interventions by sector

Sector	Adaptation option / strategy	Underlying policy framework	Key constraints and opportunities to implementation
Water	Expanded rainwater harvesting; water storage and conservation techniques; water re-use; desalination; water-use and irrigation efficiency	National water policies and integrated water resources management; water-related hazards management	Financial, human resources and physical barriers; integrated water resources management; synergies with other sectors
Infrastructure and settlements	Relocation; seawalls and storm surge barriers; dune reinforcement; land acquisition and creation of marshlands / wetlands as buffer against sea level rise and flooding; protection of existing natural barriers	Standards and regulations that integrate climate change considerations into design; land-use policies; building codes; insurance	Financial and technological barriers; availability of relocation space; integrated policies and management; synergies with sustainable development goals
Human health	Heat-health action plans; emergency medical services; improved climate-sensitive disease surveillance and control; safe water and improved sanitation	Public health policies that recognize climate risk; strengthened health services; regional and international cooperation	Limits to human tolerance (vulnerable groups); knowledge limitations; financial capacity; upgraded health services; improved quality of life
Tourism	Diversification of tourism attractions and revenues; shifting ski slopes to higher altitudes and glaciers; artificial snow-making	Integrated planning (e.g. carrying capacity; linkages with other sectors); financial incentives, e.g. subsidies and tax credits	Appeal/marketing of new attractions; financial and logistical challenges; potential adverse impact on other sectors, involvement of wider group of stakeholders
Transport	Realignment / relocation; design standards and planning for roads, rail and other infrastructure to cope with warming, emissions etc.	Integrating climate change considerations into transport policy; investment in research and development for special situations	Financial and technological barriers; availability of less vulnerable routes; improved technologies and integration with key sectors (e.g. energy)
Energy	Strengthening of overhead transmis sion and distribution infrastructure; underground cabling for utilities; energy efficiency; use of renewable sources; reduced dependence on single sources of energy, increased efficiency	Energy policies, regulations, and fiscal and financial incentives to encourage use of alternative sources; incorporating climate change in design standards	Access to viable alternatives; financial and technological barriers; acceptance of new technologies; stimulation of new technologies; use of local resources

Source: *IPCC/Parry et al, 2007*

These examples show that the performance of present urban services and systems needs to be reassessed with reference to environment, hygiene, mobility and public health. The sustainable mobility needs and efficient public transport system should be promoted which would reduce the need for personalized travel.The spatial model should be based upon the principle of "less travel, more energy saving". In order to safeguard public health the urban society has to adopt re-cycling (e.g. water, solid waste, land), regeneration (dilapidated, old areas), recovery (wastelands, encroached areas), restructuring (networks, land use, transport), recharging (traditional areas) and rejuvenation (river, water bodies, parks etc.). Instead of conventional drainage, the concepts of micro-runoff, bio-swales and bio-drainage need to be adopted. Ponds/ reservoirs and sediment traps can be planned in the catchment zones on low-lying grounds. The concepts of watershed development, rainwater harvesting and conservation and recharging of groundwater need to be institutionalized and legalised. Various options can be explored for augmentation of physical infrastructure, such as technology upgradation, dual piping system,

rain water harvesting, energy audit and exploring alternative sources of energy. Several technologies, such as decentralized and compact water treatment units, solar/ aerobic/oxidation and root zone systems can be employed to purify potable water from natural sources. Various alternative technologies, like Extended Aeration Technique, Biogas production, Bubble Diffusion process, Floatation, double or triple plumbing, pneumatic system, Anaerobic Reactors, etc., are already available, which can be explored for sanitation and water supply. Decentralized systems based on recycling, energy generation and organic decomposing can be explored for solid waste treatment. Bio-reactor composting, vermi-culture, recycling-cum-waste to energy and vassal system (Tunnel Reactor) is new generation technologies which can be employed for treatment of urban solid waste. All public buildings, slums, roadsides and parks, etc. need to be provided with public toilets, garbage bins, water points/public taps, etc.

URBAN CLIMATE RESILIENT PLANNING FRAMEWORK (UCRPF) PROGRAMME IN INDIA

With immense geographic

Table 4 6 Rs of Resilience

Disaster Resilience Parameters and Attributes

Robustness

- Continuity in designated functions besides a level of perturbation & disruption
- Clustering of services to avoid cascading failure
- Contingency teams & inclusion of community
- Safety parameters-accessibility, evacuation planning
- Compliance of development control's regulations & building bye-laws
- Resources & team deployment for operation of disaster management centers
- Training program for livelihood recovery, inclusion of marginalized groups
- Community leadership & incentive to adopt risk reduction measures.

Redundancy

- Heterogeneity/diversity in resources for uncertain & unpredictable conditions
- Ability of horizontal restructuring to avoid delays
- Synchronization in distributed actions
- Back up in service provisions, transport & other infrastructural services
- Segmentation in communication technology
- Role of institutions in recognizing new agents

Resourcefulness

- Reprioritization & generation of resource distribution
- Availability & accessibility, distributive mechanism of reserve resources
- Efficiency of safety nets for support during no income period
- Investments for structural reforms
- Sharing of technical information with the community
- Role of social capital & community partnership
- Efficiency of collective action from the community

Reformability

- Horizontal and vertical integration for avoidance of time delays
- Single window clearance for continuity in operation of services
- Flexibility and adaptability to change usage, activity and location
- Role rotation in planning & operation for efficiency
- Acceptance of new & emerging modes of recovery

Recoverability

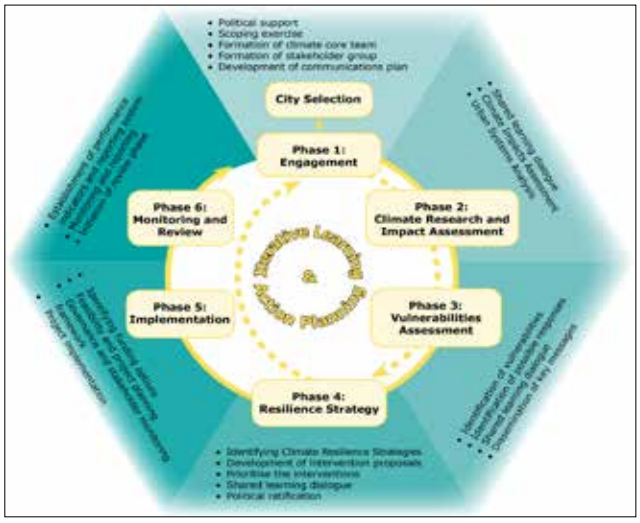
- Distribution of roles & resources for efficient recovery
- Capacity to include diverse actors for recovery
- Capacity building program for self and organizations
- Efficiency of Risk transfer mechanism/ insurance/catastrophic bonds
- Accessibility and disbursement of funds to the affected communities
- Emergency Operation centers & available logistics
- Adaptability & learning capacity of communities

Rapidity

- Efficiency of immediate response on self help basis
- Efficiency of Emergency responses to organize people for collective action
- Readiness of Institutional framework
- Emergency & evacuation warming system
- Efficiency of contingency funds

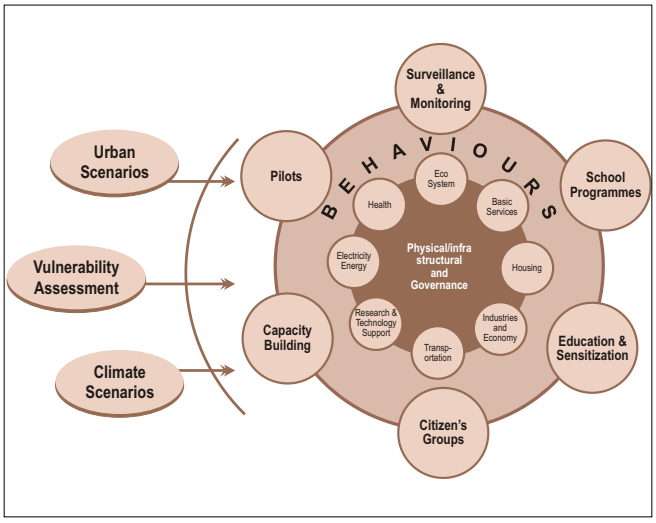
***Sources**: James Smart, (2012), the Role of Post Disaster Institutions in Recovery andresilience–a comparative Study of Three Disasters-Victorian Bushfire (2009), QueenslandFloods (2010-11) and Cantebury Earthquake (2010-12), Institute of Governance andPolicy Studies, Victoria University, Wellington and Mehrotra, Nirmita, (2013), Disaster Resilience, Architecture-Time Space and People,Council of Architecture, New Delhi*

Fig.3: The ICLEI-ACCCRN (Asian Cities Climate Change Resilience Network)Framework for Resilient Planning



Source:*Tewari, S., (2013), ICLEI ACCCRN Process, Presented at the International Conference on Resilient Cities, Experiences from ACCCRN in Asia and Beyond, New Delhi*

Fig.4 ICLEI-ACCCRN Framework for Resilient Governance



Source: *GEAG, 2009, Vulnerable Analysis, Gorakhpur City, GEAG, Gorakhpur*

diversity and different climate zones, vulnerability to climate change and risks are varied and multi-dimensional, in India. Considerations for climate proofing are therefore not only desirable for climate sensitive sectors such as agriculture and water,but also for the overall development paradigm, so as to develop resilience to climate change impacts in the long term. Resilience is comprised of 6 Rs-Robustness, Redundancy, Resourcefulness, Reformability, Recoverability and Rapidity (Refer Table 4). These are all interlinked through an area specific disaster Resilience Strategy. The Asian Cities Climate Change Resilience Network (ACCCRN), which aims at catalyzing attention, funding and action to strengthen cities' resilience to climate change impacts, has been working in seven Indian cities to develop and demonstrate effective processes and practices for addressing urban climate vulnerabilities using participatory planning as well as implementing targeted intervention projects. These are Surat,Indore, Gorakhpur, Shimla, Bhubaneswar, Mysore and Guwahati. The framework (Refer figure 3 & 4) provides information on agents and institutions as enablers to resilient system in a city, thus defining three pillars of resilience building within a city system:

- Strengthening fragile system
- Strengthening social agents
- Strengthening institutional system.

The programme considers targeting urban systems, including infrastructure and ecosystems; agents including community, government, NGOs; institutions, regulations and laws. The programme views resilience as an ability of a system to not only withstand and resist climate circumstances, but also to recover and re-organise functions to prevent failures and irrevocable damage. Rather than relying on the strength of individual components, resilient systems retain functionality through flexibility and diversifying functional dependence. More such UCRPF programs in other Indian cities need to be implemented to make them resilient to various vulnerabilities.

Therefore, the approach to make safe, secure and resilient cities has to be more holistic, local, preventive and gender sensitive, which covers a gender sensitive approach to urban safety; city planning – Structure, Form and Zoning; travel and transport safety; safety from disasters, fire and emergencies; safety of structures; environmental health

and safety (including pollution control, safe drinking water, waste disposal and management, sanitation, noise control, reducing carbon emission and toxins, climate change, occupational and energy safety); and a unified, networked safety and security action platform.

At every step it is necessary to prepare action plans with respect to hazard specific coping and adaptive practices and responses. (Refer Table 5). The resilience strategy targets achieving compound benefits through preparedness and focus on capacity, support, information structures, institutions, agents, and multi-hazard measures. Adaptation is considered as a part of the larger resilience building objective and has the potential of addressing the vulnerability of urban systems to specific climate conditions. It also displays an equal focus on increasing the capacity of urban systems to withstand extreme climate events and shocks, while also increasing the institutional capability of the urban system to support and develop the resilient systems.

CONCLUSIONS

Recurring disasters, floods, hurricanes, tsunami, droughts, accidents, fires etc. should make us rethink how we can make the people and the settlements more resilient, gender sensitive and safer. In this pursuit, an integrated approach with focus of safety of individual lives is the need of the hour with 'safety first' as the prime motto.

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Table 5: Adaptive Preparedness for Disaster response

Strategy	Illustrative Action Areas
Creating family and community support networks for disaster response	• Create community emergency groups • Share resources, promote community solidarity and coordination. This facilitates to: ◆ Oversee empty houses and watch over people who may be asleep ◆ Transport belongings to higher-level streets ◆ Move to safe houses (of other community members) and other refugees ◆ Share food and services (e.g. toilets) during emergencies. Store water for community use
Creating information structures for early warning	• Mutual learning and creation of local mechanisms to access and disseminate early warning information: ◆ Contact government organizations ◆ Check weather forecasts on radio, television, internet; ask neighbours; go to church (priests are a source of information) ◆ Observe indicators of disaster (cloud colour, river levels, animal behaviour) ◆ Establish informal communication structures for early warning between community members ◆ Door-to-door warnings to alert at-risk residents
Preparing for potential evacuation	• Keep emergency stores of food, water, torches, etc. • Prepare emergency shelters, food distribution points, etc. • Store a portable cooker • Stay awake to hear warnings
Physical multi hazard measures	• Exchange rooms/apartments so that less mobile residents have more accessible accommodation • Construct or maintain emergency facilities for refuge or food distribution

SOURCE: *Adapted from Wamsler, C (2014), Cities, Disaster Risk and Adaptation, Routledge Series on Critical Introduction to Urbanism and the City, Routledge, London.*

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Making a Disaster Resilient City

DEEPAK KUMAR PANDEY

The planning of a resilient city must take into account the peculiarities of a city and disasters. Some effects of disasters specially chemical, nuclear and environmental may manifest itself after a very long time.The effect of the atomic bomb attack on Hiroshima and Nagasaki and of gas leakage in Bhopal (India) manifested itself in the form of birth of malformed babies to the parents who witnessed these disasters in their childhood. Therefore investment in time, effort, aptitude and training is a must.

KEYWORDS

Disaster Resilient City, Rescue, Protective infrastructure, Safe zone, Modular system

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Disaster management in urban areas has been a challenge for town planners. The huge loss of lives, property, economy and society can be minimized by making our cities resilient to disaster. Resilient cities are able to cope with disaster situations. A resilient city bounces back to normalcy once disaster passes away. Before planning to establish a resilient city, we must understand the basic paradigm of disasters such as earthquakes, floods, volcanic eruptions, avalanches, landslides etc. These natural phenomenon made earth's atmosphere conducive for evolution of life and shaped the history of evolution of mankind and its civilizations. We face disasters because we are setting cities dangerously close to a natural phenomenon, and we cannot handle its impact with available resources and arrangements. This article talks about RPR (Remedial, Potential & Residual) phase system of disaster risk management. It takes into account city's peculiar physical characteristics which define urban ecosystem, society, culture, religious practices, economy, and governance and its unique relation with other cities. In this article, the services of housing, water, sanitation, food supply, energy, transportation, waste management, social services, recreation, education, policing, safety and communication etc. along with the urban characteristics of a particular city have been considered for planning for a resilient city. It propounds 28 planning considerations for a disaster resilient city.

On 16th June, 2013, the small town of Rambada in Kedar Nath Valley, Uttrakhand was completely washed away by a flash flood. This devastating flash flood destroyed many cities downstream also. On November 25, 1838, the famous ship building harbor town of Coringa, in Andhra Pradesh was completely destroyed by a killer cyclone. At least 0.32 million inhabitants died and thousands of ships were destroyed. Only a 2 minute earthquake, on 26th January, 2001, killed 20,000 inhabitants, injured 1,67,000 and destroyed 4,00,000 houses in Ahmedabad, Bhuj and many other towns in Gujarat.

The huge loss of lives, property, economy and society can be minimised by making our cities resilient to disaster. Resilient cities are capable to cope with disaster situations. A resilient city bounces back to normalcy after a natural disaster or calamity.

Before planning to establish a resilient city, we must understand what is meant by a disaster? Earthquake, flood, volcanic eruptions, avalanche, landslide etc are called natural disasters. In fact, these are all natural phenomenon which shaped the environment of the earth. These natural phenomena made earth's atmosphere conducive for evolution of life. These events shaped the history of evolution of human beings.

These events were branded as disasters when human beings started to encroach upon the sphere of influence of these natural phenomenon. We settled

in flood plains and faced flood. We established cities on mountain slopes and faced avalanches and landslides. We cut trees, disturb the water cycle and face drought. We settle near sites of volcanic eruptions and face the brunt of volcanic fury.

Before starting any planning we must understand that these are inevitable natural phenomenon and are integral and essential parts of making the earth. We face disaster situations because we are not prepared to face it. We face disasters because we are settling dangerously close to a natural phenomenon, and we cannot handle its impact with available resources and arrangements.

Risk of disasters cannot be totally eliminated. However, the risk can be so managed that its impact is minimised. The risks from disasters in an urban setting can be classified into three categories. These are(I) Future risks (II) Present risks (III) Residual risks.

To manage risks in an urban setting the RPR phase system of disaster risk management can be applied. The three phases of RPR system of risk management system are:

a) Remedial Risk Management Phase- Remedial risk management phase identifies all risks emanating from present setting of a city. In this phase, all the risks directly or indirectly being caused by social,economic,geographical, environmental, architectural, infrastructural, and its inter relation with neighbouring villages and cities, are identified and analysed. On the basis of analysis of all the identified risks and their inter-relations, remedial plan to minimize the risks is launched.

b) Potential Risk Management Phase-Many peculiarities of a city increase the probability of disasters. Some of these disasters can be man-made. For example, the construction of Tehri dam in upstream Ganga has created a probability of a massive flood by breach in dam boundaries, thereby posing a threat to settlements downstream. Construction of a Nuclear power plant in a city creates probability of a nuclear disaster. If these dams or nuclear plants were not constructed, the probability of flood or nuclear disaster in the concerned cities would not exist. In potential risk management phase, the identification, evaluation and analysis of all potential risks rising from various factors of a city is done. Accordingly, the necessary steps are taken to minimise the impact of these potential risks.

c) Residual Risk Management- All the risk which has been left over because of various reasons or limitation of knowledge or expertise is tackled in this phase.

To understand the cause and effect of disasters in a city, we must understand its peculiar physical and special features. In a city, population density and land coverage or built up surface area increases with time, while the size, position and distribution of areas covered with vegetation and recreational facilities normally have a declining trend.

The peculiar physical characteristics define urban ecosystem, society, culture, religious practices, economy, governance and inter relation with other cities. The urban characteristics and services of housing, water, sanitation, food supply, energy, transportation, waste management, social services, recreation, education, policing, safety, communication etc. dictate the course and impact of disasters in a city.

The planning of a resilient city must take into account the peculiarities of a city and disasters. Some effects of disasters specially chemical, nuclear and environmental may manifest itself after a very long time. The effect of atomic bomb attack on Hiroshima and Nagasaki and of gas leakage in Bhopal (India) manifested in the form of birth of malformed babies to the parents who witnessed these disasters in their childhood. There fore investment in time, effort, aptitude, and training is a must.

Growing inequality has become a typical problem in urban settlements. Sectors / territories having low income settlements face higher risk because of low level of risk mitigating infrastructure. Poverty leads to development of socially neglected and segregated neighborhoods. This gives rise to a new pattern of disasters-low income colonies in hazard risk areas.

The global support during disaster rehabilitation and reconstruction also poses disturbing trends from the disaster management angle. Large volumes of capital inflow

in hazard prone areas results in the creation of large amount of economic assets. These newly created assets often produce a cascading effect, as new risks are being generated without catering to reducing the older risks.

The following characteristics of cities are important from the point of view of disaster management:

1. Increasing population density.
2. Increasing built up surface area and reducing open space or uncovered land.
3. Size, location and distribution of green areas. The size of green area is reducing and its location keeps changing to accommodate new buildings or infrastructure construction. Distribution of green area is also becoming sparser.
4. Reduction in tree coverage, particularly big trees, which cover very large land area. The small trees covering less surface area or selective decorative plants are preferred for plantation in urban areas.
5. Bio-diversity is decreasing; plants of a few selected varieties are planted which kill or eliminate growth of other native varieties suitable for the climate and soil type of the concerned city.
6. The open recreational area is also reducing. Covered recreational areas like cinema halls and sports stadia are preferred. They can accommodate large number of viewers in a stratified space, thereby decreasing the probability of mass casualty in the event of a disaster.
7. The concentration of economic activities like markets, stock exchanges, storage facilities and industries is on the rise. This also increases the chances of larger economic loss in case of a disaster.

Any phenomenon either natural or man made, adverse impact of which is beyond coping and managing capacity of the affected community with its available resources, can be called a disaster. Daily, hundreds of landslides, avalanches and rock-falls occur in Himalayas but we don't call them disasters. Millions of gallons of water flow in the river Ganga and we consider it a boon for our survival. When this water changes its course and starts flowing through a city, it becomes a disaster. When the landslides, avalanches and rock falls occur in a Himalayan town, we call it a disaster. Disasters happen only when humans are present in the sphere of impact of a naturally occurring phenomenon having adverse effect. Each disaster has three spheres of impact:-

1. Direct Impact Area (DIA) -The area where direct adverse impact of a disaster is felt in a city. It has the highest number of casualty and damage. Normally, it is not able to cope with the disaster without external assistance. The resources and disaster management experts located in direct impact area may be rendered unusable by the disaster. For example, in the Leh cloud burst disaster in 2010, the government hospital was badly damaged. In normal circumstances,this hospital was capable of tackling medical emergencies for disasters occurring in the areas of Leh region.
2. Area of Influence (AI) -Area of influence is the area which is beyond the direct impact of a disaster and it immediately surrounds the area of impact. This area also faces some adverse impacts of the disaster. However, it is used as a launching pad for disaster management operations for the area of direct impact. It also provides a safe zone for evacuation of affected population from area of direct impact. This area is a dynamic zone, which may expand or shrink with passage of time. For example, in case of nuclear disaster the radiation and radioactive material from area of impact may penetrate the area of influence and this penetration may cover new areas of influence.
3. Area of Sympathetic Impact (ASI)-Area of sympathetic influence is the area where no direct impact or influence is visible. This area may have sympathetic or consequential effect of a disaster centred in Area of Direct Impact. For example, when Uttrakhand flash flood occurred in 2013, its sympathetic or consequential impact in the state of Gujarat and Andhra Pradesh was very much seen. Many politicians, social workers and philanthropists were seen competing in taking the credit of providing maximum assistance in search and rescue operations for the

victims of their respective states. The positive impact of this competition was that it led to mobilization of large resources for the help of victims.

A rescue team should work with the following objectives:

1. Minimize the loss of lives.
2. Reduce the degree of damage to property.
3. Minimize the disruption of social fabric.
4. Reduce the economic loss.
5. Fix the chances of cultural or religious disturbance.
6. Douse the political anger.
7. Reduce the disruption of governance.
8. Minimize the psychological trauma.

Disasters cannot be viewed in isolation. Most of the disasters have a cascading effect. One disaster may trigger several other disasters. Like earthquake can trigger rains, breach in dam, fire, building collapse, flooding etc. Each disaster should be seen in totality –along with its associated problems.

In October 2013, a very severe cyclonic storm, category 5 (Saffir-Simpson scale) named Phailin hit Odisha coast near Gopalpur town. The wind speed reached up to 215 km/hr. It caused damage worth more than $696 million. It was the second strongest tropical cyclone ever to hit India. The first was the 1999 super cyclone, which had also hit Odisha.

There was a pleasant difference in the impact of the two cyclones. In 1999 Odisha cyclone, more than 10000 persons lost their lives whereas, in the 2013 Phalin cyclone, only about 40 persons lost their lives. This improvement was possible because of advanced preparations. The precise information about its speed, path, damage capacity and intensity was available in advance and therefore, National Disaster Response Force and other Central Armed Police Forces, trained and equipped for disaster management, were deputed to the area. They were able to move more than 550,000 people and large numbers of cattle to safer places and shelter them in 5000 specially built cyclone camps.

The town of Gopalpur, although not a resilient city in its original form, displayed the quality of a resilient city by adopting means and management practices to minimise the loss of life in a short reaction time.

Making a city resilient to disasters needs a multi pronged strategy. This section discusses the steps which can make a city resilient.

1. Coordination and organization of roles-It involves coordination of all relevant pre-planning activities and assigning specific roles to the concerned organizations. An organizational workflow chart may be prepared. Roles of each component of this organization tree must be defined. The city administration has organisations dealing with roads, armed forces/civil defence, police, water, energy etc. Private sector organizations can also facilitate in running healthcare, logistics companies, fuel depots, property,utilities, phone companies, etc. Many non-governmental organisations, trading bodies, industries, research and education organizations etc. may also be involved in this effort. A Memorandum of Understanding may be signed between all the stakeholders so that there is no confusion in the functioning of these organizations at the time of a disaster. A person or an organization should be a designated overall coordinator for this activity. To test the effectiveness of this coordination mechanism, regular meetings and rehearsals for different disaster situations must be carried out.
2. Listing of skills, knowledge and experience of disaster management and relevant activities- The list of skilled manpower in risk identification, preparation, mitigation activities, planning, disaster management response, rehabilitation, reconstruction, training etc, should be prepared. Skills of medical emergency management, hospital management, communication, land planning, energy, environment, law and order, water and structural engineering, logistics, debris disposal, project planning and management should be accounted for. Emphasis should be given on accumulation of knowledge for operation of the city government and city infrastructures like electricity generation and supply, water, sanitation, traffic and other critical city systems,which may come under risk in disasters.

Pre and Post Satelite Image of Dedarnath Valley (Kedarnath)

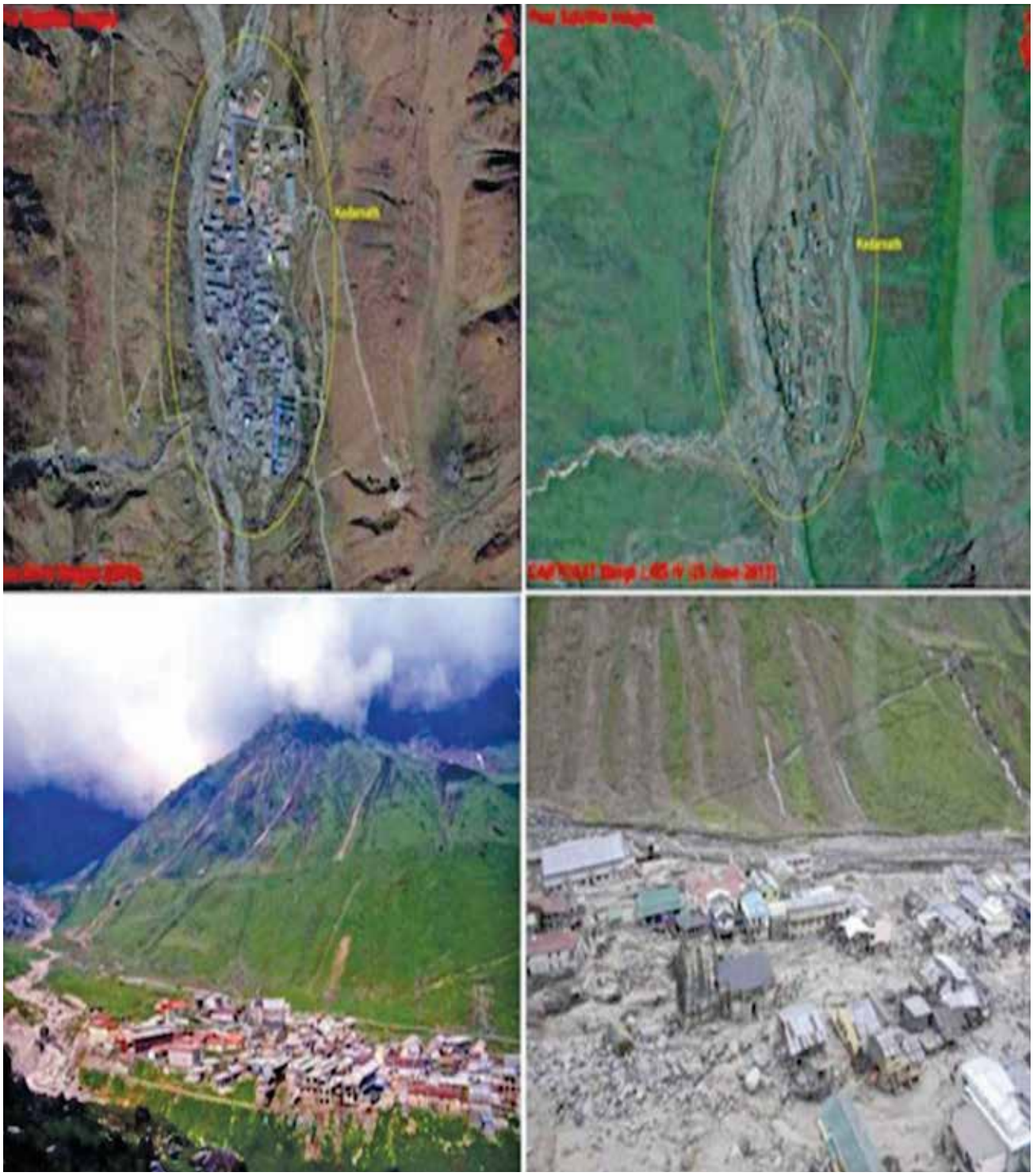

Photo Credit-Uttarakhand Space Application Centre, Dehradun.

3. Integrate the initiatives-Other initiatives should also be integrated with disaster resilience of a city. While taking initiative of development,the infrastructure needs of disaster management should be incorporated. While taking decisions for land use pattern, one must see that it does not kill wetland, destroy waste management area, eliminate safe evacuation zone or wipe out the food supply chain. For example, lack of such integration in town planning of Srinagar led to destruction of the wetlands of Bemina and encroachment of Wular Lake, which in turn contributed to the Kashmir flooding in 2014.
4. Funding for a disaster resilient city-A plan should be drawn and implemented to ensure that adequate funds are allocated for disaster resilience. To cover the complete cycle of disaster management, the following funds are required.

   a) Capital fund,

   b) Operating fund,

   c) Contingency fund.

   Different incentives and loans should be provided to individuals, government agencies, municipal bodies, private business organisations, Residents' Welfare Associations, research organizations, and education organizations to strengthen and prepare them for the type of risks, a probable disaster may pose, in a particular city. There should be consistency in this funding, irrespective of change in governance at local or national level. There should be provision for insurance for individuals and organisations.
5. Identification, assessment of probability, and impact of disasters-All disasters which may hit a city must be identified by past experience and analysis of present threats. A probability distribution map of the city should be prepared to categorize the impact of the most probable and most severe disaster.

   While identifying probability and severity of disasters, care must be taken to account for cascading effect of each disaster, which may generate additional threats and vulnerability to the city. For example an earthquake may trigger tsunami and nuclear disaster,if nuclear establishment is located in the coastal area.

   A Complete Panoramic Picture of Disaster (CPPD) should be prepared. It will include Direct Impact Area (DIA), Area of Influence (AI) and Area of Sympathetic Impact (ASI). This CPPD must include exposure, vulnerability, recovery time, inherent strength and ecosystem benefit of the city, available resources, outside help, safety zone etc. This CPPD should be evaluated by an outside expert/ agency and it should be reviewed after every 12 months.
6. Identify critical assets-All critical assets should be identified and proper steps should be taken to protect them, so that these remain operational and useful during disasters.
7. All Chains of Cascading Impacts (CCI) should be identified-Chain of Cascading Impacts (CCI) are those events, failure or collapse of which may trigger failure of other activities in the chain. For example, failure of electricity supply will lead to failure of computer network, CCTV operation, mobile communication, metro rail operation, operation of all automatic instruments, water supply, hospital operation etc. This data should be regularly updated and tested.

   In the Uttrakhand disaster of year 2013,the national highway connecting Mana, Badrinath, Rudrapryag, Srinagar, Rishikesh and Haridwar was badly damaged and washed away at several locations. It affected the food supply to affected areas, hampered movement of rescuers to incident sites and evacuation of victims to nearest railway station of Haridwar, and also prolonged the search, rescue, evacuation, and rehabilitation and reconstruction process.
8. Make critical infrastructure disaster resilient-An exercise of assessment of damage, impact, cost of reconstruction,cost to keep it operational, its protection arrangement and its inter- relation and coordination with other critical and non-critical infrastructure should be done.

   Protection of critical data and computer system is very important. Other critical infrastructure is electricity, communication, fuel, water, sanitation, public safety,

Rescue of victims after the bridge and road was washed away in Uttrakhand disaster,2013.

transportation and hospitals.

9. Make protective infrastructure- Protective infrastructure is that which protect the city and its dwellers from direct impact of a disaster. These are flood bunds, barriers, water reservoirs, cyclone shelters, storm drains etc. All buildings should have shock absorption capability. Proper arrangements should be made to maintain them.
10. Cater for water supply-There should be arrangement for protection of water supply system in a disaster. Adequate measures should be adopted for the safety of local water bodies like reservoirs, wells, and pond. In case of major disasters, even a robust water supply system will be damaged. Moreover, damaged roads will make water tankers useless. Normally,water channels like nalas and rivers get polluted and start carrying contamination from one part of city to others areas. In such a scenario, only local water bodies will be able to provide water needed for the survival of victims.
11. Make roads disaster resistant- Roads are critical for movement of heavy equipments, ambulances, victims, rescuers, building materials for reconstruction etc. during a disaster. All major roads in the city and surrounding areas must be identified along with their vulnerability, strength, type, probable damage from different disasters, number of days for their repair, and their service area. Special arrangements for safety of infrastructure like bridges, tunnels, culverts etc. should be made, otherwise their damage will also make roads unusable.
12. Cater for effectiveness of transportation in the city- Proper arrangement in view of threats of disaster should be made to insulate mass transport systems like buses, trucks, rail, metro, ferry, boats etc. isolated from the disasters. Normally,

Rescue work being carried out by ITBP in Leh, 2011.

rail transport and long distance vehicular movements are hampered in disasters. Boats and ferries become effective transport means at the time of floods and in the presence of water bodies.

13. Strengthen the law and order enforcement system-Disasters also create problems of law and order. These problems hamper search and rescue operations. Police machinery should not be employed for search and rescue operations. Diversion of police for search and rescue operation leads to decrease in available manpower for law and order management, which in turn needs more strength during disasters.
14. The administration should be insulated from the impact of disasters-A proper study should be taken up to identify the effects of different disasters on administrative systems of the city. The most critical system of governance and most severely affected wing should be identified and strengthened accordingly. The construction of offices, location, approach route, their electronic and physical connectivity with rest of the city, safety mechanism of individual government functionaries and their families should be catered for. Special emphasis should be given to the government system related with water supply, electricity, health, housing, finance, computers system, waste management and food supply.
15. Modification of Computer systems and data collection-An elaborate arrangement should be made to create a computer system which can function in isolation as a stand alone devise also. Both wire and wireless systems of networking should be adopted. Data collection for each and every aspect of the city should be done. Proper arrangement should be made to ensure safety, availability and usability of this data during disasters. Arrangement should

be made for un interrupted working of computer systems. Dedicated power backup or alternate source of power supply may be identified for uninterrupted functioning of computers.

16. Prepare Education system for resilience-Buildings of education system should be structurally safe. It can be so designed that these may act as shelters during disasters. An assessment of impact of disasters on teachers, students and associated staff should be made. To continue the education during rehabilitation and reconstruction phase of disaster, an alternative site should also be identified. Education data like details of students, teachers, other staff, syllabus, education material, results of exams, etc should be digitised and stored at remote servers located at remote locations which may not get affected by the disaster simultaneously. Loss of this data may create havoc for education system and ruin careers of students.

17. Prepare the health care system-The health care system and its components play a very important role at the time of disaster. Their effectiveness has both psychological and physical impact on victims and residents of acity. The manpower of healthcare system should be trained to handle challenges of medical care in different types of disasters. The training and rehearsals play a very important role in preparation of heath care system for a disaster resilient city. To ensure the effectiveness during disaster, proper administrative, financial, infrastructural arrangement should be made for safety and security of healthcare staff.

    Concentration of health care services and infrastructure should be avoided. Even distribution of health care infrastructure, specialist doctors, paramedical staff and fund allocation should be ensured. This will enable the city to maintain an optimum level of medical care, even if, one or more areas of the city is severely affected by a disaster.

    While planning for establishment of a hospital, structural safety of its building during a disaster must be ensured. The approach route, both in and out route, should be so designed that it can handle enhanced vehicular load, movement of vehicles and victims. Provision of a helipad, power back up and alternate means of power generation must be made in all hospitals.

18. Cater for mass casualty and disposal of debris-Most disasters cause mass casualty and produce huge amounts of debris. Proper and safe disposal of dead bodies, as per the existing social and religious practices, is a challenge. Failure on this will lead to grave psychological trauma for victim's family, friends and other inhabitants. Sometimes it also causes social and political unrest. A plan for disposal of dead bodies in large numbers should be made and suitable area for it should be earmarked.

19. Develop Safe Zone-The Safe Zone is an area where the citizens can be evacuated. A city can have more than one safe zone, according to its topography and size & distribution of population. This area should be so prepared that it can sustain the target population, until the time of safe return to the city. This area should have appropriate arrangement of water, sanitation, sewerage and electricity. During normal days this area can be utilised for agriculture or recreation purposes. Temporary shelter will be erected only during disaster situations. The size, number,and location of these safe zones must be calculated correctly so that it accommodates the displaced population of humans and animals and also has a sufficient margin to accommodate the additional population present in the city as a result of natural increase and migration.

20. Develop Disaster Resilient Buildings (DRB) - A Disaster Resilient Building (DRB) is the most important component to make a city disaster resilient. During a disaster, buildings kill or save the citizens. Most of the casualties in a city can be minimized by making buildings disaster resilient. Presently, we develop a single building code for whole city. A big city may have various zones having different social, economic and physical features like terrain, soil type, water bodies, wind flow pattern, forest cover, rock formations, slope pattern etc. Micro zoning of every city is a must. To develop a true DRB, different building codes for different city zones should be developed, according to their peculiarities. For example, many buildings in Bhuj earthquake displayed different collapse

patterns in spite of being affected by the same disaster.

21. Public awareness and capacity building- Public awareness and capacity building prepares a city to face a disaster. Education, training, volunteer programme, media campaign, and rehearsals are a must to prepare acity for resilience during a disaster. A well prepared citizen, along with a well prepared city, bravely faces a disaster, suffers less damage and bounces back from the crisis situation.
22. Protect the ecosystems and natural defence mechanism- As per World Disaster Report 2014, the ecological footprint from the unsustainable overconsumption of energy and natural capital now exceeds the planet's bio capacity. Ecosystem of a city plays major role in deciding the degree of damage from a disaster. Many cities have natural defences like natural storm drains, hillocks, tree line or forest cover etc., which acts as buffers and protect the human habitation from the impact of disasters. Suitable measures should be taken to protect the eco system and natural defence mechanism.
23. Adapt to climate change– Climate change generates new demands in consumption patterns of the citizens. This needs to be taken into account during modification of building codes. New risk reduction practices need to be developed in the light of modern practices and consumption pattern. For example, Leh flash flood disaster of 2011 exposed various deficiencies of local building practices. Unbaked soil bricks were used to make buildings and other structures. Local traditional buildings had flat roots. During rain and flash flood these buildings were washed away and generated huge mud flow. This mud flow along with debris created larger damage in Leh.
24. Stop environmental pollution- Pollution is a slow killer. It is a disaster in itself and a cause to many other disasters and diseases such as cancers, environmental degradation, social unrest, reduction in food production, decrease in productivity of humans, animals, and plants and failure of traditional living style. There should be strict enforcement of the pollution control laws to make a city disaster resilient.
25. Create warning system- A good warning system will prepare the city and its dwellers in advance, for any impending disaster. Technology exists for long term and short term warning for many disasters like cyclones, hurricanes, volcanic eruptions, drought,avalanches, snow storms, floods etc. Emergency management simulation should be an integral part of this warning system. Each citizen should be involved in rehearsals and training for this warning system and should be well aware to understand and use them.
26. Learn from victims- The victims are the best educators of a disaster. Their experience and suggestions should be properly documented, analysed and implemented. While rebuilding homes, organisational mechanism, response system, means of livelihood and health care mechanism, this learning must be utilised.
27. Develop Modular System of Settlement (MSS)- Disaster management is a dynamic system involving constant up-gradation and changes. Recently, a Modular System of Settlement (MSS) has been designed with such an arrangement that inhabitants of a module, affected by a disaster, can be easily accommodated in other modules not affected by a disaster. This shifting of location of a citizen group will not affect the normal functioning of the group. To achieve MSS, we must create a seamless system of information management where all information is collected, stored, and used in digital form. Facilities and essential services should be equally distributed and available for use without any discrimination or special affiliations. Individual transport and individual territorial boundaries will have to be minimised or totally eliminated. Modular System of Settlement (MSS) may sound futuristic but this has to be adopted in the long run to make a city resilient to disasters.

CONCLUSIONS

Huge capital inflow is expected for urban development in Asia and Africa. As per UN report, about 60 per cent of the area, expected to be urbanized by 2030, remains to be built. India is planning to develop 100 smart cities. All these investments in urban growth face the danger of being washed away by a deluge of urban disasters, if not properly planned. A city is never smart unless it can survive smartly and to service smartly, it needs to make itself a disaster resilient city.

Expert Views of Director, SPA, New Delhi on
RESILIENT CITIES

The importance of cities and urban systems for prosperous economies is now more widely recognized. Climate change should not undermine the economic growth of our cities hence building resilience to likely and possible climate change impacts is very important in the context of rapidly urbanizing India.

PROF. CHETAN VAIDYA

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What are the challenges and opportunities for urban India?

India's urban population was 377.1 million in 2011and urban population to total population was 31 per cent. There were about 8,000 urban centers and out of these as many as 53 were metropolitan cities with more than a million population and over 2700 were small non-municipal or census towns. The urban sector contributes about two-third of the gross domestic product of India. There is robust economic growth at the national level, however the percentage of urban poor continues to be high. The all-India head count ratio for urban poverty was 20.9 per cent in 2009 - 10 and total number of urban poor was 76.47 million in 2009-10. In India, there is a strong realization that its urban areas need to improve, to achieve fast and sustained economic development. Thus, urban India has many challenges but it also offers many opportunities. The primary challenge in the context of climate change would be poor slum and squatter settlement dwellers that are most vulnerable to climate change.

What is a Resilient City approach?

"Resilient cities in the light of climate change should be able to develop a blue print for development and growth, bearing in mind the climate impacts that the urban systems are likely to face". UNISDR has given a ten-point check list for making cities resilient. These include: (i) put in place a city disaster management plan (DMP) and zonal DMPs

that integrate climate change and other hazard mitigation concerns into the primary land use and zoning instruments, city structure plans and development plans; (ii) organize and coordinate to understand and reduce risks; (iii) assign a specific budget for disaster risk reduction; (iv) maintain up to date data; (v) invest in infrastructure; (vi) assess safety of school and health facilities; (vii) apply risk compliant building regulations; (viii) conduct education and training programs in schools and local communities; (ix) protect eco systems; and (x) install early warning systems and (xi) after disaster ensure that needs of survivors are recognized in habitation programs.

Resilient cities should be able to maintain their functions and linkages in the face of stresses and change and respond to the vulnerabilities identified in each specific city context.

How can the Resilient city approach be a part of the proposed urban strategy in India?

Overall goals for urban development in India are, and should be,creation of sustainable, inclusive and smart urban centers. India has to improve urban infrastructure and governance to achieve economic development goals and provide jobs for the youth. "There is a need for a paradigm shift in the way in which the cities of today are planned and managed. Integration of a climate resilience agenda has the potential to systematically build resilience of cities and its systems, reduce vulnerability and achieve the desired developmental goals. A policy towards this end is an important stepping stone to achieve the larger goal of sustainable and climate-resilient cities". For future urban programs, it is recommended to undertake: assessment of vulnerability of urban systems, completion of reforms, preparation of City Development and Financial Plan, shifting of focus from projects to programs, 10- year mission period, leveraging of funds through Private Public Participation, separate capacity building mission, incentives for taking more complex reforms, extensive use of Information and Communication Technology (ICT) tools, etc. The Government of India is keen to develop or promote 100 smart cities. The resilient city approach should be an integral part of India's urban strategy.

What is the difference between Smart City and Resilient City approaches?

There is no universally accepted definition of smart city. As per Wikipedia, a smart city (also smarter city) uses digital technologies to enhance performance and well-being, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Key 'smart' sectors include transport, energy, healthcare, water and waste. As mentioned earlier, resilient cities should be able to develop plans for future development in the context of various climate related and environmental risks. India should focus on developing smart cities that are climate proof and resilient to withstand the shocks of extreme weather events. Smart city initiative should also include GIS based smart response, to reduce vulnerability and damage during climate change induced disasters.

What are the different types of disasters that impact Indian cities?

Our cities are under high risk from natural, man-made and climate change impacts. Overall risk in Indian cities is more associated with vulnerability than hazard exposure. It is, therefore, important to understand a number of processes that are rapidly changing India's urban landscape, altering livelihood opportunities and wealth distribution, which in turn affect the vulnerability of many communities and stakeholders and their capacity to adapt to long-term risks. Several Indian cities have been impacted by floods. The Srinagar deluge in 2014 affected more than six hundred thousand people. Patna and Guwahati cities are in flood prone areas and are adversely affected by floods. Cities in Gujarat were severely damaged by earthquake in 2002. Studies predict that impact of climate change will be in the form of heat waves. In 2010, a heat wave in Ahmedabad killed 300 people in a single day. Another impact is due to cloud bursts. In June 2013, a cloudburst in Uttarakhand caused devastating floods and landslides. Our coastal cities are under risk due to extreme weather events being attributed to the climate change. Cold waves during the winter months are becoming frequent in some parts of India. Urban planning with environmental concerns could address many of these issues.

Photo Credit *NRDA.*

I strongly recommend that India should mainstream the resilient city approach into urban planning and the development process with focus on improving public health. This will require amending state Town Planning Acts, Municipal Acts as well as environmental laws. The proposed chapter on approach to sustainability in India's National Building Code is a first step in this direction.

Do you think public health should be linked to urban planning in India?

According to the World Health Organization, New Delhi is the most polluted city in the world. Many Indian cities have very poor air pollution readings. This is causing many health hazards to the urban population. Public health should be an important criterion for urban planning in India. "Geographic analysis is a key planning tool shared by urban planning and public health. During the 19th and early 20th centuries, the synergies between urban planning and public health were evident in at least three areas: (i) creation of green space to promote physical activity, social integration and better mental health; (ii) prevention of infectious diseases through community infrastructure, such as drinking water and sewage systems; and (iii) protection of persons from hazardous industrial exposures and injury risks through land-use and zoning ordinances. Climate change is expected to accentuate environment-related health risks, including those from water-borne diseases (e.g., diarrhea, cholera and typhoid), due to water scarcity and contamination. Malaria is expected to expand from its currently endemic range in eastern and northeastern India to western and southern India, thereby placing a large incremental population at risk. Given that Indian cities have become major reservoirs of vector-borne diseases such as malaria and dengue fever, it can be expected that morbidity risks would increase.

What is a good example of a Resilient City?

There is lot of literature available on initiatives taken by London, New York and Seoul. However, I would like to discuss the initiatives taken by Melbourne in Australia. This metropolitan city has a 4.5 million population and has been judged as the most livable city for four consecutive years. It has recently won a City Climate Leadership award. Melbourne city implemented two major projects: planting 3,000 trees annually and large-scale water harvesting projects in main parks and the river. These projects have enhanced the city's resilience and helped to reduce temperature by around 4 degrees in summers and consequent reduction

in energy costs. Other initiatives include changing concrete and asphalted areas in green parks, affordable housing, development of community centers, preservation of historic market, extensive bike paths, improved footpaths, etc. The city has the world's most extensive tram network- of about 250 km, reaching the whole city including suburbs. I am a Visiting Fellow of Melbourne University and have spent a few weeks in the city during August 2014. It has really provided a livable environment to all citizens. Many of these lessons are relevant and feasible for urban India.

Is there a good example of resilient city initiative in India?

The Asian Cities Climate Change Resilient Network (ACCCRN) initiative strives for outcomes that are focused on building capacity of cities and building skill sets that are needed to cope with the challenge of climate change. In India under the ACCCRN program three cities namely Surat, Indore and Gorakhpur have been identified for the city-level vulnerability assessments. In Surat and Indore, GIS-enabled vulnerability analysis was utilized to provide information on the spatial distribution of risks and vulnerability to explore targeted options for adaptation. Gorakhpur is a successful example where a micro resilience plan, as a model for city level planning, was prepared in tune with the spirit of the 74th Constitutional Amendment Act.

The National Building Code, 2011 has recently included an additional chapter on Approach to Sustainability. This provides a comprehensive set of requirements intended to reduce negative impact of buildings and infrastructure on natural environment. It would protect public health but does not necessarily increase construction costs. This is an important and welcome step.

How should we plan resilient cities in India?

The concept of resilient city should help cities to reduce non-sustainable consumption. Indian cities are still being planned in the traditional style, where there is segregated land use, not integrated with the transport system. It has to go back to mixed land use. Public transport system like metro, rapid transport, bus, etc. should be linked to land use planning. Moreover, there should be higher floor space index and density. What I am promoting is generally known as `transit-oriented compact city concept.' The concept should be relevant for new centers as well as the existing cities through retrofitting. Extension of the existing city will be cost effective. A city is mainly an agglomeration of people from different locations. Existing cities can be connected with the ICT tools such as GIS, GPS, cloud computing, mobile phone, computerized data center, etc.

What should be the role of the private sector in climate proof urban development?

As public finances become increasingly constrained, the private sector is going to play a more critical role. The private sector should be guided to partner in development especially in the infrastructure augmentation. We should encourage the private sector and not discourage it through over regulation. The UN Framework Convention on Climate

Community as a Key Stakeholder

Photo Credit: Rajiv Sharma

Change, places a special emphasis on involving the private sector in resilience.

As far as Public Private Participation (PPP) options for urban infrastructure are concerned, the entire notion of developing and implementing projects in a commercial format is a relatively new trend in India. These projects require considerable efforts in evolving project documentation, developing institutional arrangements for project structures, securing approvals and clearances from stakeholders, financial engineering, selecting a contractor, operator or concessionaire and ensuring overall financial closure. A wide range of actors have to be involved in all these processes, and consistent coordination is necessary. In addition there is a constant need for the sponsor to pursue project related activities to mitigate and minimize risk and here the private sector can play a key role.

What is feasibility for private funding of climate proof urban infrastructure?

Government grants should be leveraged for private investment. Great progress has been made in developing the policy and legal framework for local governments to access the capital market to finance urban infrastructure. However, to routinely access capital markets or invite the private sector, ULBs will need to have the capacity to develop commercially viable projects. The most critical factor for obtaining market finance will be a healthy municipal revenue base. A market-based approach to financing urban infrastructure linked with Government funded programs will further strengthen ULBs and help achieve the decentralization objective of the 74th Constitutional Amendment. Thus, market-based financing is an important innovation for urban infrastructure in the country.

What should be the strategy for Capacity Building for resilient city development?

There is a need to engage urban local bodies and external experts into producing knowledge about vulnerabilities and build local understanding and ownership of proposed actions for capacity building. It is well acknowledged that lack of capacity both in quantitative and qualitative terms is one of the biggest challenges facing urban local bodies today. Requirements would be different for different class of cities. There is need for creation of a municipal cadre in synchronization with their functional domains. There is need to identify formal educational qualifications which would include course curriculum etc., link them to recruitment and career progression, and identify institutions that are capable of providing such courses.

An important issue would be to ensure geographical spread of such institutions and balancing of supply with demand. Under the National Action Plan on Climate Change there exists a National Mission on Strategic Knowledge for Climate Change. The Mission acknowledges that knowledge networks, which would inform and support strategic actions and policies among the stakeholders, are necessary. Producing a climate resilience strategy requires technically credible information—not only with regard to climate, but about urban systems, interactions among various stakeholders and existing development plans. It requires the engagement of vulnerable groups and communities in diagnosing problems and designing actions to respond to these (NMSKCC 2010). There should be a separate Capacity Building Mission for resilient city development.

What other actions are needed from the Government sector?

Addressing a complex task of six major risk groups – (i) temperature and precipitation variability; (ii) drought; (iii) flooding and extreme rainfall; (iv) cyclone and storm surge; (v) rise in sea-level; and (vi) linked environmental health risk – is a serious public policy and adaptation management challenge for India. Specific actions by the Government may include: (a) Incorporating sustainable habitat standards in statutory plans like master plans and building bye-laws; (b) Process of city vulnerability assessment, preparation of city resilient strategies and urban planning; (c) Providing incentives to cities for taking up innovative waste recycling projects and waste to energy projects; (d) Supporting energy efficient habitat construction; (e) Recycling of construction waste; (f) Using renewable energy in residential and commercial sectors; and (g) city and state wide scaling up of successful experiments.

Energy Management for a Planned City

A Case Study of Chandigarh

SARANG GOEL

Planning for energy at the urban level has always focused on supply-side management (i.e. the provision of infrastructure and increase in production to meet increased demand, etc). Demand-side management still hasn't gotten its due in urban studies. City Master Plans also do not include energy management. There is a missing link between energy management and urban planning in India.

KEYWORDS

Cities, energy management, electricity consumption, sustainability

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The pressure on commercial energy resources is increasing and will be so in future. But the rates at which these are being extracted are not in proportion with their period of replacement. Hence, it is important to make sure that the urban centres, that are consuming a maximum share of energy supply, utilize this energy in an efficient manner by minimizing the wastage. The aim of this paper is to address energy management for a planned city, so as to reduce its consumption of conventional energy. Chandigarh, independent India's first well planned city, has been taken for the case study. The paper attempts to analyze the role of the city's urban and built form in establishing the electricity consumption patterns (in residential & commercial consumption only; industrial consumption not considered) which may lead to identifying strategies for efficiently managing the same.

INTRODUCTION

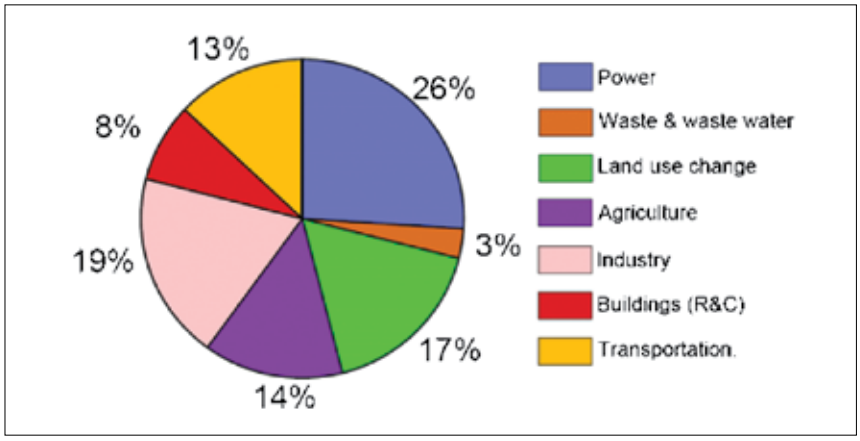
Cities are engines of economic growth. Over the last 20 years, these engines have experienced tremendous surge. Today half of the world's population (around three billion people) lives in urban settlements, a share that is likely to reach 70 per cent in year 2050. In the context of economic development, it is recognized that urbanization is not only inevitable, but also desirable and energy is an important pre-requisite for this. It is estimated that one per cent increase in urban population increases energy consumption by 2.2 per cent (Sanyal et al).

Energy is crucial for the functioning of urban settlements. For a typical city, energy consumption can be broadly classified in terms of infrastructure provision (i.e. construction, water, sewerage, street lighting, transportation etc.), and demand for commercial, domestic and industrial activities. Access to sufficient energy and the sources of energy production have far reaching implications on a city's economic development and environmental health. Most of India's energy demand is currently being met from non-renewable sources. Since last 40 years, there has been a global energy crisis and the apparent abundant supply of energy resources now seems limited.

Hence, it is important that urban centres (globally), which consume around 80 per cent share of energy supply (World Bank 2010), utilize this energy efficiently. According to a study conducted by the World Business Council for Sustainable Development, manufacturing, construction, transport of material, maintenance & renovation consume 16 per cent of total energy, during the full life of a building. The balance 84 per cent energy is consumed by a variety of other requirements on a day-to-day basis, like heating, ventilation, cooling, computers, cooking etc. (Sanyal et al).

Complimenting this issue is the threat of climate change, as cities

Figure 1: Global CO_2 equivalent emissions by sector



***(Source**: World Bank report)*

account for roughly 80 per cent share (World Bank 2010), of global greenhouse gas emissions, majority of which comes from energy production, generation and consumption (Figure 1). Developed cities, cities in cold climatic zones, richer cities, less dense cities and cities that depend predominantly on fossil fuels to produce energy, emit more greenhouse gases. So, how cities meet energy demand is critical to climate change (Bhaduri, 2002).

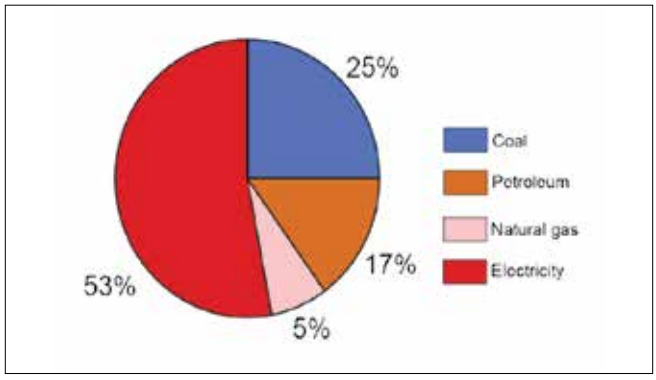
In India, the gap between energy demand and domestic production is rising, leading to rising fuel import bill and threatening energy security. Of all the conventional energy (in Peta joules, refer Figure 2) consumed in India, share of electricity is highest (Energy Statistics, 2011). But, only 11 per cent of electricity is generated from renewable sources (refer Figure 3) (World Energy Council 2012). Additionally, existing studies across Indian cities reveal that household energy has a major share in India's total electricity consumption and this share is increasing as years pass by. It is seen that every year there is an increase of 20-30 per cent in energy demand in the residential sector and 10-15 per cent in the commercial sector(TERI, 2009).

Inefficient consumption was reported for 20 per cent energy wastage in the year 2006 (Shahi, 2006). Research shows that the cost of reducing energy use by one kWh (with more efficient technologies) is much lower than cost of increasing energy supply by one kWh (through investments in new energy supply equipment) (Garg, 2012). Thus, use of conventional energy needs to be minimized.

Analysis of sector-wise consumption trends of electricity usage is given in Figure 4. According to this figure, industrial sector is the biggest consumer of electricity, followed by residential, agricultural,commercial and miscellaneous (comprising of transport sector, public lighting, public water works, sewage pumping and others).

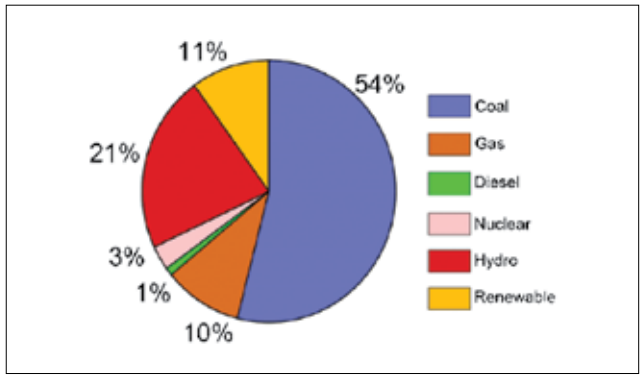
In a typical residential building, lighting and ventilation (including

Figure 2: Consumption of conventional energy in Petajoules, India, 2009-10



***(Source**: Energy Statistics 2011, Central Statistics Office, Government of India)*

Figure 3: India's installed electricity generation capacity (year 2011)

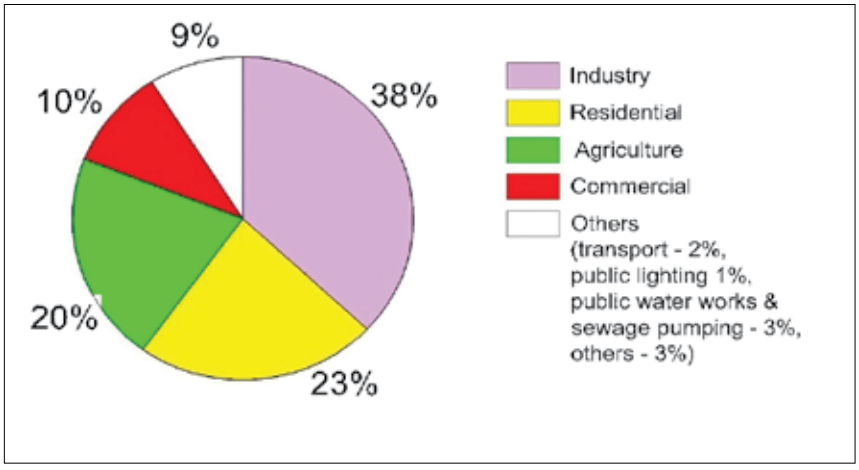


***(Source**: World Energy Council report)*

air-conditioning) take the major share of the energy consumption pie (refer Figure 5). In commercial buildings too, air-conditioning and lighting serve as the two most energy consuming end-use applications, accounting for around 90 per cent of the total consumption of a building (remaining being taken by other electronic items).

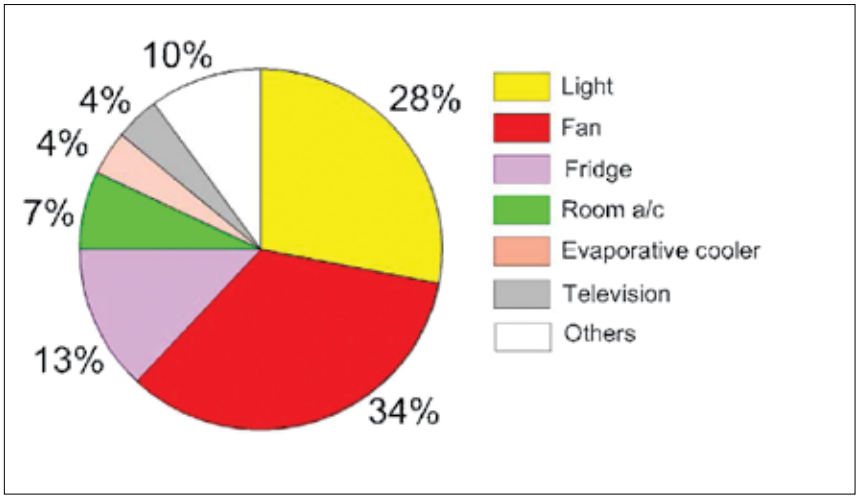
This study started with a hypothesis that Chandigarh (independent India's first well planned city) has very high per capita electricity consumption. When this hypothesis was cross-checked with consumption trends of some other planned and unplanned cities (having similar population size) and the national figure, it was found to be true (refer Table 1).

Figure 4: Sector-wise electricity consumption scenario (2009-10).



***(Source**: Energy Statistics 2011, Central Statistics Office, Government of India; India Energy Handbook 2011; Kumar, S (2011) Benchmarking Energy Use in Buildings and Clean rooms, ISA Vision Summit, Bangalore)*

Figure 5: Electricity usage pattern in a residence (Delhi).



***(Source**: Goel V (2006), Steps towards an energy efficient building)*

This fact reveals that planned cities have more per capita electricity consumption, as compared to unplanned/traditional cities.

So, does it mean that we should not plan our cities? Or does it indicate certain shortcomings in our planning process? Taking Chandigarh as an example, this paper attempts to identify, how as city planners, we can maintain an energy balance for a planned city, so as to reduce consumption of conventional energy (with focus on electricity in residential & commercial sectors only). But before that, let us see what we mean by energy management.

ENERGY MANAGEMENT

Energy management is defined as a proactive, organized and systematic approach of procurement, conversion, distribution and use of energy to meet the requirements, taking into account environmental and economic objectives. In simple terms, it ensures a coordinated, long-term approach to ensure that the city's energy needs are met at minimum cost to all sections of the society, without any discrimination. Urban Energy Management entails development of a programme that holistically integrates both the supply-side and demand-side management goals (India Infrastructure Report 2011).

Traditionally, planning for energy at the urban level has always focused on supply-side management (i.e. the provision of infrastructure and increase in production to meet increased demand, etc). Demand-side management has still not got its due in urban studies and City Master Plans do not include energy

Table 1: Per capita electricity consumption of selected cities, year 2009-10

S No	City	Population° (in lakh)	Area (in sqkm)	Average density (pp/sqkm)	Annual per capita electricity consumption (Kwh)
1	Chandigarh	10.25	114	8,991	1,238
2	Jaipur	30.73	200.4	15,334	794
3	Bhubneshwar	8.37	135	6,200	864
4	Puducherry	6.54	492	2,500	1,864*
5	Gurgaon	9.02	N.A.	N.A.	1,900*
6	Raipur	11.22	154	7,286	409
7	Jabalpur	12.67	N.A.	N.A.	258
8	Gwalior	11.01	289.5	3,803	384
9	Ranchi	11.26	111	10,144	589
10	Tiruchirrapalli	10.21	146.9	6,950	568
11	National avrg.	----	----	----	778

**-on account of high industrial & commercial activities. °= Census 2011.*
***Source:** Electricity Department, UT, Chandigarh; Website of Press Information Bureau, GoI; Report on Energy and Carbon Emissions Profiles of 54 South Asian Cities, ICLEI; Census of India 2011.*

management. There is a missing link between energy management and urban planning in India.

To make an efficient use of the energy and, as a consequence, to save it, the actions in energy management are focused on three aspects: conservation, substitution & recovery. While energy conservation is described as efforts made to reduce energy consumption for an existing scenario; energy substitution deals with substituting non-renewable energy sources with renewable ones i.e. looking for cleaner sources of energy. Energy recovery deals with efforts made to close the energy cycle to prevent dispersal of waste energy back to nature i.e. using waste energy of one process as a resource for the other. Figure 6 illustrates these aspects in more detail.

CHANDIGARH – A CASE STUDY

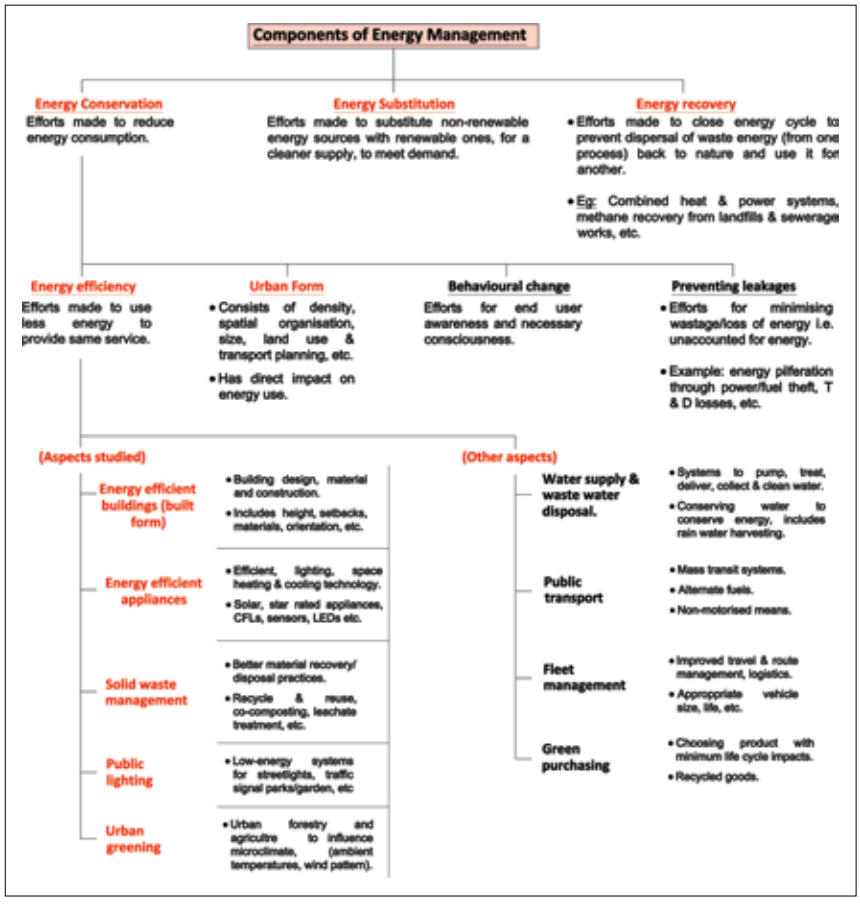
Electricity consumption of a city is a function of many variables, like climate (i.e. cities in different climatic zones have varying consumption pattern); settlement size (i.e. more people implies more energy consumption); urban form (i.e. shape of settlement, density, network pattern & its relation to land-use, physical extent, types of land use & zoning, skyline, etc); built form (i.e. clustering of buildings, siting, spacing between buildings, height, building envelope & mass, orientation, open space to built-up area ratio, micro-climate, floor area ratio, etc); economic base (i.e. nature & level of economic activities taking place); and income & affordability (i.e. rising incomes & living standards, changing lifestyles, etc). In short, a large number of factors influence energy consumption, so it is difficult to isolate effects of form.

Chandigarh is a well planned city, which means that components of urban & built form have been taken care of in planning & designing of this city. For the composite climate this city enjoys, controlling solar radiation & movement of hot winds, reducing thermal gain & provisioning of green spaces/water bodies to lower ambient temperature form important planning elements. The creators of the city took care of this, by incorporating aspects like orientation (of sectoral grid, public & private buildings), dwelling unit density, building height, soft paved to hard paved area, spacing between buildings, fenestration sizes & positioning, sun shade devices, vegetation cover, etc. Despite this, the city has high consumption figures.

For this paper, data was collected at city level and from four residential sectors. The following observations were made on the basis of data collected and analysed:

1) Of all energy sources used (petroleum products used in aviation and industrial sector has not been considered) (in tonnes of oil equivalent), share of electricity is highest.
2) Of all the power consumed by the city, share of thermal is 31.5 per cent, nuclear is 10.5 per cent while that of hydro is 58 per cent, i.e. all the power is being sourced from non-renewable sources (because as per Ministry of New & Renewable Energy, Government of India, hydro

Figure 6: Components of energy management



power from projects above 25 Megawatt [MW] is not considered green power). All the obligations for clean energy are being met through Renewable Energy Certificates, which the electricity department buys from the open market to offset its share of carbon emissions, produced as a result of power generation.

3) Total electricity consumption is increasing at a rate of 10 per cent each year, while annual per capita consumption is increasing at the rate of 3 per cent (approximately) each year.

4) Maximum consumption occurs in summer months, so reducing building's internal temperature & heat gain is important.

5) Maximum consumption is in domestic & commercial sectors, also the scope of reducing electricity consumption is highest in these sectors.

6) Per capita consumption goes down with rise in density, which can be achieved by planning more dwelling units per hectare (either through flatted or small plotted residential development). The traditional concept of joint family stands good in this scenario.

7) There is inequitable consumption pattern in society, with high income group consuming much more energy than the other sections of society. Bigger residential plots, despite lesser occupants, have higher consumption than smaller residential plots, which house more people.

8) Energy consumption (per capita) goes down for flatted developments against plotted developments.

9) Commercial areas have much more consumption than residential areas, despite occupying less area as per land use. Reasons could be inappropriate plot width to depth ratio (increasing the lighting load) and less window area (increasing the ventilation load), besides other factors like activity patterns.

10) Government houses consume less electricity as compared to private houses of same size. This indicates possible difference in incomes and consequent electrical appliance ownership. Besides, government houses have climate responsive exterior finishes (usually white wash, which has high reflectivity & emissivity), thus reducing the energy load.

11) In row housing plotted developments, detached houses (receiving light from all 4 sides), consume lesser electricity than houses receiving light from front & back only.

12) Orientation is one of the major means to control and regulate

solar radiation, falling on a building.

13) Row development offers greater protection from sun because of less exposed area. However, heat gain from roofs is responsible for increased air-conditioning, leading to higher energy consumption in summers.

14) Building materials (like concrete) being commonly used today have high heat gain.

15) There are big un-shaded parking areas. This results in enhancing the heat island effect, thereby increasing the ambient temperature and the consequent need for cooling. Shade trees planted in rows mitigate this effect substantially and also provides much appreciated shade for parking vehicles.

16) High initial cost of energy efficient appliances and green buildings is a barrier in their use and construction.

17) There is negligible scope of harnessing wind power as a source of energy(TERI, 2009).

18) Though the city has started marching towards harnessing solar energy, technical (like its integration with the existing grid; obstacles on account of freehold ownership of private residential plots and others) and financial constraints are some stumbling blocks in its large scale application.

19) Energy recovery from biomass &sewage has not been tried, except for a solid waste treatment plant, which converts municipal solid waste into fuel pellets for industrial use.

Managing energy involves regulations, incentives and efforts by both government & individuals. Some of these efforts are listed below:

1) Periodic energy auditing, followed by use of energy saving appliances needs to be mandated for all public and commercial buildings as well as big residential plots. Independent studies (by The Energy and Resources Institute [TERI]) reveal that energy savings to the tune of 20 per cent is possible by promoting use of energy efficient appliances.

2) New upcoming developments & plots under redevelopment shall be mandated to incorporate green building principles (like, Green Rating for Integrated Habitat Assessment [GRIHA] & Energy Conservation Building Code [ECBC]), through revision in building byelaws. Roof gardens should be made mandatory for all (existing & proposed) public buildings and promoted for non-public buildings too, as they help in reducing heat influx in a building (upto 5OC). Independent studies reveal that energy savings to the tune of 15-40 per cent is possible by promoting use of green building concepts (WWF; Srinivas).

3) For any future residential/ commercial development (in row formation), appropriate building width to depth ratios need to be followed. As per concepts of day-lighting criteria, daylight penetration in a space varies linearly with window head height. So, limiting depth should not be more than 2.5 times the window height (in case of no shading device). In case a shading device exists, this depth is further reduced to two times the window height.

4) Building materials (like hollow bricks and others) need to be promoted and mandated, as these help in controlling heat influx, thereby providing thermal comfort.

5) Schemes, which offer concessional loans for building green homes, should be promoted and publicized (like SBI Green Home Loans).

6) Replacing High Pressure Sodium Vapour (HPSV) lamps in public lighting with Light Emitting Diode (LED) lamps can conserve electricity to the tune of 50 per cent, without any compromise with the quality of lighting.

7) On an average, 50-70 per cent of electricity demand in Chandigarh can be met by tapping solar energy (through solar photovoltaic panels). Byelaws need to be amended to mandate use of roof-top solar plants on public buildings, flatted housing and private plots. Energy Service Company (ESCO) in collaboration with individual/ society can work out a model (like rent-a-roof scheme) to tap solar energy under National Solar Mission.

One common belief about tapping solar energy is that more the heat (ambient temperature), more is the electricity produced. But that is not the case. In fact, efficiency of solar panels goes down with rise in ambient temperature (their ideal operating temperature range

being 24-32OC). Putting them in combination with roof gardens increases their efficiency.

8) It is recommended to mandate distribution companies to buy power generated through renewable sources by ESCO and distribute it to consumers, to reduce consumption of power generated using conventional energy sources.

9) Around 5-10 per cent of the electricity demand of a residential sector in Chandigarh can be met from power generated through municipal solid waste & biomass (through anaerobic digestion technology, (Shiv, 2009)). These plants may be located in green belts of a sector, as it won't require much land & is odour free (as it works in a closed system).

10) Similarly, exploiting the potential of methane produced from city's sewage for electricity generation would result in reduction in greenhouse gas emissions. City-level sewage treatment plants can be positioned at the final outflow point of Chandigarh. This shows the necessity of coordinated efforts between city administration & management, urban planning and tools like the City Sanitation Plan and Energy Management Plan in a city.

11) Concept of micro-grids (at sector level) could also be explored to consume the power generated locally (from solar energy and biomass).

12) Differential tariff plan needs to be introduced for high energy consuming users.

13) Finally, a city level energy action plan should be prepared, which lists all the possible sources of energy, their scope and evaluation (technical & financial), weighed against the demand and supply scenario.

CONCLUSIONS

Sustainability of cities depends on how energy is utilized and managed. Although architecture controls and planning principles of Chandigarh have been climate responsive to a great extent, the high per capita electricity consumption can be explained by the habits and lifestyles of its citizens. So, without public participation, it will not be possible to achieve desired results. But whatever be the reason, one thing is crystal clear, that meeting this growing demand for energy is taking a huge toll on our environment. When planning for a water supply system (another scarce resource), planners follow a design norm of 135litres/capita/day. No such notion exists in the case of electricity. It's time to evolve such a norm so that energy planning can be achieved in our towns and cities.

India is urbanizing at a rapid pace. As India is yet to build most of its urban spaces, there is an opportunity to imbibe energy management in planning principles. It shall showcase our commitment to the cause of fighting climate change & global warming.

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Energy Conservation Building Code (ECBC) Implementation

ARUN BHANDARI

There are clear estimates that ECBC-compliant buildings can use 20-35 per cent less energy than a conventional building. According to Bureau of Energy Efficiency (BEE), the average national benchmark for commercial buildings in India has been above 180 kWh/m²/ year. The ECBC compliant building could help to achieve a benchmark of 110 kWh/ m²/year, thus saving energy in buildings operations.

This article argues for implementation of Energy Conservation Building Code (ECBC) which would help in significant reduction of energy consumption in the building sector. The article compares the proposed energy efficient building against the Standard Building to determine the actual energy saving from ECBC compliant buildings. ECBC intends to improve the energy performance of building by energy management and with the use of best available technologies in the market. Also, most green building norms in India have formally complied with ECBC and have followed prescribed building form and functionality, thereby achieving considerable energy saving. Bureau of Energy Efficiency and state governments are discussing the institutional and administrative setup required at state and municipal level for enforcing of ECBC.

KEYWORDS

ECBC, Energy Conservation Act, 2001

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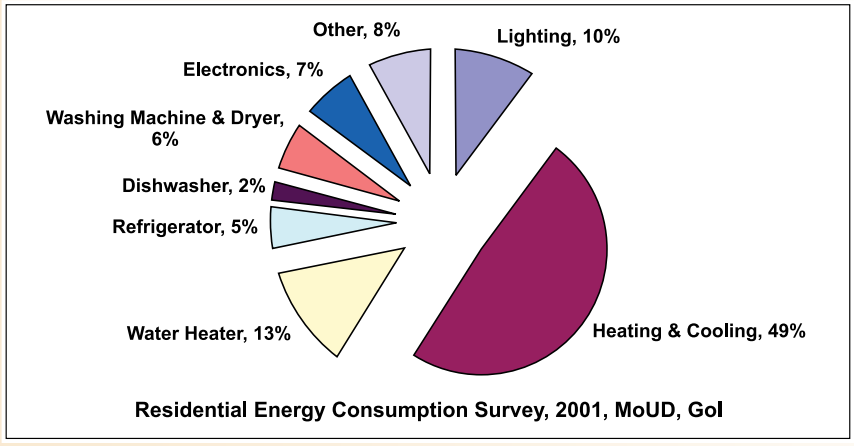
INTRODUCTION

In the rapidly growing economy of India, the energy requirements are increasing at a fast pace. The Government of India (GoI) is giving top priority to the achievement of nation's long term energy security and reliable power supply. To meet growing energy requirement, the GoI has given priority to add new power generation capacity, also giving equal importance to look out for options that will help in reducing the energy demands. Considering the vast potential for energy savings, to give impetus to energy conservation in the country, the GoI in 2001 enacted the Energy Conservation Act, 2001 (EC Act) which provided the legal framework, institutional arrangement and regulatory mechanism at the central and state level to embark upon the energy efficiency (EE) drive in the country. The Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, was established in March 2002 to implement the EC Act.



Residential Energy Consumption Survey, 2001, MoUD, GoI

ENERGY CONSUMPTION IN BUILDING SECTOR

The building sector is one of the major consumers of energy, accounting for about 33 per cent of India's total electricity consumption—of which the residential and commercial sectors account for 25 per cent and 8 per cent, respectively. The commercial sector will sustain the growth rate of 8-10 per cent in coming years. Recently, the Ministry of Power, GoI has announced guidelines for BEE Star Rating scheme for commercial buildings. This is a great step towards advancing EC Act. However, the EC Act implementation is lagging behind market trends, in widely covering Energy Conservation measures in the Building Construction Industry.

The electricity consumption in the commercial building sector has experienced an average growth of 13.5 per cent over the last four years because of sharp rise in economic growth rate, substantial increase in living standards and other aspects of human development. It is estimated that a sustained compound annual growth rate (CAGR) between 5 to 10 percent is likely to be achieved for the same duration across different building types. Hospitality and retail, which have had a relatively smaller constructed area so far, are expected to achieve higher CAGRs, in range of 8 – 10 percent. In terms of constructed area the maximum growth will be seen by residential and commercial sector registering an increase of four to five times. Government studies indicate that in conventional Indian buildings, annual energy consumption is 25 units per sqft, of which 34 per cent energy is accounted for by fans, 28 per cent for lighting, 13 per cent for refrigeration, 10 per cent for evaporative cooling and rest goes to other equipments and heat losses. However, this does not include the energy-mix on supply side that utilizes other forms of energy such as petrol, diesel, LPG gas, fuel wood etc., consumed in each household, for which data is not available at this stage. There is a scope for reducing energy consumption up to 12kwh/sqft/annum by using the existing technology and to achieve a saving about 40 per cent of energy consumption or reduction in building's carbon footprint.

THE ENERGY CONSERVATION BUILDING CODE (ECBC) IMPLEMENTATION

The ECBC now applies to buildings with connected loads over 100 kW or contract demand of 120 kVA and does not apply to multi-family buildings of three storeys or fewer above grade or single family buildings. The ECBC applies to both new construction as well as large-scale commercial building retrofits in which the final air-conditioned space of the building is greater than 1,000 m^2.

ECBC code provisions apply to: Building Envelope (walls, roofs, windows, day lighting and skylights); Heating, Ventilation & Air Conditioning (HVAC); Lighting (Indoor and Outdoor); Service Water Heating and Pumping (Solar Water Heating); and Electrical Systems (motors, transformers, power factor, monitoring).

There are clear estimates that ECBC-compliant buildings can use 20-35 per cent less energy than a conventional building in India. According to BEE, the average national benchmark for commercial buildings in India has been above 180 kWh/m^2/year. The ECBC complaint buildings could help to achieve the benchmark of 110 kWh/m^2/ year, thus saving energy in building operations. ECBC is still recognized as optional for buildings. The state of Tamil Nadu has made ECBC mandatory for all commercial buildings with support from private sector in implementing energy efficient technologies, and necessary amendments have been made in the municipal building byelaws.

TAMIL NADU SHOWS THE WAY FOR ECBC IMPLEMENTATION

Moving a step further, the Government of Tamil Nadu has announced budgetary allocation in 2012-13 to implement ECBC in commercial buildings and certain categories of major building complexes having connection load of 100kW or more. The implementation of the ECBC can therefore promote sustainable development by reducing energy use, cutting costs, improving services, and reducing environmental impacts—bringing down the growing energy demand in States/cities. The professional community is actively engaged in supporting the Tamil Nadu State Government Energy Department to help implement ECBC as per local climatic conditions of the state. To demonstrate the concept of "Energy Efficient Building", the government has announced that the new Collectorate complex at Cuddalore, Tiruppur and Thanjavur would be designed as model "Energy Efficient Buildings". Tamil Nadu Government has already issued Government Order on establishment of Technical and Empowers Committee for implementation of Energy

Conservation Building Code in Tamil Nadu.

OPTIONS FOR ECBC COMPLIANCE

Building components and systems have two alternative options to comply with ECBC code requirements. First is "Prescriptive method" and second is "Whole Building Performance method". Both approaches guide the building owners and designers to implement energy efficiency in buildings. In the first approach, a building has to meet or exceed the specific levels (meeting minimum values, and other energy-related design features) intended for individual elements of the building systems. Under the prescriptive standards approach, the builder has the option of "trade-offs" for envelope features, which allow for lower thermal efficiency in one of the envelope element for better efficiency with another envelope element, to achieve the overall efficiency required by the code.

CONCLUSIONS

In whole building performance method, designers have to perform computer modeling of whole building to demonstrate that the building will use less energy than a standard design for the same type of building in the same climate zone. In either of the methods, the prescriptive or performance methods, the building must first meet mandatory measures as well.

ECBC intends to improve the energy performance of buildings by energy management and implement with best available technologies in the market. Also, most Green Buildings norms in India have formally complied with ECBC and have followed building form and functionality, thereby achieving considerable energy saving. Bureau of Energy Efficiency and state governments are discussing the institutional and administrative setup required at state and municipal level for enforcing of ECBC.

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HUDCO Best Practice Award to Improve the Living Environment 2014-15
List of Award Winning Organisations

S. No.	Category	Name of the Best Practice	Award Winning Organisations
1	Urban Governance	Implementation of GIS based Property Tax Reform in ULB's of Madhya Pradesh.	Urban Development & Environment Department, Govt of Madhya Pradesh
2	Housing, Urban Poverty & Infrastructure	Services for Urban Poor	ISHWAR SANKALPA, Kolkata, West Bengal
3	Urban Transport	Ahmedabad Bus Rapid Transit System – "JANMARG" and Sitilink – Surat Bus Rapid Transit System	Ahmedabad Janmarg Limited jointly with Surat Municipal Corporation, Gujarat
4	Environmental Management, Energy Conservation and Green Building	Rain Water Harvesting	Municipal Council, Maharajpur, Madhya Pradesh
5	Sanitation	SabarShouchagar – Transformation to an Open Defecation Free District	Nadia District Administration, West Bengal
6	Sanitation	Solid Waste Management	Nagar Nigam Haldwani, Nainital, Uttarakhand
7	Sanitation	Low Cost Sanitation Solutions	Shelter Associates, Pune jointly with Pune Municipal Corporation, Maharashtra
8	Urban Design and Regional Planning, Inner City Revitalization and Conservation	Inner City Revitalisation and Conservation	Municipal Corporation of Chennai, Tamil Nadu
9	Disaster Preparedness, Mitigation and Rehabilitation	Early Warning System	Meteorological Centre, Dehradun, Uttarakhand

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Sabar Shouchagar

An Inspiring District Level Model for Eliminating Open Defecation in India

P. B. SALIM
S. N. DAVE

"Sabar Shouchagar", is an excellent example of accountable governance with coming together of duty bearers and rights holders to collaborate and demonstrate actions leading to improving the quality of life and making the environment livable for future generations through promotion of new social norms towards eliminating open defecation.

KEYWORDS

Open Defecation, Sabar Shouchagar, Nadia, CLTS Model

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Photo credit- author, unless specified.

"Sabar Shouchagar", meaning "toilets for all", is a thought that was later actualized by the district leadership. This initiative aims at overcoming challenges such as correct situation analysis, information management, participatory planning to enable implementing a convergent social engineering program for providing access to toilets for all families in the district, within the given financial, technical and human resource constraints of a low priority development programme in India. The experience of one and a half years of implementation indicates that by involving and motivating key stakeholders, using innovative communication approaches for mass mobilization of communities, making them aware of the health hazards of open defecation; developing systems for improving service delivery of sanitary toilets, triggering the collective behavior change for stopping open defecation; have transformed the environment in the district. It has become possible to achieve an Open Defecation Free district in record time.

CONTEXT AND BACKGROUND

Wide spread open defecation in rural India is a unique human development emergency. India shares the largest proportion of open defecation; (60 per cent) which is nearly six hundred million people out of 1.20 billion people defecating in open globally (JMP-2014). Recognizing the urgency, Government of India has recently revamped the national sanitation programme guidelines for sanitation and hygiene promotion i.e. Swachh Bharat Mission (Gramin) with a mission to eliminate open defecation nationally.

The District Administration in Nadia took an early note (even before the launch of Swacch Bharath Mission) of the poor sanitation and hygiene situation in Nadia district. Priority was given to the issue in a mission mode, as over 30 per cent population in the district defecate in the open.

It was noted that in adjoining country, Bangladesh (with a similar socio-cultural situation), the open defecation levels have reduced to 3 per cent (JMP, 2014). The issue was raised in public forums with elected peoples representatives and stakeholders to trigger consciousness for action to change the situation. The district leadership took a collective decision on 2nd October 2013 and launched an innovative "Sabar Shouchagar" (Toilet for all) movement (Ref. Fig 1). The concept had the branding that includes product, positioning and promotion,all the 3 'Ps' for a business model with another 'P' as 'passion' worked very well and made sanitation and hygiene promotion every person's business and not just a government programme in Nadia.

Fig 1: The launch of "Sabar Shouchagar" movement and Public Pledge for ODF on 2nd October, 2013.

TIME LINE

In March 2013, the district administration of Nadia started a re-verification of the baseline survey data conducted under NBA, to identify those households and individuals practicing open defecation. Through the process, 3,26,000 rural households and 14,300 urban households were identified as without access to toilets and thus practicing open defecation, out of a total of 1.04 million households (This corresponded to around 1.8 million individuals out of a total of 5.2 million population).

For the "Sabar Shouchagar" movement, the low cost (Rs 10,000) double leach pit honey comb toilet model was adopted, for which the labour component was sourced through Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) fund; material component from NBA fund and the entire human resource (training, skill development, setting up of rural sanitary marts etc.) were sourced from National Rural Livelihood Mission (NRLM) resources. The Information, Education and Communication (IEC) and contingency fund available at the district level of all other major schemes including Indira Awas Yojna (IAY), Border Area Development Program (BADP), Multi-sectoral Development Program (MsDP), National Highways etc. were used for the massive mobilization campaign.

Thus, in just one and a half years' time, the district made remarkable

Fig 2: Glimpses of the longest human chain against open defecation (122.3 km) in Nadia on 21st February 2015.

Fig 3: Faith based organisations influencing and encouraging collective behaviour change

progress by accelerating the pace of service delivery and covered over 97 per cent families and it further aimed to ensure 100 per centcoverage by March 2015. A positive and enabling environment has encouraged and motivated the stakeholders for effective service delivery and people at large have become aware and started realizing that a new social norm towards stopping open defecation is doable and has to be ensured. The organized network of women Self Help Groups (SHGs) and school children played a major role in generating awareness and demand and supply response is coordinated by Non-Government Organizations (NGOs) and Panchayat Raj Institutions, (PRIs - the local self-government) (Ref. Fig 2&3).The transformation and turnaround in behavior change among people is the most important outcome of the innovative communication strategy coupled with close and effective monitoring of the programme which has enabled optimum resource mobilization for accomplishing the mission successfully.

"Sabar Shouchagar" is an excellent example of accountable governance with coming together of duty bearers and rights holders, to collaborate and demonstrate actions leading to improving the quality of life and making the environment liveable for future generation through promotion of new social norms of eliminating open defecation.

Now, while accomplishing a record number of toilet's constructed (over three hundred thousand toilets within a period of one and a half year), the district administration in Nadia is at the cusp of realising the pledge and achieving the vision and mission,within the stipulated period of March, 2015 (Ref. Fig 4).

MODIFIED CLTS MODEL

During the implementation of "Sabar Shouchagar" movement, a classic CSCSS (Community and

Fig 4: A chart showing progress during NBA period (2009-13) and Sabar Shouchagar period (2013-2015)

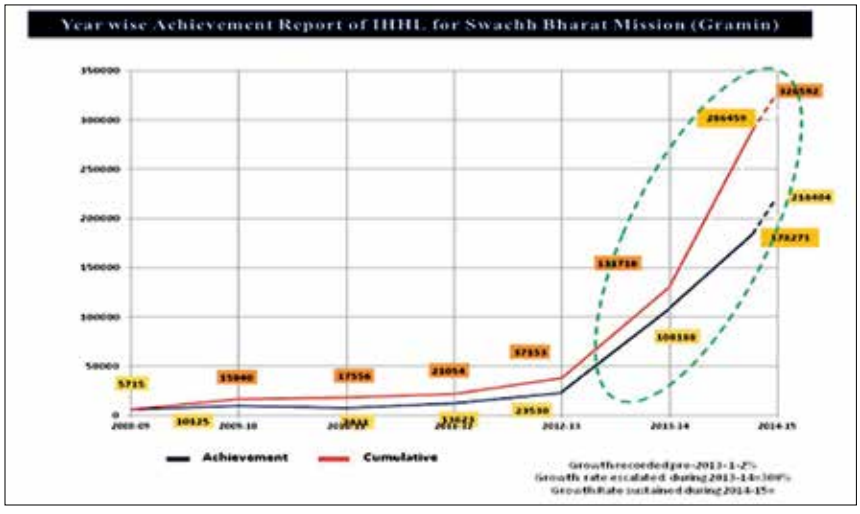

Fig 5: Women SHGs – Managing Rural Sanitary Marts for toilet construction

Stakeholders Co-led Sanitation) model has evolved that enables accelerated service delivery, on demand, to achieve saturation in rural district settings of India. In a way "Sabar Shouchagar" movement has all the major components of the Community-Led Total Sanitation (CLTS) model like community awareness; triggering to start; walk of shame to instill the need; community and stakeholder led; sourcing of materials through rural mart; imposition of social sanction on violators; enforcement through paranajardari committee; board of pride in every village etc.

In addition, the movement was guided and supplemented by a committed administration which helped in accelerating the pace of the movement manifold.

STRATEGIES

Nadia district conceptualized and developed its strategy and action plan using the 'Theory of Change' framework that includes; start big; government should lead; be flexible; use external support when needed; create demand; strengthen supply chain; and make enabling environment which are detailed below:

1. Situation analysis using primary and secondary information;
2. Strategy formulation through stakeholder consultations;
3. Innovative behavior & change in communication campaign for community mobilization;
4. Involvement of women Self Help Groups for demand and supply management (Ref fig 5&7);
5. Involvement of children as change agents (Ref fig 6);
6. Effective convergence of programmes for improved coordination and resource mobilization;
7. Capacity building of key stakeholders, front line workers and masons;
8. Partnerships with faith based organizations, corporate organizations and civil society organizations; and
9. Use of technology for programme monitoring.

Fig 6: Massive participation of School children - as catalysts

Fig 7: Women as the real change agents of the movement

Fig 8: Proud women with enhanced dignity and safety after possession of home toilets

RESULTS

The "Sabar Shouchagar" programme implementation has become people's movement, led by community and supplemented by the administration. The summary of results after 15 months of implementation is as under:

- Over 3,06,000 families not having


Fig 9: The ODF declaration and celebration : ODF enforcement through Para Najardari Committees

toilets have access to sanitary toilets (Ref fig 8);

- All families (5.20 million population) reached through innovative IEC with key programme messages that improved awareness on toilet usage;
- Increased and accelerated sanitation coverage from 60 per cent to 97 per cent;
- Increased use of toilets from 50 per cent to 95 per cent;
- Significant reduction in open defecation (29 per cent) (UNICEF study report); and
- All schools have Water, Sanitation and Hygiene (WASH) facilities.

OPEN DEFECATION FREE (ODF) DECLARATION AND ENFORCEMENT

Culmination of the movement involves scrutiny and validation of the field level activities leading to certification and ODF declaration. A bottom–up system of ODF declaration was followed,wherein the 'catchment areas' under Angan Wadi Centres (AWCs) independently verify every household/individual and on satisfaction, declare the 'catchment' as ODF with celebration. This process was followed by verification and declaration at Gram Panchayat (GP)/ Municipality level(Ref fig 9).

Community members are forming hamlet/ community level vigil/ enforcement teams called 'Para Najardari committees' at every hamlet area (paras) to keep watch on the enforcement of ODF and to take care of defaulters, if any. Social sanction and social pressure are strong deterrents for probabale defaulters. Satisfactory enforcement will be celebrated by erecting 'Board of Pride' at village level.

CONCLUSIONS

The Nadia "Sabar Shouchagar" model is an evidence based model which ensures access to toilets, behavioral change and sustainability. A UNICEF supported study has acknowledged and appreciated the Nadia model as an emerging and inspiring model that has demonstrated accelerated sanitation service delivery for saturation of villages with sanitation, mobilizing communities and effectively communicating the need for collective behavior change in a record time. The "Sabar Shouchagar" Movement' has been shortlisted for the prestigious United Nations Public Services Award. Learnings from the model have inspired stakeholders within and outside the state. The Nadia model has demonstrated successful approaches and strategies to address the major development challenge i.e. eliminating open defecation and has the potential for replication inside and outside the state of West Bengal.

RECOGNITION

1. HUDCO Award for Best Practices, 2014-15.
2. Shortlisted for UN Public Services Award
3. Lough borough University, United Kingdom has selected the project as "An Inspiring District Level Model for eliminating open defecation in India".

Gurgaon
Almost the Millennium City

MANSI SAHU

SARFARAZ MOMIN

MAHESH WAGHDHARE

SHRADDHA MARATHE

RAHUL DALAL

The city of Gurgaon needs to urgently recognize that quality of life is a key competitive asset which is now becoming a new paradigm for effective urban economic development and invest in plans that are no longer just static blueprints, as in the previous decades but dynamic, so that multiple parties can collaborate to use them and make decisions over them.

KEYWORDS

Gurgaon, Millennium City, Studio POD,

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In the past 2 years, StudioPOD has been working collaboratively with different clients to create visions, design manuals, research documents and master plans for existing and new development in India and around the world. Cities are the real beacon of hope for urban India on many accounts, fuelled by young ambitions and nurtured with determination to excel. We need cities like Gurgaon to flourish and inspire hope in millions of young dreamers, looking to fulfil their dreams in changing the economic landscape of India. Citing the case of Gurgaon, this article highlights a few possible short-term and long-term strategies that could potentially alleviate stress on existing cities and facilitate building newer smart cities in India.

INTRODUCTION

Indian cities matter today – they are home to an estimated 340 million people or 30 per cent of India's population. Cities will be even more important by 2030 when more than 40 per cent of people will likely be living in them.[1] This shift has happened historically with every major industrialized country in the world, however India's urbanization will be on a scale that is unprecedented. It will offer undoubted economic benefits but it also raises the question: Is India ready to deal with the realities of its urban future?(Refer Figure 1)

To house the rapidly urbanizing population, eleven new cities of the size of New Delhi will have to be built over the next two decades.[2] This task seems rather daunting as

Diagram 1: Infographics of current trends of Indian Cities

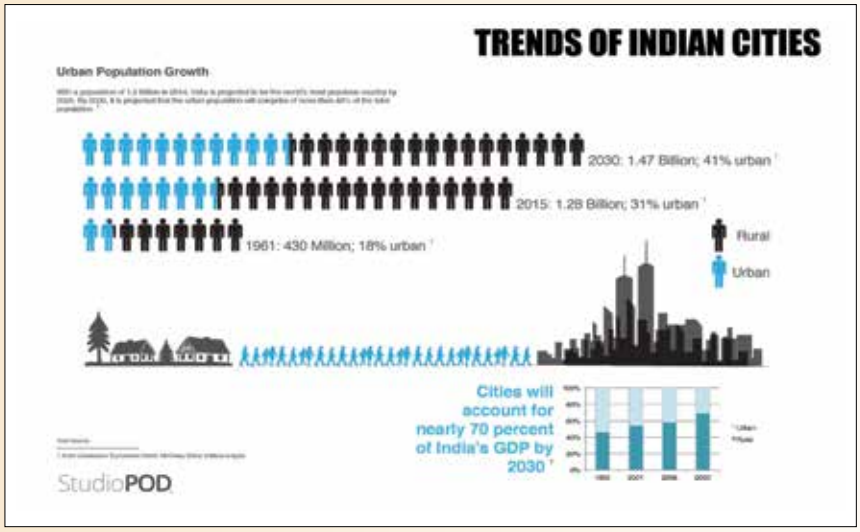
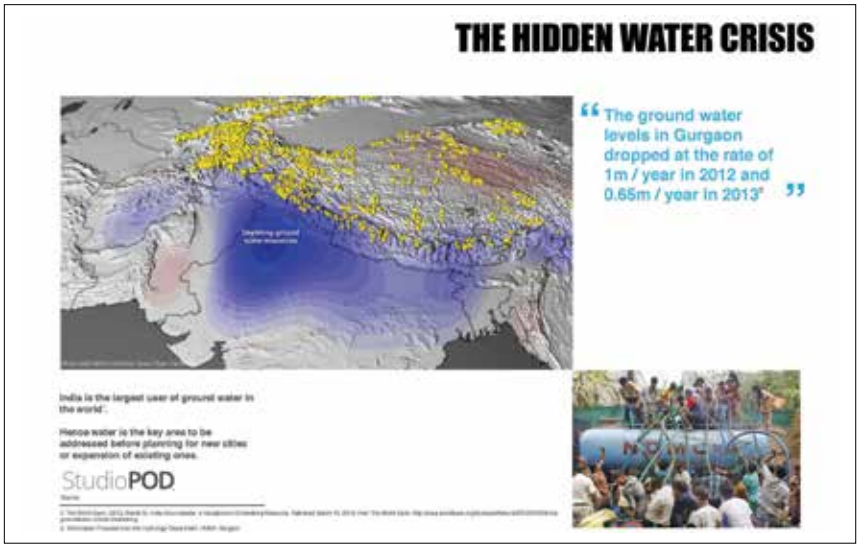
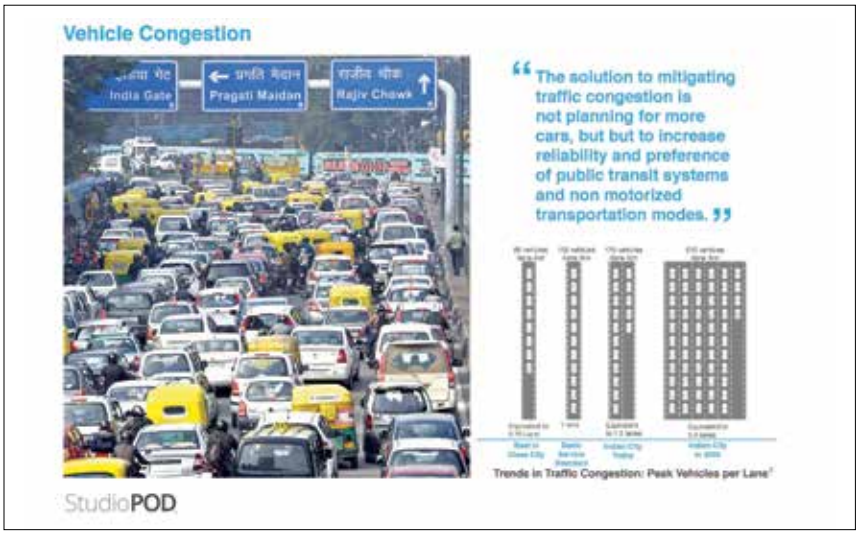


Diagram 2: Photo from NASA, Showing the depleting groundwater resources



our cities haven't really managed to cope with rapid growth well in the past and continue to struggle. The infrastructure is tattered and access to basic services in urban areas continues to be poor. The increasing gap between basic facilities offered to residents versus an expanding urban population, and rising income levels are already challenging India's aspiration for a cohesive and sustainable growth model. It is in this context that planning newer cities along with upgrading existing ones shall become imperative to positively maintain India's growth story. With 100 smart cities planned in the near future, this article shall highlight a few possible short-term and long-term strategies that could potentially alleviate stress on existing cities and facilitate building newer smart cities in India.

Diagram 3: Existing Vehicle Congestion of Indian cities.



THE CITY OF GURGAON

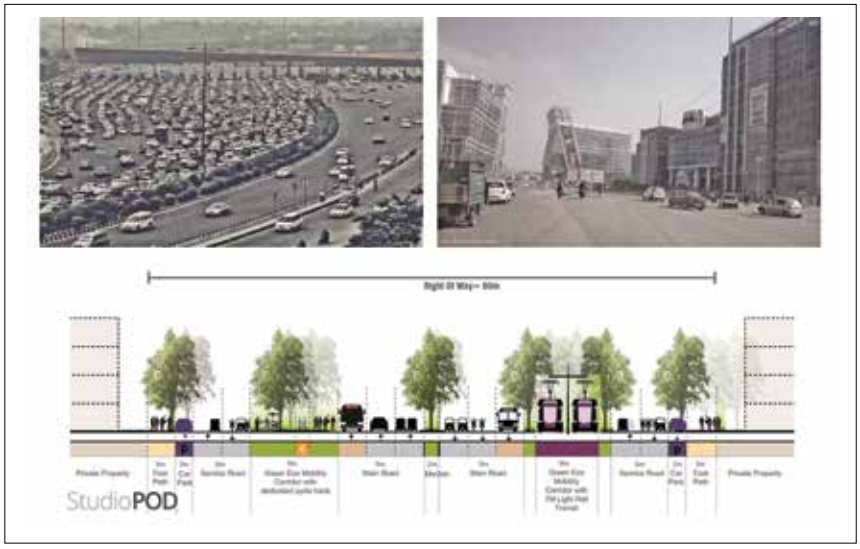
The city of Gurgaon is a case under consideration that has managed to grow rapidly in recent times. Today, it is the third wealthiest city by per-capita income and the city has witnessed a massive population growth from 900,000 in 2001 to more than 1.5 million in a short period of time [3]. Such phenomenal growth rate has overwhelmed city planning in Gurgaon even with availability of funds. The transportation system, urban infrastructure and overall quality of life have been below par when compared to other Indian cities while social inequity continues to rise.

This article showcases a few of Studio POD's research, learning and strategies outlining actions that the city of Gurgaon can start putting in place that could leverage the potential economic benefits that urbanization can confer while improving the quality of life for its residents.

At a national scale, Gurgaon's role was always to be an important node between Delhi - Jaipur corridor which functions as an Industrial and service based growth centre. Today, it is one of the hubs for the IT and outsourcing boom that drove India's economic growth from the 1990s, giving it the name "Millennium City".

However, this "wealthy" city today,

Diagram 3: Redesigning existing right of way in Gurgaon: A 60m road that currently only designed for vehicles have the possibilities to become an equal street for multiple modes of transportation.



reflects how city planning can fail its citizens. The city of Gurgaon experiences crippling power and water shortages (Refer Figure 2); its crater-ridden excessively wide roads are unsafe for pedestrians and open sewage drains are polluting the ecology of the place. The city's façade might be glamorous with glass towers and expensive malls, but the underlying truth is that Gurgaon faces challenges of social inequity, unsafe environments, non-existent public realm and a very low index of liveability for its residents.

Diagram 4: Map of Gurgaon showing the planned open spaces as per GMUC and a comparison to Manhattan's central park.

The city of Gurgaon needs to urgently recognize that quality of life is a key competitive asset which is now becoming a new paradigm for effective urban economic development and invest in plans that are no longer just static blueprints, as in the previous decades but dynamic, so that multiple parties can collaborate to use them and make decisions over them. The city is home to one of the most progressive, well-educated and upwardly mobile population that has propelled the success of its economy and also a ground for rapidly increasing slums. Hence, if Gurgaon wants to be a global centre and a great city it must adopt people centric planning practices that are socially, environmentally and economically inclusive.

ACTIONS NEEDED FOR GURGAON TO BECOME SMART MILLENNIUM CITY

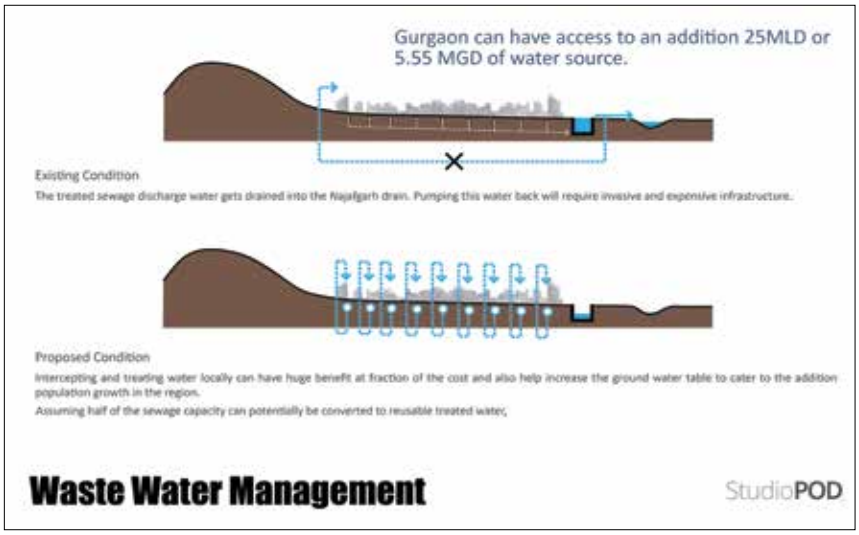
We would like to illustrate some urgent actions that need to be taken by Gurgaon today, with respect to planning, to become a smart city for India.

Action 1: Envisioning a new Public Realm

If you are in Gurgaon, you are probably always travelling in a car or a two-wheeler. This is what the city demands. Late arrival of public transit systems is the major reason for high dependencies on private vehicles. Every day, Gurgaon faces multiple traffic jams in spite of having rights of way that range from sixty to hundred meters.

Our primary action for better

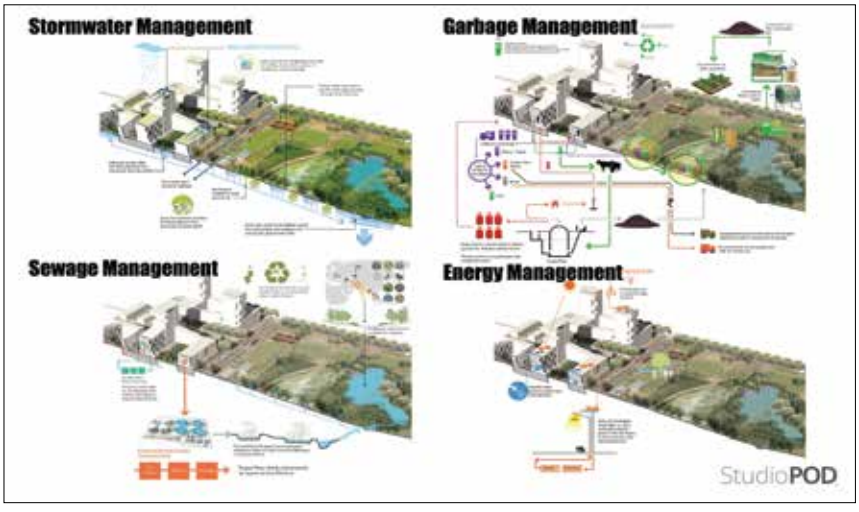
Diagram 5: Diagram showing the proposed waste water management for Gurgaon.



connectivity is emphasized on pedestrian comfort by providing multiple invitations to the citizens of Gurgaon to take part in the city. This means re-envisioning the right of way to be more flexible and lend it to different kinds of uses. Exploring the possibility of streets surrounded by nature along multi-functional footpaths that turn into markets; where buildings would open seamlessly into wide footpaths; and where healthy human interaction and maintaining human comfort would be integral to all aspects of design and planning (refer Figure 3).

Studio POD's research shows that approximately 80 per cent of Gurgaon is more than a twenty minute walk from the existing and proposed metro stations; however due to the lack of last mile connectivity users are forced to use private vehicles to access their different destinations within Gurgaon. To maximize public transport and metro patronage, actions to create a human friendly scale of the right-of-way is required. It is also important to create a street design manual which functions as comprehensive resource for street design standards, guidelines, and policies while recognizing the human dimension of transit planning.

Diagram 6: Different sustainable infrastructure systems that can be implemented to create a synergy between private developed spaces and adjacent open spaces.

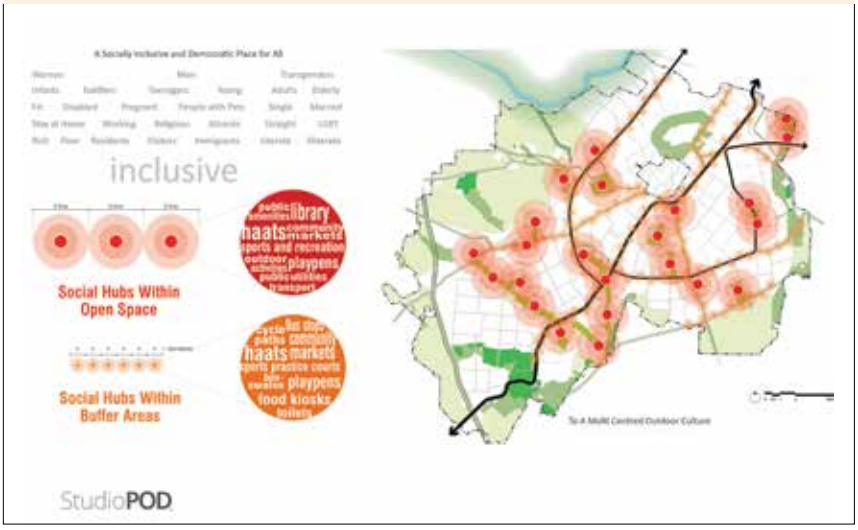


Action 2: Gurgaon's Green Secret

Today, living, working or visiting Gurgaon, means working in air-conditioned offices, living in gated communities and expensive recreation in malls, bars, house parties or golf clubs for sports etc. Research shows that Gurgaon offers little access to culture, nature and safe street life. The development is largely speculative and the majority of people working in Gurgaon prefer to live in New Delhi. If you are a resident, then there is a high possibility that the quality of life of your family is directly proportional to the investment/ rent you pay to be a part of one of the exclusive gated communities that promise access to private recreational and social amenities.

However, the city of Gurgaon has an unprecedented opportunity that can transform the city's liveability index. As per the Gurgaon-Manesar Urban Complex (GMUC) Master Plan for 2030, approximately 3,737 acres of land has been earmarked

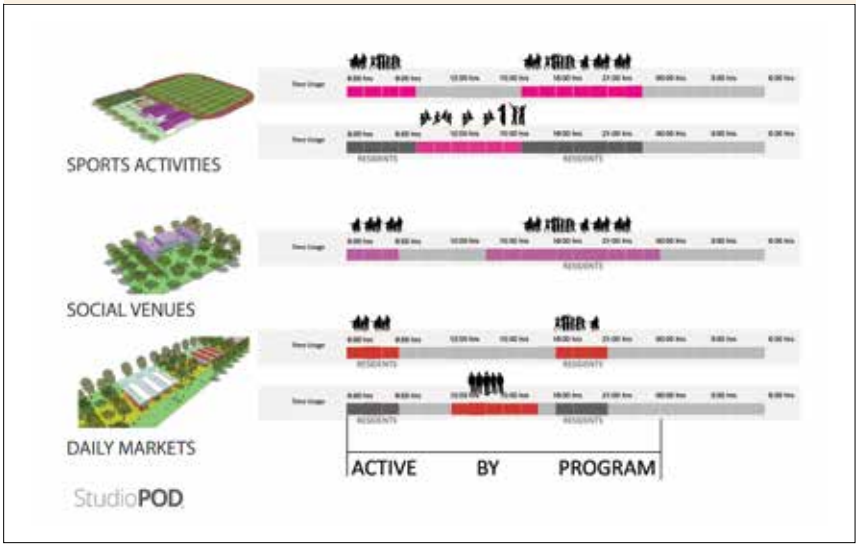
Diagram 7: Plan of Gurgaon with distributed social hubs along the designated open spaces to trigger vibrant neighbourhoods.



as open spaces. An additional thirty metre buffer along the main arterial could potentially add 2,800 acres of park space to the master plan. As compared to the Central Park in New York City, the open spaces in Gurgaon will be 7.82 times bigger, if planned and created responsibly (refer Figure 4).

Gurgaon has a potential to boost itself to become one of the greenest and most sustainable urban areas in the NCR. An opportunity to use sustainable landscape spaces, to add a fresh dimension to its image, and to create world-class sports activities that are accessible and open to everyone. It has the potential

Diagram 8: Activity timings of different programs and a demonstration on how their synergy can promote active spaces.



to trigger development along its neighbouring villages and farms by creating platforms for local markets. It is important to have a strategy document for the development of the open spaces of Gurgaon, designed to upgrade the living standards, while promoting inclusive communities of its citizens.

Action 3: Sustainable Utilities and Support Infrastructure

It is important for the infrastructure in the cities to work effectively. New cities are quickly abandoning the age old centralized models of infrastructure planning and are moving towards more decentralized systems that prove to be more sustainable and ecologically friendly. Basic amenities such as continuous electricity, solid waste disposal, water supply and effective public transport are critical for the success of any city's economy. To compensate for the lack of these basic amenities, Gurgaon's companies, malls and real estate developers operate massive diesel generators, and source water from bore wells that are depleting the groundwater table at the rate of 0.65 meters per year [4]. Gurgaon represents a patchwork of private islands rather than an interconnected city, however with some planning and political interventions; it is possible to use these private islands to the advantage of the city.

Adopting a decentralized localized system to manage utilities such as garbage, sewage and wastewater rather than depending on a large supply and treatment centres, may be the solution to Gurgaon's utility management problems. Creation

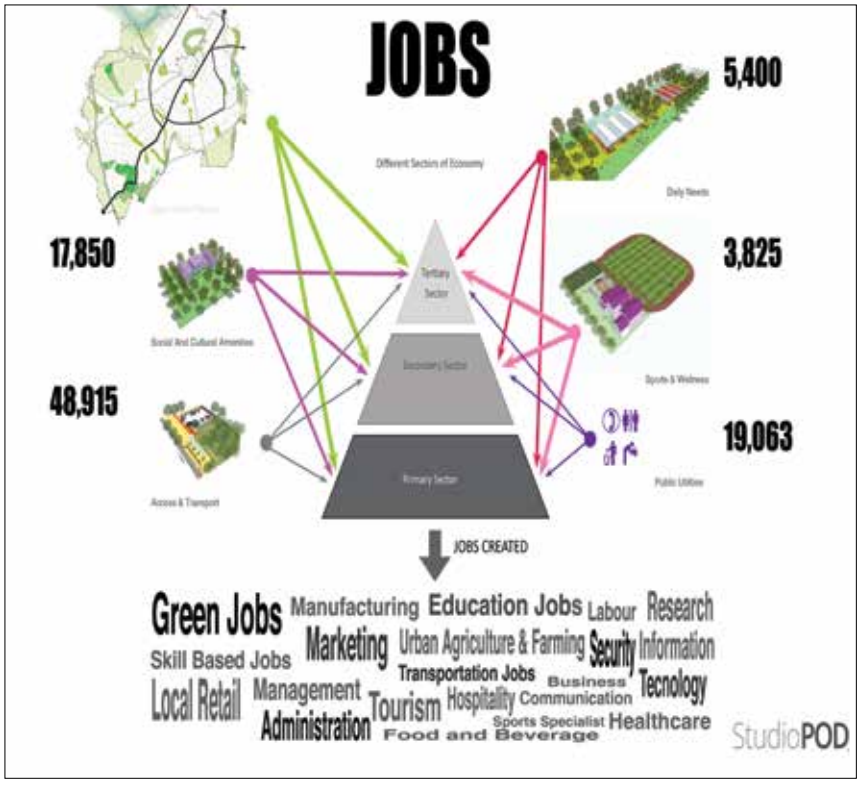
of smaller collection and treatment centres will reduce the need for bigger treatment plants and also generate local advantages. The treated wastewater discharge will be of better quality and can be reused locally for irrigation and flushing, while the excess water can be used to recharge the underground aquifers, curbing the depletion of the groundwater table. This will also promote the concept of sustainable and responsible neighborhoods setting an example for all future smart cities of India (refer Figures 5 & 6).

Action 4: Develop Equally

Gurgaon today is a space where one can experience several private luxury cocoons that flourish behind high compound walls of private complexes and as soon as you exit them you will probably enter a village or a slum that lacks even basic infrastructure. The spaces lack neighbourhood interactions and inclusive planning. World Bank research suggests that it is 3 to 9 times more costly to upgrade an existing slum, than to plan a neighbourhood correctly.

Open and public spaces can become destinations that cater to the social and cultural needs of all in the city. Identifying the requirement and providing them in a decentralized manner shall promote easy access to these amenities for greater number of people. When open space are not just landscaped but also programmed with spaces that cater to daily needs, sports, child care, local retail, food and beverages etc., they will play a vital role in the social community life in Gurgaon.

Diagram 9: An investigation of New job possibilities due to investments in Open Space Program.



These spaces will cohesively act as a shared resource where experiences and value will be created for all its citizens, contributing as a 'self-organising public service'. (Refer Figure 7)

The synergies between different programs will offer many benefits like:

- A vibrant street culture.
- Therapeutic benefits of being outdoors in natural surroundings. Enhance cultural and ethnic diversity on streets.
- Encourage social interaction and provide opportunities for children and young people to meet play or simply 'hang out'.
- The open spaces shall provide venues for people of all age groups to engage in sports and fitness.
- These social hubs shall promote creativity in everyday life with greater exposure to public art, performances, music and literature. It shall provide facilities enhancing health, fitness and liveability of the surrounding communities.
- Instigate a sense of ownership and responsibility towards common public spaces. An active neighbourhood and safe outdoors.
- Locating social facilities at regular intervals will not only ensure vibrancy but also provide

safety and security with minimal supervision.

- Promote affordable living conditions in neighbourhoods.

The synergy between the typologies will benefit and help to create local attachments and identity for the open space of Gurgaon. However, the success of the open space planning is not solely dependent on a good master plan. It is also crucial to understand how well the people adopt, use, and manage these spaces. It is imperative to have developers, schools, villagers, residents, and users of the area around the open space to become its stakeholders and to share the responsibility for its maintenance.

The synergy of various typologies will result in a 24 hour active and safe area as each typology varies according to the time of day and day of the week, and is affected by what is on offer in a particular place at a particular time. Retailing and commercial leisure activities dominate town centres and through public space can act as a 'social glue'. (Refer Figure 8)

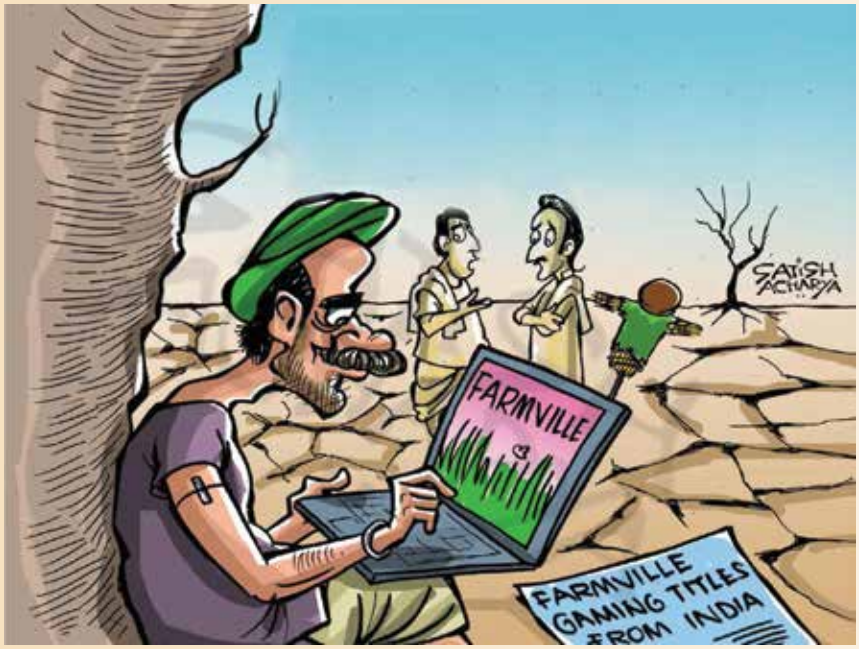
Investing strategically in public spaces will not only create better neighbourhoods but also promote new local economies and jobs that will emerge from these investments. (Refer Figure 9)

WAY FORWARD

In the past 2 years, Studio POD has been working collaboratively with different clients to create visions, design manuals, research documents and master plans for existing and new development in India. We have emphasized that cities like Gurgaon are the real beacon of hope for urban India on many counts. It is a city that was built grounds-up at a rapid pace, fuelled by young ambitions and nurtured with determination to excel. We need cities like Gurgaon to flourish and inspire hope in millions of young dreamers, looking to fulfill their dreams in changing economic landscape of India. What if Gurgaon can also become a torchbearer for cutting edge urban planning and design? What if the city of Gurgaon allows people to develop equally by prioritizing equitable mobility, and quality of life for its inhabitants through people centric development approach?

Creating high quality public spaces, connected with an effective public transit network, which is then supplemented with smart infrastructure, shall ensure ecological, social and economic sustainability. We believe the dream of a truly 'Millennium City' is a real possibility. The immediate catalytic actions that Gurgaon needs to take today are comparable opportunities available in all cities of India. The Gurgaon development model can be used as a blueprint for developing people centric design ideas in order to transform the tier two and tier three cities of India into the smart cities of tomorrow.

Illustration Credit: Satish Acharya



'Smart City' Must be about People First

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[4] (Information Procured from the Hydrology Department N.D.)

A Smarter Gurgaon

Must Learn from Dharavi

ANKITA CHACHRA

Dharavi redefines the basic principles of governance and planning. It is in essence a truly user generated city built by consistent efforts of its 700,000 residents living in its 80 distinct Nagars (neighborhoods). It has developed and crowd-sourced its own improvements through generations of residents upgrading their shelters and businesses according to their evolving needs and means. It is strong community spirit and social capital that holds together Dharavi and many other informal settlements in India.

KEYWORDS

Gurgaon, Dharavi, User Generated Cities, SOCC Model.

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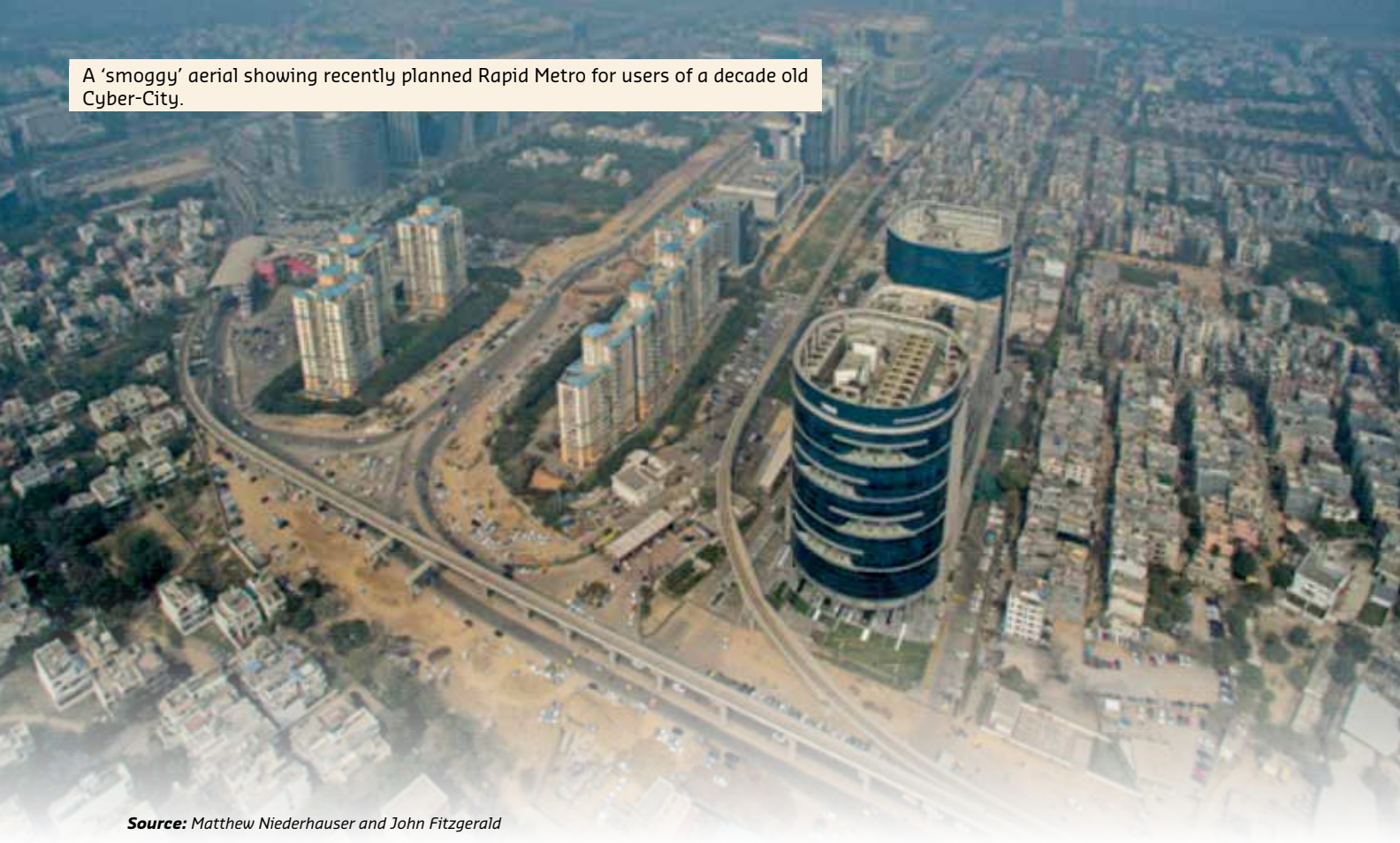
At present, the city of Gurgaon consists of privately owned islands of development, segregated gated enclaves, disconnected technology-savvy office complexes and loosely tied public infrastructure. The trigger for the proliferation of gated developments and private islands was the Haryana Development and Regulation of Urban Areas Act, 1975. It allowed private investors to purchase agricultural land, apply for a change in land use regulations, and develop huge land parcels for very high profits, without any strategic master plan, or any requirements from the developer to help build civic infrastructure. With an eager interest and emphasis on building new smart cities in India, it is critical that we discuss Gurgaon's model of planning, as it is becoming a strong precedent for Indian cities being developed in the 21st Century.*

INTRODUCTION

It is estimated that India needs an equivalent of 500 new cities of approximately 500,000 people each in the next two decades[1] to meet the projected demands of rapid urbanization. The program of 100 smart cities proposed by Prime Minister Shri Narendra Modi in 2014 is promising in this regard; the lack of strong infrastructure and basic amenities in the present day cities raises a series of questions and doubts for the preparedness for this ambitious goal. Since Prime Minister Modi announced his plans for building 100 Smart Cities across India, there has also been much debate about how to make our cities smarter. It should be noted at the very outset of this debate, that cities couldn't just become smart by applying some information technology systems. The smartness lies in planning ahead and for all users. Cities must be smart from the point of view of land-use, mobility, sustainability, social equity, participatory planning and safe public environments for all city dwellers. On all these counts, Gurgaon, the large new sister city of Delhi is not a smart city. It is made up of privately owned islands of development, segregated gated enclaves, disconnected technology-savvy office complexes loosely tied public infrastructure. Instead of providing opportunities for people to enjoy public spaces and utilize streets for activities other than transporting vehicles, Gurgaon has rendered itself as unfriendly and dangerous city for people not inside their homes or cars. So what are the steps towards making Gurgaon a smarter city?

Indian political, governance and planning systems as structured today are not adequate to deal with the extent and pace of urbanization both in existing and new cities, smart or not. The solution to deal with urban growth lies in user generated cities. This solution focuses on empowering and leveraging the citizens to become active partners and work towards improving



A 'smoggy' aerial showing recently planned Rapid Metro for users of a decade old Cyber-City.

Source: *Matthew Niederhauser and John Fitzgerald*

their own environments through participatory planning. Ironically, it is the crowded, underserved, but vibrant parts of the city, wrongfully named as 'slums', which provides us with the hope and directions for the user-generated development. Energizing the top-down as well as bottom-up systems is the best bet in India towards building functional, accessible and truly smart cities for all in the foreseeable future.

USER-GENERATED CITIES

User generated cities are the past, present and the future of building functional and accessible cities. User generated cities are user-friendly cities. The term "user generated" is self-explanatory and implies that the decision makers, stakeholders and investors are the users themselves. One great example of user-generated city is Dharavi in Mumbai. Erroneously called a slum, it is in fact a community of craftsmen and craftswomen working towards creating opportunities through active decision-making. Dharavi, that got more than its fair share of fame through various documentaries, movies and articles, redefines the basic principles of governance and planning. It is in essence a truly user-generated city built by consistent efforts of its 700,000 residents living in its 80 distinct Nagars (neighborhoods). It has developed and crowd-sourced its own improvements through generations of residents upgrading their shelters and businesses according to their evolving needs and means. It is a strong community spirit and social capital that holds together Dharavi and many other informal settlements in India. This self-empowerment has arisen out of need and understanding that they are responsible for their own environment, as help from the government has been minimal. With the help of some architects and planners serving as volunteer facilitators, Dharavi has further strengthened its underlying dynamic and complex inter-dependence between users and their environment. URBZ, a not for profit organization launched dharavi.org in 2008 and has been able to facilitate work such as household water surveys and other self-upgrading programs in Dharavi since then. With the pressing need to cope with rapid urbanization, the example of Dharavi as a user generated city of over half a million people is equally relevant for middle class and wealthy

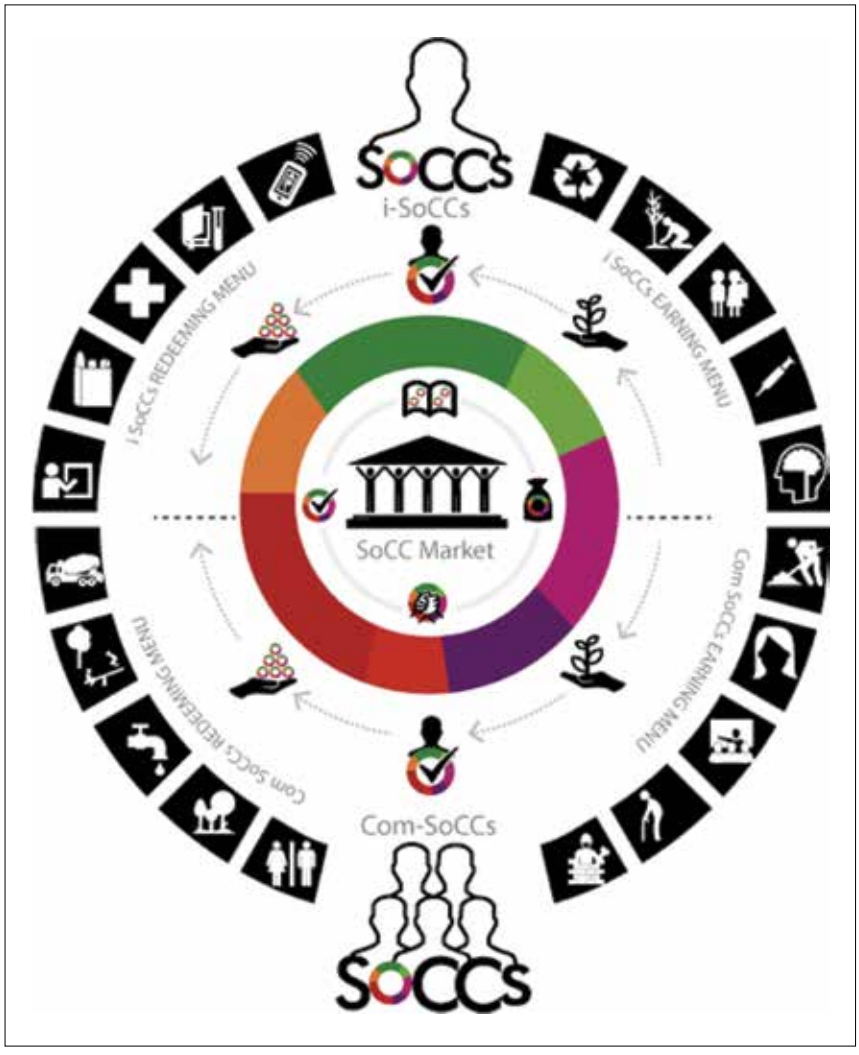
communities. Dharavi proves that residents can work together to improve and maintain their own neighborhoods, while working alongside the government to get larger infrastructure and amenities, which cannot be provided by the communities themselves.

CAN THE MODEL FROM THE INFORMAL DEVELOPMENT OF DHARAVI BE USEFUL FOR THE UPSCALE OF NEW "FORMAL" DEVELOPMENT IN GURGAON?

Gurgaon has faced backlash from most planning experts, to the extent that some even believe that the fast-paced development model of Gurgaon is nothing short of a disaster. There are good reasons for this outrage, but all hope may not be lost if this so called 'Millennium City' can learn from the self-empowering model of Dharavi on how to improve and facilitate change. The trigger for the proliferation of gated developments and private islands in Gurgaon was the Haryana Development and Regulation of Urban Areas Act, 1975. It allowed private investors to purchase agricultural land, apply for a change in land use regulations, and develop huge land parcels for very high profits, without any strategic master plan, or any requirements from the developer to help build civic infrastructure[2].

While private developers are responsible for their parcels, Haryana Urban Development Authority (HUDA) and Municipal Corporation (set up in 2011) are expected to manage their delineated zones. This multiplicity of ownership occurred before any holistic plan for Gurgaon was developed and seems hard to unravel now. This has caused lack of accountability among the various owners, making the development model in Gurgaon comparable to unorganized informal settlements like Dharavi. However, unlike Dharavi, Gurgaon lacks any sense of place and community for user-generated development, is much larger in scale, and has much more at stake, financially. The inadequate water, electricity and waste management systems, dysfunctional public transit and unkempt roads have created a feeling of frustration amongst the residents of Gurgaon, who have paid large sums of money to purchase or rent their properties. The 'Millennium city', that claims to be a future economic hub has failed its users due to a lack of holistic and progressive

Diagram explaining SoCC Menus.



Source: *Asia Initiatives*

planning. The poor quality of basic infrastructure is now encouraging residents to take matters in their own hands, empower themselves to improve their surroundings, and become smarter, just like Dharavi.

One of the promising user generated platforms that has emerged in Gurgaon is – Iamgurgaon (I am Gurgaon). It is an initiative which aims to create awareness, encourage and empower the residents and other stakeholders to improve the living conditions in the city. It brings together varied interest groups including the administration, corporate organizations, schools, Residents Welfare Associations, NGOs and developers in a collaborative partnership. Their most noteworthy achievement so far has been the maintenance and upkeep of Aravali Biodiversity Park in conjunction with the Municipal Corporation of Gurgaon. I am gurgaon has organized plantation drives, nature walks, clean-up drives as well as cultural events at this park. Their other upcoming and ongoing initiatives include a drive to plant 1 million trees, launching of a Gurgaon water campaign, up-gradation of the existing rainwater nallahs across Gurgaon, cleaning up of villages, improving sanitation, and launching a school initiative that teaches kids to become more aware about their environment and take positive steps to improve and preserve it[3].

Another user generated organization that is working in Gurgaon is DLF City Residents Welfare Association. Although only partially effective with a typical mid-high income bias towards gated communities, their agenda includes liaising with DLF, collaborating with, and supporting NGO's, facilitating and partially funding upgradation of internal infrastructure such as parks, signage, and water harvesting recharge pits[4].

While still small, these efforts give us a glimpse of the potential of crowd sourcing and user initiatives in the context of making cities smart, especially where planning and governance still fail to provide basic amenities. The urban chaos of recent rapid developments has led to a scenario where users will need to help improve their own cities collectively with help of facilitators. This does not absolve government bodies of their duties, but it does develop civic bodies that can demand accountability from the government, and partner with government agencies to accomplish common goals. It is also important to understand that empowerment and encouragement of a community to build itself is only one side of the coin. The other face of this coin, quite undeveloped at present in most urban contexts, is the incentive that encourages every user/volunteer to provide his/her services to the community.

SOCIAL CAPITAL CREDITS (SOCC) MODEL

Asia Initiatives, a not-for-profit organization, has developed a model of a community currency for social good, which can incentivize and encourage users to serve their community. Social Capital Credits (SoCCs) is a digital currency earned by people for undertaking projects that are good for their communities. The digital SoCC market can provide digital wallets to members in a community to keep track of their SoCCs earned, and menus of what they can be spend on. Such systems have recently been set up for pilot projects in India, Costa Rica, Ghana and Kenya geared towards nurturing communities and developing local leadership. For example, members of the SoCC community in Kotputli, Rajasthan are trading the public good they do for skill-building classes that enable them to get jobs. SoCC Managers work with communities to develop SoCC earning and SoCC spending menus. In communities where governments are unable to provide basic services, SoCCs can be earned for waste management, micro infrastructure building, paving or maintaining streets, improving neighborhood safety etc. Earned SoCCs can then be redeemed for products and services such as telephone talk time, skill building courses, home improvements, healthcare, school scholarship etc. SoCCs is particularly relevant for unemployed youth and senior citizens who have much to contribute but are hampered if money is the only medium of exchange. Just as carbon credits encourage and reward environmental responsibility using market mechanisms, SoCCs encourage social responsibility using market mechanisms and help price community values into the economy at a premium to values of consumerism. The build-out of the SoCC market will enable trades to be conducted via text messages on ordinary mobile phones, just like MPesa, the revolutionary system in Kenya that is bringing micro banking within reach of any one with a mobile phone.

The SoCC model developed for

poor communities, by Prof. Geeta Mehta of Columbia University, can also empower middle and high income people in Gurgaon, to come together as a community to enhance their own life style. Residents can earn SoCCs for caring for the public areas within and outside their communities, for organizing car-pools for daily travel, for helping aged people or children, creating public art, for running yoga classes or childcare centers, and creating cultural events. SoCCs thus earned can be redeemed for participating in activities that enhance people's health, environment and community life. Corporate sponsors can also be invited to provide services in return for SoCCs as part of their corporate social responsibility.

WAY FORWARD

The new upcoming cities as well as the old established ones have a great deal to learn from the user initiatives in the smart slums of India. Once you add the Social Capital Credits to the equation serving as incentives to users, investors and stakeholders, the result can be 'User-Generated Cities' where the quality of life is enhanced for and by the people. It is time to improve our cities through user-generation, and perhaps Gurgaon can take the lead in becoming a truly smart and sustainable city.

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General Guidelines for Submission of Articles

1. The paper should be created using a word-processing program (such as Microsoft Word) and should be between 3,000 and 5,000 words in length. The file may be in .docx or .doc format.
2. The paper is typewritten, double-spaced, and formatted to print on 8.5" x 11" (or A4) size paper. It is written in the third person in a clear style, free of jargon.
3. The first page of the article includes the following:
   i. the paper's title and
   ii. an approximately 200-word abstract that emphasizes the paper's contribution to the field and its practical architectural/ planning social/ economic implications.
   iii. the name(s), position(s), professional or academic affiliation(s), and email address(es) of the author(s), as well as the full postal address of the corresponding author;
4. The body of the paper should include the following:
   i. an introduction to the subject,
   ii. background information,
   iii. discussion of procedure,
   iv. results,
   v. conclusions,
   vi. implications for practice and advancement of research,
   vii. references,
   viii. acknowledgments (optional; if funding for the research was received from non-personal sources, the sources must be identified in this section), and
   ix. an autobiographical sketch.
5. Please ensure that:
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      a. Large enough to be readable when reduced to fit the journal page size (approximately 5.25" x 8.25").
      b. A brief caption is provided for each figure/ picture/ graph.
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6. If your paper is accepted for publication, you will be provided with information on where to send the hard copies of any figures if required.
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Improved Public Transport for a Resilient City

The Japanese Experience

DR. PAWAN KUMAR

There is an efficient public transport network within the metropolitan areas as well as between the cities of Japan. The public transport system is characterized by superior services, punctuality, neatness & cleanness, good behavior of drivers/ staff personnel, driving discipline, respect for pedestrians, strict adherence to traffic rules & regulations, etc. The expeditiousness and punctuality secured through improved performance of rolling stock, proprietization of tracks, traffic signal pre-emption, fare collection system, etc. are well appreciated.

KEYWORDS

Public Transport, Japan Resilient City, Japan

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Improved public transport is an approach to revitalize an existing transport system by retrofitting various measures which may be comparatively economical, socially acceptable and adaptable of new updated technology. Any change puts pressure on infrastructure, governance and commuters. The resilient city needs to develop and retrofit various measures for enabling flow of people, goods, services and information to maintain efficient mobility in the city. In this context, the Japanese experience to adopt various measures for improved public transport is more relevant and scientific. It is important to identify priority areas and accordingly, strategies need to be formulated. The promotion of the next-generation low carbon transport is a bold step in this direction.

Environmental sustainability and safety / security are two important pre-requisites to brand the public transport. Therefore, vehicle technology and safe infrastructure are necessary to maintain the image of public transport, avoiding property and human loss. Such transport measures help to develop technical and functional capacities to maintain the form, function and future of the city, as a resilient city.

INTRODUCTION

A city needs free flow of people, goods and information at affordable cost for each and every resident across the geographical area, particularly within the municipal limit. It requires hardware and software infrastructure for physical movement as well as digital infrastructure for information and communication. In due course of time, functions of a city need modifications in existing plan making process and practices. Further, improvement in existing utility & services and transport networks, creation of new infrastructure, modification in urban planning and design in the context of environmentally sustainable transport, reduction in carbon footprint, climate change mitigation, re-cyclic society, inclusive development, smart city concept, etc. provide enhanced know-how to maintain the city economically, socially, environmentally and culturally viable. In this context, a city is resilient in nature if it has the ability to cope with changes in urban sector precisely in governance, economy & transport, environment & climate change, etc. to retain its basic fabric and functions.

A resilient city is a sustainable city and hence its growth and development should support transit development. Contrarily, a modern and updated transport to meet the changing travel demand is the need of the society. Therefore, integrated multi modal and improved public transport is prioritized to brand as the preferred, convenient, comfortable and reliable mode of transport. Improved public transport is also one of the attributes which makes a city more resilient by changing car oriented development to transit oriented development by adopting densification of corridors, permissible mixed land-use, multi

modal transport hubs, real estate development within influence zones, etc. Such an approach not only enhances the quality of life but also reduces dependency on automobile, thus achieving savings in environment and resources.

IMPROVED PUBLIC TRANSPORT

Transport is a state subject but central policy is necessary as several acts and rules, which have important implications in dealing with urban transport, are administered by the Central Government. There is always a need to have a policy at state level as well as city level to monitor and develop transport infrastructure. Now-a-days, transport is an interconnected and inter-sectoral issue and hence improvement in public transport requires advanced support and commitment from all stakeholders.

Public transport engages with other sectors to deliver integrated and inclusive development. A comprehensive and integrated approach includes a planned shift from personalized vehicles to improved and expanded public transport systems, better provision for pedestrians, bicyclists and other environmental friendly transport, traffic restraint and traffic management, land use planning and development in order to reduce the length of the journey and un-necessary car use whenever possible (Hine , 2000). An integrated and improved public transport includes:

- Modal Integration: It is an integration of different modes of transport so that each mode can contribute its full potential and commuters can move easily, comfortably and seamlessly.
- Integration with Local Environment: The availability of improved transport supports better journey environment and provides various modal choices to the commuters as per their priority of time, affordability, comfort etc. The improved public transport protects the environment and reduces Co_2 emissions.
- Integration with Land use: Such integration supports more sustainable travel choices and reduces the need to travel.
- Integration with Sectoral Policies: Improved public transport is essential for trips related to work, health, education, recreation, social etc. Therefore, safe mobility of children, ladies, senior citizens, patients, etc. in journey chain needs integration of various sectoral policies. Further, policy related to housing, real estate development, property development, re-development and densification, etc. needs to be integrated with urban transport. It helps to make a fair and inclusive society.

Improving public transport through innovation and integration in the transport systems is as good as formulation of correct policy. Now-a-days, the development by innovations in infrastructure, vehicles and service operation are stimulated by commercial values rather than social objectives. Therefore, social objectives and inclusive society may be considered as integral components of public transport system. Better transit quality, affordable fares, extra charges for car use, high parking charges, etc. are some of the tools for improving performance of a transport system. The integrated transport strategy has been promoted as a more realistic and effective approach for solving

Table 1: Various types of Integration and their Characteristics

S.N.	Integration	Characteristics
i.	Network Integration	• Integration of bus network with MRT & BRT to reduce wasteful duplication of services. • Enhance to meet commuters' needs.
ii.	Fare Integration	• Integrated ticketing system to allow passengers to travel on MRT, BRT, buses and other modes of transport seamlessly.
iii.	Information Integration	• Traveler Information Services (TIS) to provide complete real time information on public transport system at MRT stations, major bus stops, interchange nodes, etc.
iv.	Physical Integration	• Provision of transfer facilities such as covered link ways, overhead bridges, under passes, bus shelters, auto stands, etc. • Connectivity of spaces at various levels through lifts, ramps, escalators, moving walkways, etc.
v.	Financial Integration	• Sharing of budget allocation. • Cost sharing among various agencies.
vi.	Institutional Integration	• Integration among different agencies, operators, etc. • One Controlling Authority above all.

Figure 1: Subway Platform in Japan

Figure 2: Improved Subway Platform by using Platform Screen /Platform Edge Door

transport problems than individual measures. The private sector may be more capable of innovation than the concerned transport authorities, but it is less likely to be willing to innovate in ways which are not compatible with its commercial objectives (May and Tight, 2006). Table 1 describes various types of integration and their characteristics at various levels for improved services.

The information regarding parking facilities near interchange stations, unified tickets, coordinated time tables and public awareness play an important role in achieving an improved public transport system.

JAPANESE EXPERIENCE

Japan has a developed system of rail, road, air and waterways. There is an efficient public transport network within the metropolitan areas as well as between the cities. Public transport system is characterized by superior services, punctuality, neatness & cleanliness, good behavior of drivers/staff personnel, driving discipline, respect for pedestrians, strict adherence to traffic rules & regulations, etc. The expeditiousness and punctuality secured through improved performance of rolling stock, proprietization of tracks, traffic signal pre-emption, fare collection system, etc. are well appreciated.

The Tokyo subway, as a part of rapid transit of Japan, is one of the busiest subways in the world. It connects major city centers and metro trains are severely crowded during peak hours. During the morning peak hour, platform attendants known as 'Oshiya', are deputed to help the passengers to get into cars so that the doors can close. On some Tokyo Metro lines, the first or last car of a train is reserved for women during peak hours. Further, platform screen door/platform edge door is installed on some metro lines as shown in Figures 1 and 2.

Table 2 describes some of the important measures undertaken for improved public transport in Japan.

DISCUSSION AND CONCLUDING REMARKS

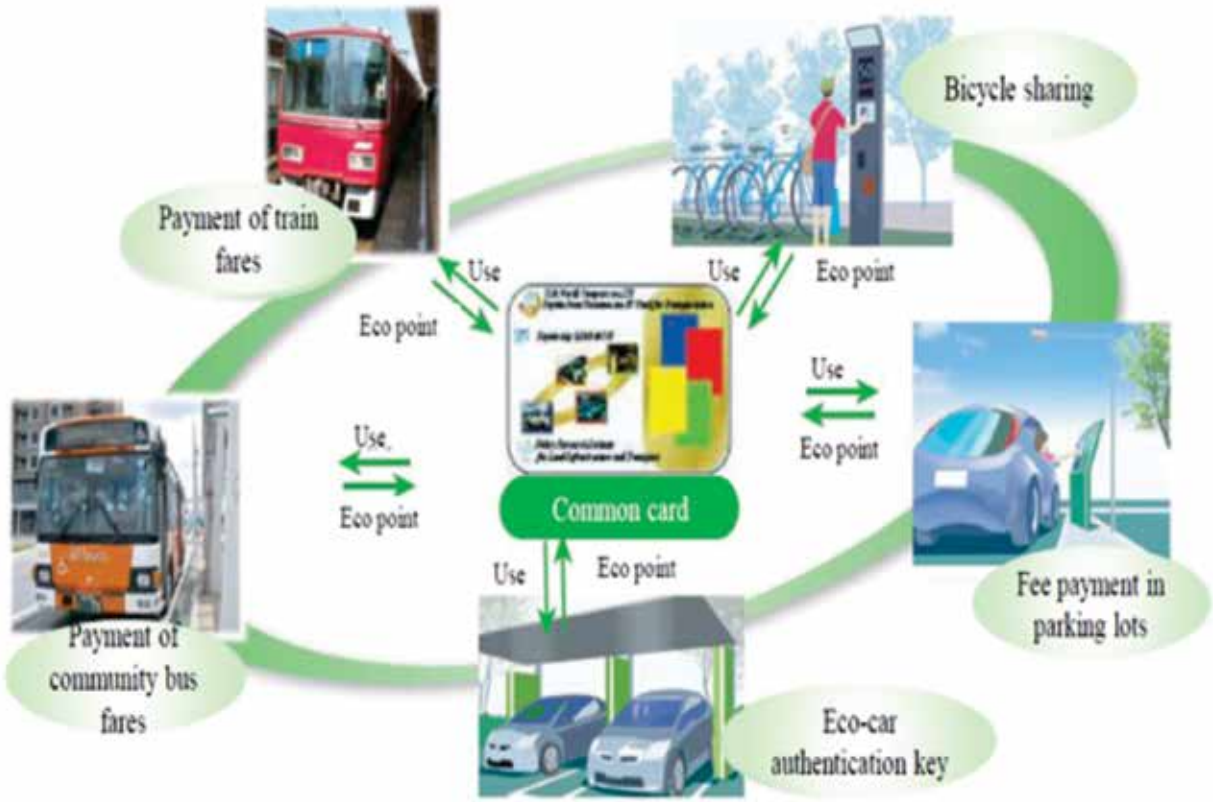
i. Cities are always dynamic, complex in nature and continue to grow. Any change due to adaptation of existing and usage of new transport system puts pressure on infrastructure, governance and commuters. The resilient city needs to develop and retrofit the various measures for enabling flow of people, goods, services and information to maintain efficient mobility in the city. Since all major cities are part of the region,impacts of such measures are therefore wide and tremendous. In this context, Japanese experience to adopt various measures for improved public transport is more relevant and scientific. It is important to identify priority areas and accordingly formulate strategies to address them. If improvement of public transport is on high priority then strategy for reduction in pollution, road accidents, fuel consumption, carbon footprint, etc. may be prepared which may further define the image of the city as healthy and safe.

ii. An improved public transport system must ensure that there is no inconvenience to the

Table 2 Important measures undertaken for improved public transport in Japan.

S. N.	Priority Areas	Priority Strategy	Measures Taken
i.	Facilitation of Movement	Improvement of convenience of public transport	• Operation of eco-friendly vehicles such as fuel cell buses. • Installation of the public transportation priority system (PTPS) • Promotion of community development with emphasis on railway stations by increasing rail speed and linking bus terminals with railway stations. • Use of Common IC Card for all transport services. (Figure 3)

Figure 3: Mutual Usage of IC- Cards in major Transport Services



Source: *Toyota Municipal Government, Transportation Policy Division*

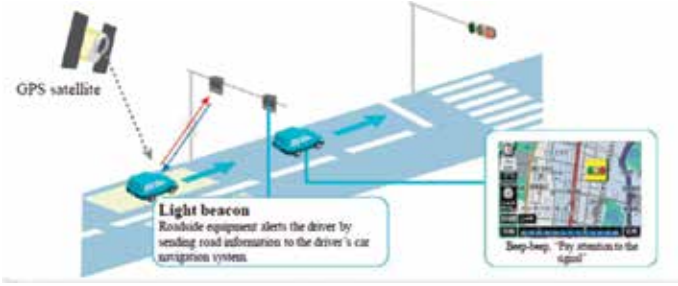
ii.	Environment Protection and Enhancement	Next-generation low-carbon transport system (Figure 4)	• Development of zero-emission / fuel-efficient automobiles. • Promotion of Electric Vehicles (EVs) and Plug-in-hybrid vehicles (PHVs). • Promotion of Fuel Cell Vehicles /Fuel Cell buses. • Encourage the use of Ha:mo Ride and Ha:mo Navi in Japan. Ha:mo Ride is Toyota's car sharing program that uses compact electric vehicles and the Ha:mo Navi program provides route guidance using both public transport systems and available cars from Ha:mo Ride.

Figure 4 : Low Carbon Transport System

Source: *Toyota Municipal Government, Transportation Policy Division*

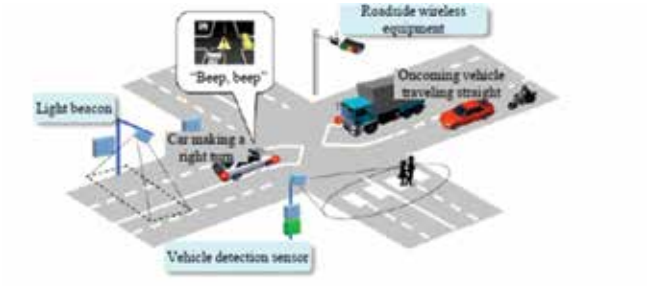
iii.	Safety and Security	Reduction of traffic accidents	• Infrastructure collaboration-type advanced highway safety system (Figure 5) • Accident prevention through the active use of advanced automobile technology and ITS. • Use of Right-turn collision prevention supporting system • Use of Pedestrian crossing oversight prevention support system (Figure 6)

Figure 5 : Advanced Highway Safety System



Source: *Toyota Municipal Government, Transportation Policy Division*

Figure 6 : Pedestrian Crossing Oversight Prevention Support System



Source: *Toyota Municipal Government, Transportation Policy Division*

iv.	Revitalization of Public Transport System	Preparation and promotion of a public transport plan for making city center attractive.	• Promotion of appropriate transport system for making city center more attractive. • Use ITS to reconstruct attractive city center for safe, secure, and comfortable movement of both vehicular and pedestrian.

commuters in the journey chain from origin to destination through multiple interchange points. A seamless journey is convenient and comfortable and hence always desirable. Therefore, smart card for all modes and transport services is required. Japan uses ten IC cards i.e. Suica, Pasmo, Icoca, Pitaba, Toica, Manaca, Kitaca, Sugoca, Nimoca and Hayakaken to travel on almost all trains, subways and buses in most of the Japan's cities. These cards are used to pay fares on public transport, vending machines, shops, restaurants, etc.

iii. To enhance the convenience of public transport, Japan has introduced eco-friendly vehicles using fuel cell technology and public transportation priority system. Convenience is also enhanced by smooth and uninterrupted flow of passengers from bus terminals to railway stations/metro stations. Therefore, the development of land uses between such terminals and stations should be regulated to ensure efficient mobility.

iv. Public transport should always be environmentally sustainable and should continuously aim to reduce emissions at source. The promotion of next-generation low carbon transport is inevitable in metropolitan cities. The affordability of such vehicles is possible in big cities. Moreover, the initiatives for development of zero emission vehicles, hybrid buses, electric vehicles, fuel cell buses, etc. needs support from the government for research and manufacturing.

v. Safety and security are two important dimensions of improved public transport system. Public transport is generally branded as safe and secure transport worldwide. Therefore, advanced automobile technology and various applications of ITS should be endorsed, to ensure reduction in accidents. The retrofitting of collision prevention supporting system with infrastructure and vehicle development is boon to avoid damage of infrastructure and loss of human life. The installation of a simple alarm and panic button in buses draws the attention of onlookers from the surrounding areas. Similarly, advanced communication systems between driver and control room hold good for making MRTS more secure and safe.

vi. In Japan, the aging population is increasing and hence there is need to provide better public transport to bring more people and activities at city centre. Contrarily, city centers are overcrowded in the Indian cities. It requires a need based planning of public transport to connect between residential areas and Central Business Districts (CBDs). Further, environmentally sustainable transport such as e-rickshaws, battery operated vehicles, solar powered cycle rickshaw, bicycle, etc. need to be operated within CBD areas.

Improved public transport is an approach to revitalize the existing transport system by retrofitting various measures which may be comparatively economical, socially acceptable and adaptable to new updated technology. It requires usage of various applications of intelligent transport system in planning and design of infrastructure, operation, monitoring etc. Environmental sustainability and safety / security are two important pre-requisites to brand the public transport. Therefore, vehicle technology and safe infrastructure are necessary to maintain the image of public transport and avoid property and human loss. Such transport measures help to develop technical and functional capacities to maintain the form, function and future of the city as a resilient city.

ACKNOWLEDGEMENT

The author acknowledges technical support provided by Mr. Takai Katsuaki (Japan International Cooperation Centre), Ms Tange Yoko [Training Co-ordinator & Registered Interpreter, Japan International Cooperation Agency (JICA)], Ms Sainto Mihoko (Program Officer, Training Program Division of JICA Chubu Centre, Nagoya, Japan) and Mr. Akira Nakane (Officer, Urban Development Division, Toyota City, Japan).

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Traditional Placemaking & Identity in Cities through Community Calibrated Charettes

Case of Mumbai Mills Revitalization

DEEPENDRA PRASHAD

It is important that planning must allow people to not just "Act", but to "React" & to "Interact". Recent tools which the government and public institutions have woken up to for engaging the community include "Public Private Partnerships", "Private investment", "Community planning workshops", "Bhagidari" etc. But in reality, in this whole business of involving the community, can we agree with its perceived benefits wholeheartedly... Do all voices count? Whether community discussions build on or confuse ideas? Does a mix of agendas produce worthwhile action strategies?

KEYWORDS

Community, Mumbai Mills, Charette, INTBAU

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"Community Planning" has been put forward as a valuable method for creating urban solutions closer to the community's need and interests. But many methods being tried out under its umbrella fall short of the desired results, as they might not be targeting the desired vision in a comprehensive manner. The Community Calibrated Charette, has emerged as a "tool"-de-force, with the ability to create overlapping / common goals for the stakeholders, with a clear physical dimension of the outcomes. Therefore, it could be termed as an outcome based planning, where physical design specialists like architects, are not necessarily designing themselves, but are facilitating the design outcome through the charette workshop method. This paper looks at the urban planning suggestions put forward by the INTBAU-India planned 4-day charette, on the usage and reutilization of the Mumbai mill lands and buildings. This method relies on quick site and data analysis and emphasizing on the realistic physical dimensions through the pen-on paper medium. Acting closer to people's needs, the process helps prevent centralized generalization, and holds vast potential in imparting local flavor and identity to urban regeneration efforts. INTBAU and other organizations would now be utilizing this in many other upcoming initiatives in India and are working towards a wider governmental acceptance of this methodology.

INTRODUCTION

Community based planning as a bottom-up tool has been often touted as a solution to all planning evils. It also supposedly prevents creation of unrealizable visions of conventional master plans. Historically, urban planning and design as a field has included all of the following approaches;

- ***Conventional Master planning:*** Uses statistics, figures, land use maps etc. Problems include unclear ownership, financial constraints, non-outcome based.
- ***Strategic planning:*** A series of small interlinked plans.
- ***Action Planning:*** Activist approach to important local issues bringing local stakeholders together. Uses the technique of a "community planning workshop" to thrash out action strategies.

It is important that planning must allow people to not just "Act", but to "React" & to "Interact". Recent tools which the government and public institutions have woken up to for engaging the community include "Public Private Partnerships", "Private investment", "Community planning workshops", "Bhagidari" etc. These vary in terms of their methodology for identifying stakeholders and the output expected of them. On evaluating them, we see that a multiplicity of voices often lead to loss of focus. On the other hand too much centralization might lead to an ineffective consultation.

But in reality, in this whole business of involving the community, can we agree with its perceived benefits wholeheartedly... Do all voices count?

Whether community discussions build on or confuse ideas? Does a mix of agendas produce worthwhile action strategies? Does community planning help retain local flavour, identity, ownership in urban renewal & place making?

It is in this context that a tool, namely the – "Community Calibrated Charette" or simply "Charette" has been tried. This tool invites the stakeholders in a proposed development to collaborate in producing a strategic plan, through a workshop which can last up to a week. This intensive process offers valuable advantages wherein new opportunities and position overlaps, emerge among participants who might otherwise have problems in working with each other.

The Community Calibrated Charette method has been tried for the first time in India at the "Mumbai Mill-land's Revitalization Workshop" held in March'2005, which brought together INTBAU, INTACH, Government of Maharashtra, Girangoan (Mill) worker's associations, The Pheonix Trust, UK, Voluntary organizations, Schools of Planning and Architectural professionals from across the country etc. Being the historic industrial core of Mumbai, these derelict mill lands and their buildings represent a vast potential for decongesting the city and developing public infrastructure and green spaces, so sorely missed, in a city sea-bound on both sides. Many mills are heritage buildings worth preserving and form important chronological and physical/social landmarks in Mumbai's development. This paper provides a summation of the steps and benefits of this process in terms if its ability to generate a more realistic and outcome based community involvement.

THE MUMBAI MILL LAND'S BACKGROUND

Mumbai is the financial capital of India, contributing to almost half the revenue collected by the Indian government. The city has grown from a group of seven islands in the Arabian Sea to a city of immense proportions. Today it is India's commercial and industrial capital and is expected to become the world's most populous urban agglomeration by 2015. It is a heavily congested and populated metropolis, with some of the world's most expensive

Picture 1: Location of Mumbai Mill Lands

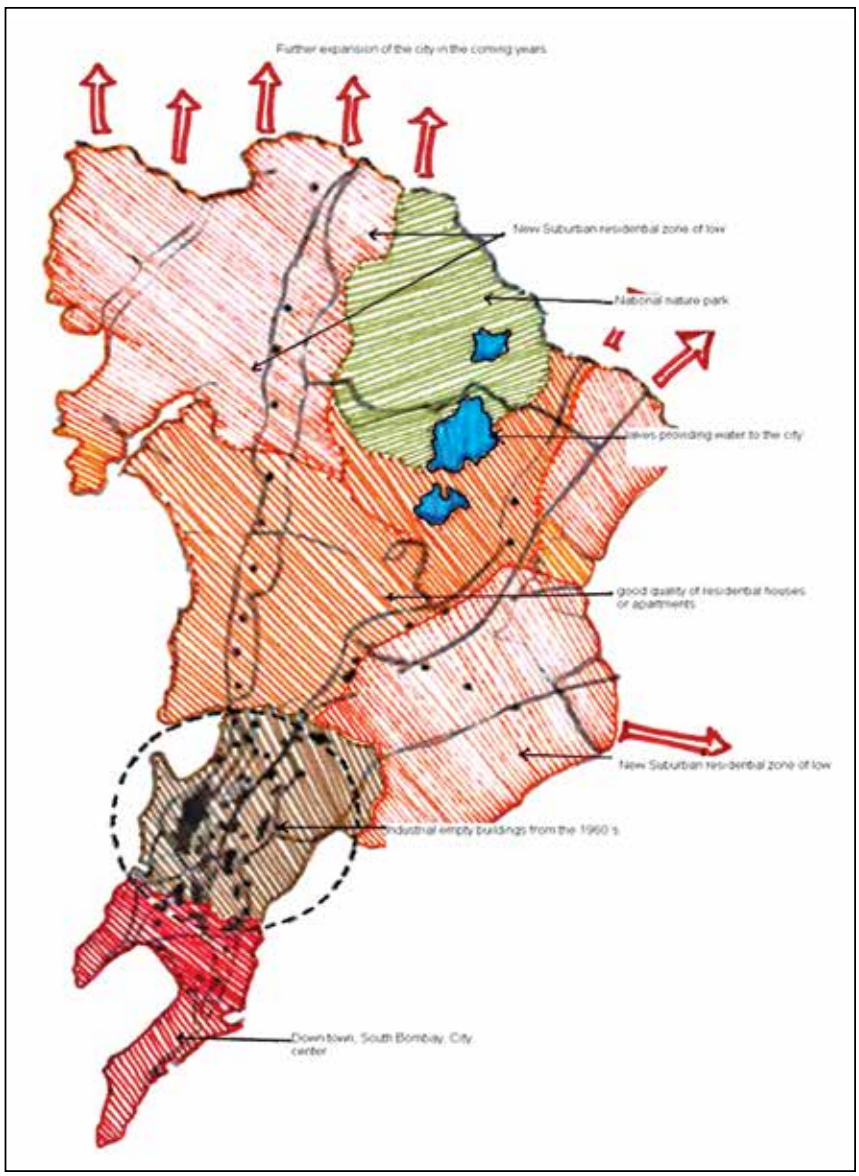


Figure 2: Spread of Mills Lands in Mumbai around Lower Parel

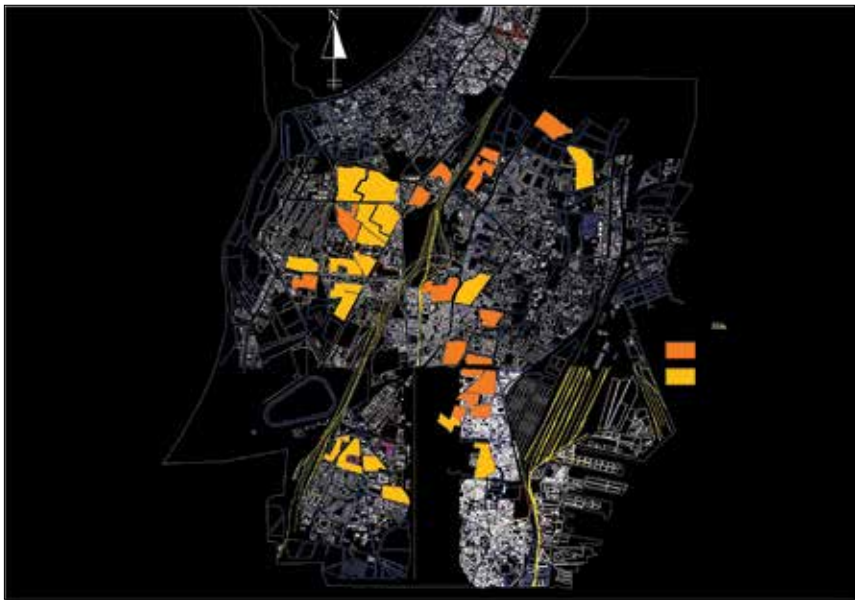
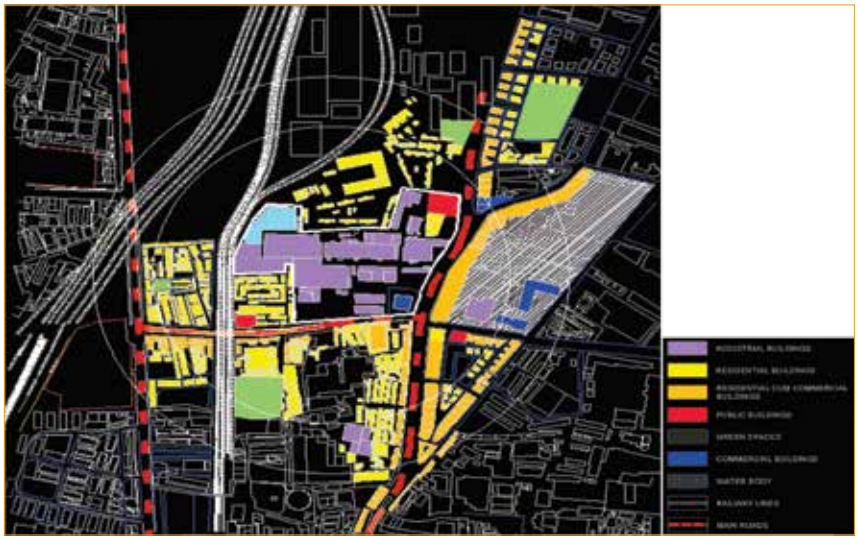


Figure 3: The Mill Lands and the Surrounding Urban Form

Figure 4: Existing infrastructure and land uses around India United Mills No. 1



real estate. The city of Mumbai is under high stress due to population expansion. Approximately five thousand people arrive each day, in search of new jobs or a new way of life. As a result of this influx of people, a great deal of unplanned expansion has occurred, making precious land unusable for planned development. The downtown centre is divided by a patch of industrial zones and residential units. People still hope that the satellite city of New Bombay, which is taking shape on the mainland, will relieve some of the pressures on the urban environment of Mumbai.

Mumbai was initially a port city. Its transformation from trading town to manufacturing centre began around the mid 1880's. With this change, the textile industry gave Mumbai an economic boost and it was soon one of the most flourishing textile-based cities. For almost a century, the city thrived on its textile industry, drawing crowds of migrants to the city. In the latter half of the 19th century, the government sold and leased land to mill owners in order to encourage textile production. These mill owners, in turn, sent contractors into the hinterland to procure workers for the mills. The number of textile mills increased from 42 in 1880 to 58 in 1900 bringing with it a continuous stream of immigrants, mostly poor, who settled in the Girangaon "The village of the mills". The textile industry rapidly became the most important employer in the city, giving employment to millions in the mills and related industries. A great many were economically dependent on the mills due to their effect on trade, transportation, energy, food and clothing. By

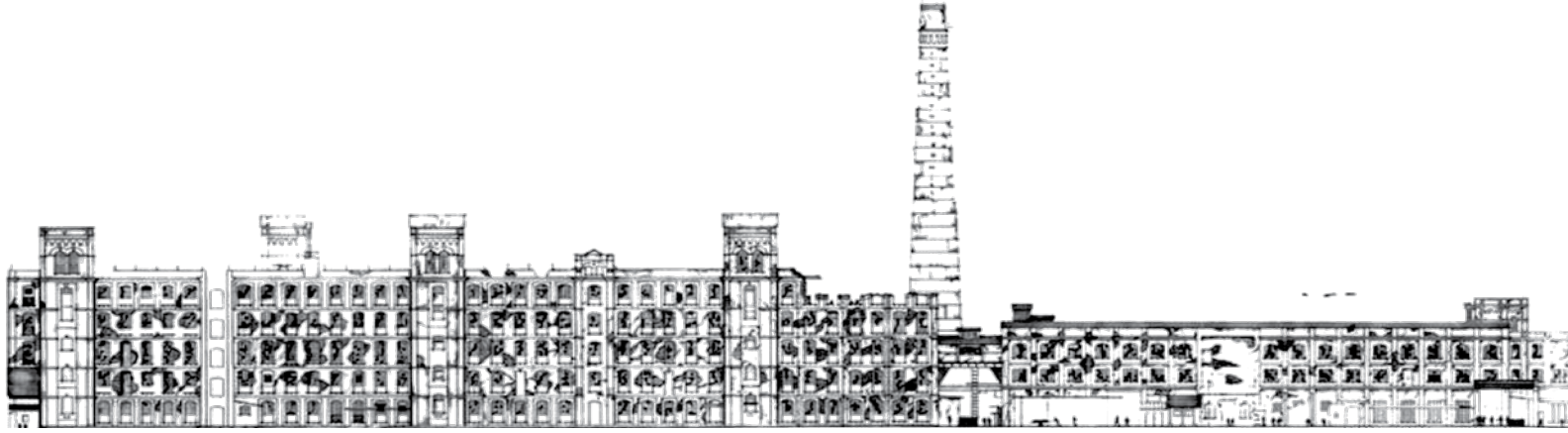


Figure 5: India United Mill No. 1

the 1900's, Parel- Lalbaug, which formed the major part of Girangaon, came to be identified with the labor class, dotted as it was, with mills, factories, workshops and worker chawls (housing). But by the later part of the century, these mills started facing problems due to labor issues, refusal to modernize and other governmental disincentives. However,the mills were in the heart of the city, occupying important and valuable land.

In 1991, the Maharashtra Government addressed the issue of locked mills by allowing the sale and development of mill lands under certain conditions, framed in the Development Control Regulations of Greater Mumbai (DCR). In Section 58 of the DCR, mill lands were to be shared in more or less equal thirds between the Municipal Corporation of Greater Mumbai (MCGM) for civic amenities; Maharashtra Housing Area Development Authority (MHADA) for public housing, and the mill owners for modernization and development of the mills. In 2001 the DCR was amended to include a provision that stated the land provided for public housing would be set aside for housing textile workers with an additional provision for job opportunities for family members. These provisions were included in response to demands made by the laid off textile workers.

Due to various pressures from mill owners and other connected people, division of open land in the present mill complex was performed. This was ostensibly with the idea of continuing mill activity in the present building which occupied about 90 per cent of the land. As a result, there was hardly any land left for social housing and open space. These actions and decisions made by the government would seriously affect the redevelopment process and the growth prospects of the city in the coming years.

THE MUMBAI MILL LAND'S REVITALIZATION PLAN UTILIZING THE "CHARETTE PROCESS"

The Enquiry by Design "Charette" Workshop as an essential participative tool is an intensive collaborative design exercise, which actively engages local residents and various stakeholders. The week-long process involves a thorough education phase, discussions, lectures and workshops led by experienced facilitators. The final product is a document of conclusions, collaboratively produced by the group.

The purpose of the workshop was to assist the government in the long-term sustainable development of the mill area in Mumbai by engaging the community in the cause. As a part of the workshop, participants analyzed the current conditions of the vacant mill site and workers' housing. The group then collaboratively produced a New Urbanist-based proposal that integrated heritage preservation and sustainable development. The proposal included a master plan for the future development of Mumbai, focusing on sound ecological and design guidelines for new traditional buildings inside the site, as well as for future expansion. The proposal is not intended to adhere to a fixed master plan approach for development, but rather as an inventory analysis for future growth.

Utilizing the Charette process, the Mill redevelopment project was appraised on the principles of balancing the non-overlapping concerns of "community good" along with "commercial returns". This paved a path for the adaptive reuse of the Mumbai mill lands along with creating public open spaces and infrastructure.

The following essential steps were followed in this case, which are intrinsic to the Charette:

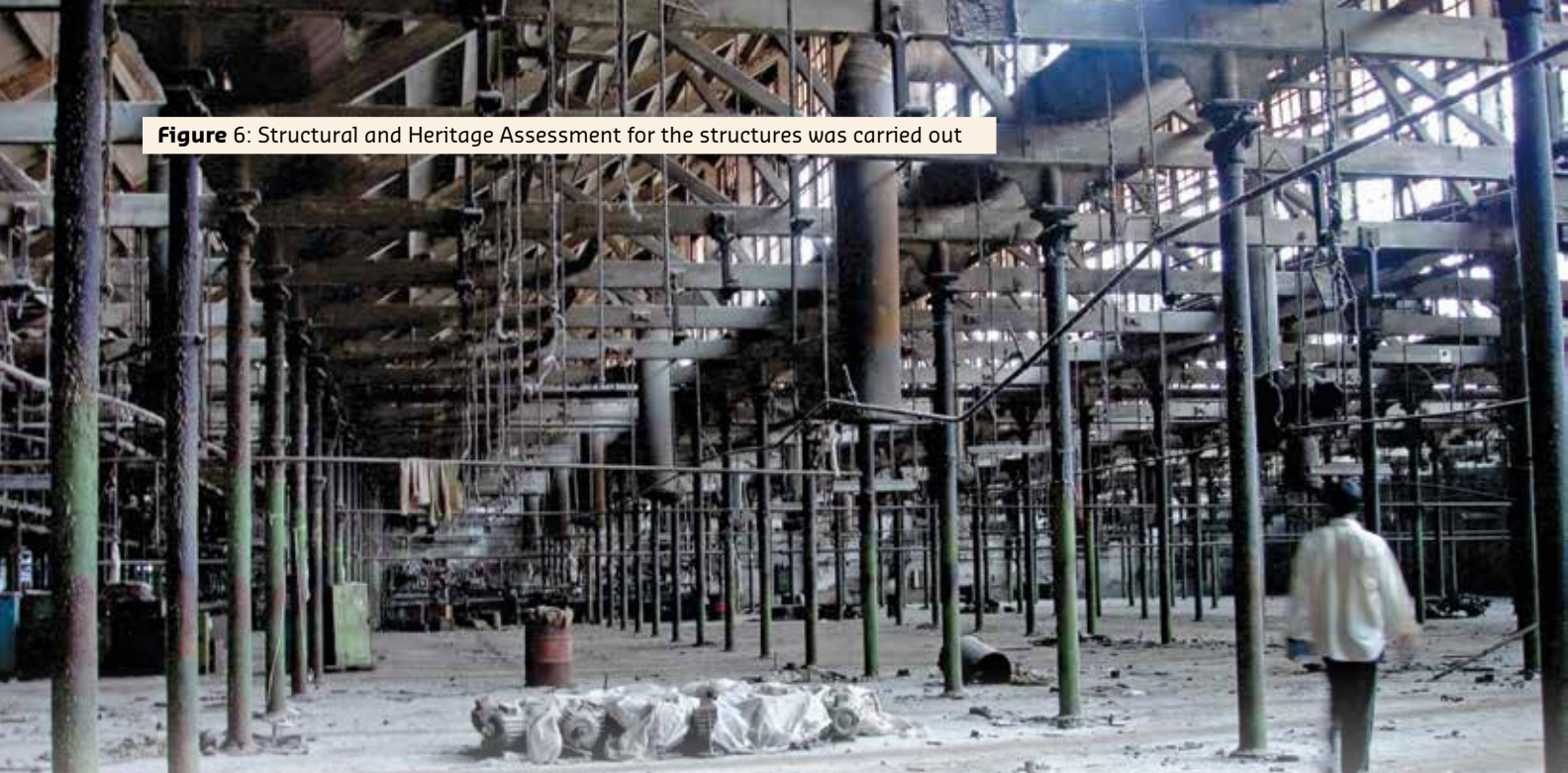


Figure 6: Structural and Heritage Assessment for the structures was carried out

The workshop included a number of components in order to inform the participants about the key aspects of the city, its people and architecture. These included:

- Extensive tour of the city's architecture, including both its traditional and colonial buildings
- Lectures and briefings by experts from around the world
- Extensive public involvement program, which included both an evening public meeting and a public exhibition involving the citizens of Mumbai
- Data collection and master plan development, with key proposals prepared from the feedback received from all the stakeholders, as a result of visits to the sites and the internal discussions. This charette concluded with presentations of the key points and recommendations on the future development of the mills from a conceptual, financial, social and physical perspective.

THE CHARETTE'S "PEN ON PAPER" ANALYSIS OF URBAN DESIGN POSSIBILITIES

Mumbai is very proud of the large sea facing region that it occupies. The large coastal region surrounding the city provides access to the sea, exhilarating views, and a good average climate throughout the year. This makes the city more desirable than many other Indian cities for residence and commerce. As a result, Mumbai has gone through a population explosion of 15 million people (as of March 2005) which has led to an ever increasing amount of pressure on infrastructure for the city's survival and proper functioning. Unplanned expansion has resulted in development of pockets of wasteland and high stress zones that need emergency relief solutions to resolve problems within the city's major networks of train and other public transportation. The industrial land is sandwiched between south Mumbai, today know as the downtown or the Business center of Mumbai, and the primarily residential zone to the north. Both road and train transit routes pass through this industrial belt to reach the downtown and the over flow of the business district in the near future into this underdeveloped belt is inevitable. The unavoidable expansion of the city can be controlled or retained, by introducing a more constructive development plan for the city. Starting from building heights to street and building ratio, density and urban form etc. can be introduced to maintain a sustainable built form.

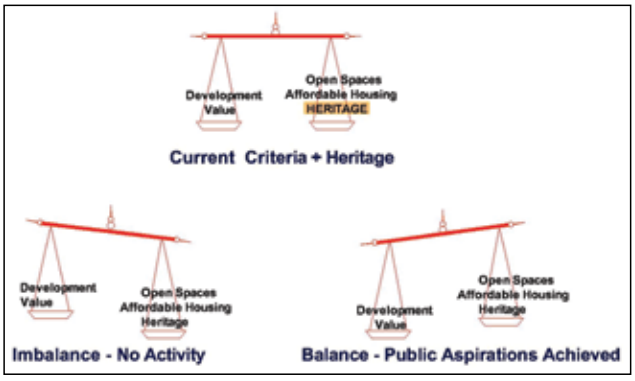
Response to urban growth issues:

- As the city expands further to the north, the pressure on the city's existing infrastructure increases. The city needs smaller neighbourhood centers that can take away the pressure on the existing downtown and relieve the old industrial area for planned growth.
- Smaller mixed use complexes for

Picture 7: Heritage Assessment

Picture 8: Environmental Assessment was carried out to assess Contamination Levels

Picture 9: Reutilization of the Mill Structures for a market square,



Picture 10: Balance needs to be maintained between developed commercial value & social benefits

small trade can be introduced at various locations to reduce travel time for citizens. Height ordinance for buildings in various areas can be introduced.

- Major areas of land could be utilized to set up dense residential-commercial mixed landuse complexes, having good infrastructure (dark brown). Buildings with heritage quality need to be preserved and codes can be laid to help buildings create a certain character and ambience.
- The existing nature parks and lakes should be preserved.
- A green belt could be introduced on the periphery of the city to avoid further expansion.

  The expansion of green in and around the city would help to alleviate some of the effects of air pollution on the inner-city residents.
- Any development should also include reasonable financial goals for the investors

RESPONSE TO THE NEED FOR CONNECTIVITY OF THE MILL SITE TO THE CITY

Mumbai has an ever expanding problem of traffic and air pollution because of fumes emitted from vehicles. In the last six years, 22 flyovers (city highways) have been constructed across the city and have been in extensive use. This linear city with its linear transportation system needs to have certain nodal points that can be developed with transverse routes running along the breadth of the city. These nodes can be connection points between the linear linkage of the city and the new transverse routes. Codes and street patterns can be identified depending on function and density of built environment for the entire city of Mumbai.

DEVELOPMENT STRATEGY SUMMARY AND PRIORITIES

- New transportation nodes

must be introduced at various points in the spinal system of transportation for the city.

- Major zones of commerce and development need to be developed at these nodal points.
- Strategic connection of the city through transportation corridors- bus, metro, road.
- Develop urban forms which create shopping and commercial areas that are integrated with housing.
- Relieve pressure of high density zones by creating points of focus that can divert and help create easy flow of pedestrian and vehicular traffic.
- Create a future plan of growth with mixed use, integrating socio-economic development with middle-class and high-class residential units.
- Pay attention to local architectural and cultural heritage and create new development on the basis of vernacular planning and architecture.
- Land use development must be based on present day requirements of the city.

THE MILL CASE AT HAND: INDIA UNITED MILL NO. 1

Earlier known as the Jacob Sasoon Mill, it is one of the best examples of an integrated mill. The complex houses G+3 spinning structures weaving and processing sheds, the staff quarters and godowns. The chimney is well articulated, with an interesting brick structure.

A feedback from the mill workers, local market hawkers, mill worker's families, local students etc. was organized subsequently. Mumbai's residents offered narratives of the growth of a colonial capital and industry. The emergence of working class politics and popular participation in the movements for independence and linguistic statehood, attest to the unique cultural milieu of Bombay City. With the advent of globalization, the cultural and political survival of these 1.3 million people, their culture and history, has been up for grabs.

The area utilized by the mills today can be put to good use by creating a clear balance between the amounts of built up versus open space. Increasing the density of built up space by volumetric increase can keep the balance while still increasing the land advantage. This way, development profit can be achieved while also maintaining citizens' rights. The quality of space is important for long term development and profit.

Right quality of infrastructure is needed to support such a development. In all of this, a balance between the "Return on Capital" and the "public good" needs to be created. Emphasis only on the former would lead to non-fulfillment of the broad goals of the public good,

Figure 11: Working Sessions from the Mumbai Mills Charrette, INTBAU India

and an emphasis only on the latter would lead to no action at all due to absence of capital. Therefore, a middle strategy was attempted with a range of placement options.

PHYSICAL PLAN RECOMMENDATIONS

Due to the fact that the mill land is located in the center of the city, a clear guideline can be made for the volumetric relationship of buildings to both the street and to each other. Most of the buildings around Indian United Mill no.1 are four or five storeyed, which defines a clear density for urban growth. Increasing the volumetric proportions to a greater height could cause heavy stress on the existing infrastructure and create an imbalance between the existing chawls and worker colonies, which would result in their communities being forced out due to high end development/ encroachment. The physical plan recommended the following:

- A harmonic distribution of function and space be made according to the location of the mill land and its immediate surroundings.
- A survey of land verses function can indicate commercial success values of operating new functions with a more balanced ratio of housing and green space.
- A fruit and vegetable market or a restaurant with open air seating could be planned in front of the artificial lake.
- Additional uses such as a hospital extension with an outdoor area, textile workshop, exhibition space, recreation and park spaces, or light industry could also be introduced.

The clear height and high ceiling spaces inside the industrial buildings could be well used for commercial purposes, schools or small colleges, exhibition spaces or open/ closed market spaces for daily trade. There could also be a fair or exhibition of textiles from all over the country that highlights new innovative techniques in the textile industry.

POSSIBLE DEVELOPMENT OPTIONS FOR THE MUMBAI MILLS

Although the design process was initiated without the Development Control (D.C.) regulations to ensure a constraint free thought process where only the social, economic and urban strategies would regulate the design, the necessity of regulatory principle was not overlooked. Taking into consideration various factors such as the urban fabric, welfare of the city and its heritage values, and the cultural backgrounds, certain proposals for regulatory controls for the mill lands were developed. These in turn determined the future steps below:

- The recommended plan for the development and growth on the Indian United Mill no. 1 site is to retain most of its existing structure and allow new, traditional development to be built around it in the form of high end residential and mixed use socio-economic housing.
- Major buildings included in the mill lands would be listed as heritage landmarks and a thorough heritage and structural assessment would be done for all of them. Based on this evaluation, development plans for these areas would be formulated.
- It must be ensured that the commercial development is not permitted to commence till the restoration work on the listed mill buildings is completed.
- The D.C. rules must be revised / amended with respect to height and area. These rules may be incorporated in the development plans that are formulated.
- Ownership of various commercial and office areas, subject to these regulations, would ensure a fair and varied usage of the mill lands.

The various mill sites in the centre of the city are occupying 600 acres of land, which has been a primary focus for developers and builders. The city needs to develop a strategy for phase-wise planning and development of the city core. Any development needs to compliment the surrounding neighborhood and provide services and amenities that cater to the city. Out of the 58 mills in question, 26 are government owned mill sites. These sites can be considered less than one master plan that can help the city solve some of the major problems it is facing today.

CONCLUSIONS REGARDING THE CHARETTE PROCESS

As the outcome of the Community Calibrated Charette workshop is the creation of a possible, sustainable developmental vision for an area; community input was gauged not just in terms of stated positions, but also in terms of what it means as an outcome. The workshop

follows a pencil-on-paper method where constant, quick and intensive evaluation of strategic design ideas effectively replaces supposedly comprehensive but time consuming conventional master plan. A clear lucid, drawing based output led to realistic critique, better ownership and a minimal text to drawing lag which hampers usual community consultation processes. Acting closer to people's needs, the process helps prevent centralized generalization, and holds vast potential in imparting local flavour and identity to urban regeneration efforts. INTBAU and other organizations would now be utilizing this in many other upcoming initiatives in India and are working towards a wider governmental acceptance of this methodology.

Most importantly, the principle of creative anarchy at the bottom of the "bottom up" power structure is at work. So the architect/urban designer/planner, becomes a facilitator, rather than just an expert.

REFERENCES

The photographs, illustrations, diagrams are sourced from the work carried out for the Mumbai Mills revitalization charette carried out by INTBAU India. All the material is reproduced here courtesy INTBAU India. Acknowledgements are due to a variety of base and advanced works carried out by INTBAU India team members including Krupali Uplekar, Jyoti Soni, Shirish Gupte, Tina John, Vivek Kumar Arya, Sophia, Laxmi. Other referenced works include those on the Mills by Neera Adarkar of the "Girni Kamgar Sangharsh Samiti" and those by Late Prof. Arvind Adarkar of "Rachna Sansad College of Architecture".

CSR Initiative of HUDCO

Nagar Nigam Haldwani lifts 90 tonnes of Municipal Garbage through door to door collection, road sweeping, nala-nali cleaning, from restaurant, hotels, banquet halls and neighbouring villages. Garbage is emptied on the road and bins then refilled, leading to corrosion of bins, overflowing, garbage ling in open, filthy spots on the main road and bad odour emanating at the site and stray animals feeding on the waste. This process is not generally acceptable due to waste collected in open, unhygienic and unclean sites.

To make Haldwani clean and green city and free from open garbage collection, a proposal for financial support under Corporate Social Responsibility (CSR) was submitted to HUDCO to install underground bins on the side of main roads along with closed body Tipper to lift the underground bins. After installation and inauguration on 2nd October 2014, all 6 bins are functional and are handed over for public use.

Installation of underground bins has introduced secured collection of garbage, clean, healthy, odour free and hygienic environment resulting into ultimately achieving the socio-economic goals. The site is no more an eyesore and no more stray animals feed on the garbage. Citizens no more cover their faces while crossing the site. Nagar Nigam has received immense appreciation from local representatives, municipal worker, vendors around the bin sites and also citizens from all walks of life. This initiative has been selected for *HUDCO Award for Best Practices, 2014-15.*

Source: *HUDCO Award for Best Practices, 2014-15*

HUDCO Art Gallery

August Kranti Bhawan
Plot No. 25
Bhikaji Cama Place
New Delhi

Housing and Urban Development Corporation (HUDCO), in its endeavour to promote works of art and culture has created HUDCO Art Gallery, a sizeable space at its commercial complex August Kranti Bhawan at Bhikaji Cama Place in Delhi.

The HUDCO Art Gallery located on the Ground Floor is an integral part of August Kranti Bhawan, with a 900 sq.ft. carpet area and 85 rft of wall length. It opens on to a courtyard of about 400 sq.ft. suitable for gatherings and interactive sessions.

The HUDCO ART Gallery is offered on license basis to artists, groups, organisations and institutions for organising art exhibitions related to painting, sculpture, photography, textiles, handicrafts etc. The license fee for space is Rs.1111/- per day plus applicable service tax. electricity charges are extra payable on actual consumption.

Terms and Conditions

1. The gallery can be booked upto 7 days at a stretch.
2. Booking of the Art Gallery is on first come first serve basis. However, HUDCO reserves the rights to accept or reject the proposals of the applicants and they have no claim to the desired dates of the exhibition at Art Gallery even if it is available on that date.
3. Booking of the Art Gallery is not transferable.
4. Applicant / Artist shall apply in the prescribed application form which can be downloaded from our website www.hudco.org and submitted along with the terms and conditions, duly filled & signed.

For details please contact :

1. Ms Upinder Kaur, DGM (PR), HUDCO, HUDCO Bhawan, India Habitat Centre, Lodhi Road, New Delhi – 110003 (Mobile No.9810868467).
2. Shri TT Dines, DGM (WD), HUDCO, HUDCO Bhawan, India Habitat Centre, Lodhi Road, New Delhi – 110003 (Mobile No.9871533882).
3. Shri Pawan Sharma, Sr. Manager (WD) HUDCO, HUDCO Bhawan, India Habitat Centre, Lodhi Road, New Delhi – 110003 (Mobile No.9953685225).

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Map for visual representation. Not to scale

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