In this issue there are seven papers out of which the first paper is written by Priya Sasidharan on the topic - "Planning for a Smart City - Critical to the Context : Reflections from Theoretical Models"; in which the author argues that the concept of smart cities in the Indian context needs a paradigm shift from "alien or alienated" foreign white papers to the vibrantly colored and critically contextual mode. Is it a techno - city or a technocrat’s city? As technology needs to be accessible and inclusive, the "smart" translates as "user friendly" with the user being universal. The answer lies in the technicalities and not in the adoption of mere technology. The smart city idea should strategize the dichotomous urban scenario - existing and the new. While the challenge is in both fronts with the new becoming the successful prototype to replicate and the existing looking at being integrated, the planning fraternity should embark on a "smart mode". The queries are multiple but the solution is singular - the smart way is deep rooted in the traditional base of sustainable practices and in the contemporary every day urbanism.

The second paper on the theme - 'Walkability for Urban Sustainability : Advocating the Green Transport Paradigm in India’ written jointly by Meenakshi Singhal Nohria and Karamjit Singh Chahal; observed that the current trends of increased auto ownerships and complex mobility patterns in the urban areas are being viewed as absolutely unsustainable. While, on one hand, the need is to reduce travel seems imminent, we also need to look into mobility patterns that might have the potential to address the sustainability aspects of urban settlements. The paper attempts to question the sustainability of prevailing mobility trends and development practices. Since walkability which is so intrinsic and pervasive among humans offers itself as an appropriate paradigm for a greener transport, it is being evaluated in the present context of Indian cities. The paper emphasizes on the need to enhance walkability of Indian cities considering its social, economic, health and environment related benefits.

The third article jointly authored by Neelakshi Joshi, Professor Dr.-Ing. Helmut Bott and Professor R. Shankar is on 'Opportunities and Challenges of Employing Crowd-mapping in Bicycle Mobility Projects'. This paper shares the application of crowd-mapping, an emerging tool in participatory planning, to collect and analyze data for a bicycle mobility project in Bangalore, India. Data was collected by engaging cyclists through an online base map. Quality and quantity of data collected is shared. Challenges faced in facilitating participation and checking data authenticity are discussed. Recommendations are made for a holistic design of future attempts at bicycle crowd-maps for cities. This paper aims to encourage governments, planning bodies and researchers to widely apply this new tool for actively engaging bicyclists in contributing dynamic and up-to-date data.

Jugmohan Singh’s paper on 'Methodological Enforcement of Specifically Planned Spatial Traffic Law: An Appropriate Approach to Decongest, Manage and Regulate the Traffic - Case Study of Dehradun’ highlight that Traffic Law Enforcement is an indispensable tool for increasing road safety, decreasing congestion, management and Regulation of Traffic in planned and unplanned urban area, therefore it is utmost essential that traffic enforcement should be done in a methodological and spatially planned nature. The theme of this research paper is to scientifically highlight and precisely pinpoint the various parameters to be considered by the traffic law enforcement agencies / organizations while enforcing the traffic laws in these cities. Accordingly, the author is of the opinion that it is an incredibly vital to have significant knowledge of traffic laws to recognize all concerned factors, while enforcing the traffic laws.
which in-return will help the traffic law enforcement agencies for enhancing increasing road safety, decongestion, management and regulation of traffic. The focal point of this research paper is how to analyze the present traffic enforcement system works, its impact and how the spatial traffic law enforcement methodology can help in decongestion of traffic in various urban area.

The paper titled as 'Impact of Urbanization on Urban Lakes : A case of Hyderabad' is jointly authored by R. Nageshwar Rao and Nauman Najammuddin in which it is argued that Water bodies are an integral part of urban landscape all over the country and are important aquatic ecosystems, constituting an important source of fresh water. Water bodies served several needs of rural life, serves as water harvesting structure impounding surplus rain water, recharging ground water and feeding wells, providing protective irrigation water, domestic water supply and drinking water for cattle bathing and washing. In urban context Water bodies recharging ground water, urban water supply, flood control. Water bodies provides recreational activities, provides open spaces with greenery in urban area. The environmentally and hydrological degradation of water bodies in urban area has bad impact on basic urban needs like domestic water supply, recreational activities and irrigation water. Therefore, it is necessary to preserve and develop these large open spaces i.e. water bodies.

The paper on 'World Class Cities : An Overview' is written by Anwesha Chakrabarty which propagates that cities world-wide are experiencing the dynamic processes of urbanization and globalization. The major cities of the world have been transformed in recent decades. This paper gives inference of growth and development in cities like New York, London, Canberra, Berlin, Mexico and Seoul. Large cities have to respond to some basic challenges i.e. active economy, urban infrastructure, quality of life, social integration, institutional mechanism and governance. The capacity to response to these challenges and adaptation of new technology; makes the urban area a World-Class enterprise.

Last but not the least, the paper on 'Indian Real Estate- Will Awarding an Industry Status, Improve its Prospects?' is written by Dr. Mona N Shah and Thilak Babu Gottipati which focuses on the construction and real estate sector in India, is the second largest employer next only to agriculture; its size is close to US $12 billion and growing at a rate of about 30% per annum. Five per cent of the country’s GDP is contributed by the real estate sector. In construction, the average profit in India stood at 18%, which is twice the profitability for a construction project undertaken in the USA. During 2010-11, the Indian real estate and housing sectors received US$ 1.12 billion in Foreign Direct Investment (FDI), according to the Department of Industrial Policy and Promotion India (DIPP). As a known fact, Indian real estate has been beleaguered with opaque practices and consumer apathy, unqualified suppliers entering the market due to lower barriers to entry, resulting in the absence of good standards of business practice amongst the majority, which is due to the existing state of Indian Real Estate, it is inadvertently endeavouring its own potential to grow.
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       to the Library. The cost of books shall be adjusted against security deposit.
Planning for a Smart City - Critical to the Context: Reflections from Theoretical Models

Priya Sasidharan

Abstract
The concept of smart cities in the Indian context needs a paradigm shift from "alien or alienated" foreign white papers to the vibrantly colored and critically contextual mode. Is it a techno city or a technocrat’s city? As technology needs to be accessible and inclusive, the "smart" translates as "user friendly" with the user being universal. The answer lies in the technicalities and not in the adoption of mere technology. The smart city idea should strategize the dichotomous urban scenario - existing and the new. While the challenge is in both fronts with the new becoming the successful prototype to replicate and the existing looking at being integrated, the planning fraternity should embark on a "smart mode". Reflecting on the classic models of planning in the contemporary context could offer the cue that could be redefined and adopted.

1. INTRODUCTION
The concept of smart city at its threshold in India stares at the global image rendering of digital and intelligent cities on the lines of technology driven initiative influenced by the western spectrum. The ambitious vision of the launch of 100 smart cities has triggered queries on the conceptualization of smart when the earlier sweep of sustainable is still holding sway on the global population. The smart city edging towards automated and controlled systems progressing on the futuristic mode of technology defined environment has become a singular, univalent dictum. Is the smart city concept an adaptable or an applied prototype?

Urbanism as 'a way of life', the Geddessian triad a networked ritual, and ordered chaos defining the urban fabric, rethinking the concept of smart in the Indian context becomes the prerogative. The distinction or the line of difference between smart and sustainable needs a clear and vivid understanding with specific reference to the Indian context where sustainable is smart has been the traditional wisdom. The Indian context is a myriad canvas of colors, vibrancy, culture and events with a tag of unity in diversity, which further lays emphasis on a decisive shift to the inclusive paradigm in development solutions.

The smart formula needs to be applied with its adaptive theorem of addressing the existing situation in equilibrium with the new initiative of urban intervention. The epitome of smart cities is not in the inception but in addressing the current scenario of Indian cities with the urban population around 31 percent of the total
and the rate of urbanization poised to increase and cities are likely to contribute 75 percent of the GDP in the next 15 years. The smart city venture needs a stylized approach in the true Indian flavor personified—singular yet universal, underlining a rare genre. The Indian way of life spells an ordered chaos, as in realistic with its jerks and brakes, push and pull features. Indian cities should aim at branding the underlying sustainable everyday urbanism against the smart futuristic globalism. Showcasing the innate potential, addressing the contextual reality against the global frame poses the challenge in realizing a smart city. 100 smart cities in India from a visionary dream to reality needs the path to be etched, directions drawn, socio-economic foundations laid and raised on pillars of regional strength.

2. COMPONENTS OF A SMART CITY - FROM GENERIC TO SPECIFIC

The indicators of a smart city are largely outlined on general terms of infrastructure, economic incubators and ICT networks (Fig. 1) while the specifics of land dynamics, resource evaluation and management, societal connotations and the contextual concern needs inclusion. The framework created by the planning communities of the developed nations target global economy leadership through the advent of smart cities. While the race is to create hubs of technical expertise pooling that would be shared at a price through consultancy domain, India has to spearhead the smart revolution by evolving its ethnic potential indicators of smart (Fig. 2).

3. SUSTAINABLE IS SMART - TRADITIONAL WISDOM

The traditional practices that were site and climate responsive were the primary markers of green, energy efficient and sustainable cities—the dictating global paradigms. The ancient planning principles of form, for example Padmaka, Dandaka, Chaturmukha, scale and density of towns, skyline regulation by the gopurams and shikaras of temples outlined the urban morphology and development context. Public spaces was an extension of the social
life and participation in fostering natural assets were the classic forerunners to sustainable living that has to be intelligently redefined to achieve smart targets. Revisiting roots is not being caught up in a time warp but rather analyzing the innate cultural strengths in the everyday Indian urbanism. The spectrum in the planning fraternity in the current scenario has to swing back and forth in time, practices, compositional organization and civic aspirations synchronous to both Indian and Western context as the dictum has moved on from think globally act locally to the fusion trend of global.

4. **URBAN RURAL NEXUS - STRIKING THE EQUILIBRIUM**

The smart intervention has to hold the promise of opportunities and potentials for a larger cross section of the society to benefit from a slice of life. The global influx of wired networks, work from home, digital revolution narrative need the public to be sensitized and brought closer to the concept. The urban - rural divide widens with the smart city venture whereby the focus remains entirely on the city whereas a paradigm shift in the approach would enable addressing the rural hinterland as an extension of the vision.

The smart city initiative poses the imminent danger of creating pockets of power and islands of isolation, while in reality it could bridge the disparities of economy. Accessibility and affordability spells the axioms of inclusivity. While the African nations are creating gigantic smart players as in Konza Techno City, Silicon Savannah and Hope City near Nairobi and Johannesburg as specialized zones clearly delineated from the urban poorer sections. The threat posed is the disparity, seclusion and the rising dissent and discrimination among the public.

Land dynamics for the venture of a smart city targets the urban rural hinterland, the fringes or vast tracts of agricultural land near the proposed industrial and investment corridors. The displacement of the people and livelihood is a cause for concern. While the zoning could allow extended functioning for the local inhabitants through land policies and usage regulation the hinterland or the industrial corridor could become the overlapping sector. The land use plan needs to address the current context on a proactive stand chalking the proposed regulations for the zones and the conversion permissibility.

5. **REFLECTIONS FROM MODELS - SPATIAL CONNOTATIONS**

The three magnets of Ebenezer Howard (Fig. 3) could be referred to understand the constituent elements defining the surge of people to the main city, hinterland and the industrial corridors against the earlier divisions of town and country. In view of smart cities and their spatial location, compositional analysis of zones near the smart city, its proximity, scale, boundary issues and land use needs to be clearly analyzed in two ways i.e. existing and new. The existing city when
identified for a conversion strategy to smart city has to become aware of its composition, spatial development pattern and the strategy to become smart (Fig. 4). The new development would transpire as a conception model with new codes and principles of experimental digital narratives.

Another cue could be an inspiration from the Central Place Theory of Christaller (Fig. 5) where the settlement patterns took geometric shapes; the central place had a sphere of influence, the concepts of threshold and range. Although the conversion process of the existing city to smart on geometric lines becomes questionable, but could be on the patterns that the city has evolved, for example, radial and finger like extensions in Chennai, twin city concepts in Hyderabad and Secunderabad, satellite of Navi Mumbai, etc; in the Indian context. In the broader spectrum the pattern that the smart city would adopt can be a fusion or overlap could be of predominantly three types (Fig. 6):

- Overlap with the fringe, hinterland and near the industrial corridor;
- Overlap with the hinterland in the proximal vicinity of an industrial corridor; and
- Overlap with the hinterland.

Three basic options of the newly developed smart cities need to vie with the mother or main city that in several cases have also been adopted to be converted as smart. The challenge to the planning fraternity would be to clearly pitch on the prerogatives, priorities and the image of the existing and new smart cities. The approach need not embark on linearity as a holistic, meeting the wish-list or
checklist of indicators, but could be tangential and lateral focusing on the prime catalysts that could bring in the ripple effects for contextually critical factors.

6. LEARNING QUOTIENT - BEST PRACTICES MODE

Learning could stem from non-linear, bottom-up and multi-sectoral domains rather than the classic illustrations. The axiom of working from whole to parts and parts to whole plays a predominant role in experiential learning. Case study based approach to understand the process of planning strategies could be to outline a holistic system from process to the product or could even highlight the specific stages in the process. Case studies presented have been selected to focus on a contextual aspect of the target to a smart city.

The case of Latin America presents an interesting smart context of having worked at grass-roots level by primarily upgrading basic amenities and community infrastructure in the cities of Bogota and Medellin amidst conflicting social issues of crime, violence and drugs in the larger picture of Columbia. Barcelona in Spain chalked the improvisation of its public domain, attracting international migration for hi-tech jobs promising inclusive and interactive environment for life and work.

The Asian front presents a remarkably different scenario with Seoul in Korea profiling waste management practices by generating energy from converted solid waste landfill sites and creating public park assets as a two pronged approach. South Korea also joined the race to brand smart cities with new towns conceived with housing towers and hi-tech infrastructure but the scale of the vision and the gargantuan series of mere replication of the success of Bundang and Ilsan proved
fateful. The answer lies deep rooted in the fact that we have to be critical to the context rather than crucial to branding. The rise of Singapore as a nation within its gardens, drawing parallels as a realization of Ebenezer Howard’s garden city concept in planning could be referred for its equilibrium of densely built with large open spaces shared by the public. While Manchester has developed a digital living lab, Helsinki has initiated the Helsinki Region Infoshare project that could sensitize the public in handling data systems. Smart cities have also been evolved from green and brown field sites as Pudong and Shanghai.

In India with the Dholera project, the first smart city to be identified on the Delhi-Mumbai Industrial Corridor Project, the joint initiative with Japan has been hailed as the Gujarat within Gujarat promises to be the pilot demonstration of a smart city dream. Mixed responses on the special investment region, the land acquisition regulations poised as a faster process and the issues raised by environmentalists on the selection near floodplains have become the cautionary note as analyzed by Ayona Dutta (2014). The parallel line of thinking on exploiting the opportunity and strengthening the local resources and enhancing the livelihoods, introducing green technologies are on the parallel stream on realizing smart in the regional localized context.

7. COMMUNITY PARTICIPATION MODEL

Priority in achieving the target of a smart city is to address all sections of the society and embark on inclusive planning paradigm. Community based practices, awareness and sensitization have proved a successful strategy, and involving the representatives of the public would erase the technocratic image of a smart city. Community participation has helped revive neighborhood assets as in restoration of built heritage, natural resources and public spaces. This line of thought has to be enabled and facilitated by mooting collaborative work between the public, NGOs and the corporate sector.

The ladder of citizen partnership model (Fig. 7) by Sherry Arnstein (1969), a time tested exercise has been revisited to differentiate between empty ritual of participation and the true power dynamics to make it happen. The bottom rung clearly elucidates the power dynamics with the authorities and their roles, while the community is being integrated at the higher rungs. The middle rung brings into the foray the awareness
Fig. 8: Inclusive Smart Participation Model

- Corporate Social Responsibility Policy (CSR)
- Youth Reach and Youth Empowerment
- Awareness and Sensitising Campaigns
- Inclusive across Cross Section of the Public
- Planning Group – Interdisciplinary approach
- Delineation of Hierarchy and Tasks
- Drafting flexible alternatives: Non-linear

A campaign to clarify myths, superlative predictions and false promises so as to build confidence motion.

Adopting villages by corporate sector seems to be the new turn of corporate social responsibility needs to be cashed on as a potential opportunity for addressing rural initiatives for achieving the smart concept. The highest rung brings in participation from varied groups of the society with the youth and corporates brought in to share the responsibility. This model has been drafted as a concept design (Fig. 8) with inputs that could moot a smart city process in the contemporary Indian context with an integral interdisciplinary process at the planning stage, responsibilities and tasks defined and experimenting non-linear approaches.

8. CONCLUSIONS

Challenges that a smart city venture in the Indian context poses are co-ordinated contribution from a multitude of actors from the cross sections of the society, technology providers, and policy makers to the powerful decision makers. The compulsion factor to join the digital stream might have its preliminary repercussions that need to be expected and prepared for. The displacement of people, livelihoods, disparities that would emerge across borders of the rural-urban front and the supremacy of foreign investments to the local indigenous economy have to be faced and addressed amicably. The dimension of time, phasing of the infrastructure network is a mammoth task in the existing Indian cities as documentation of the archaic systems in vogue becomes time consuming exercise.

The silver lining is the drive, the agenda to experiment and join the global stream that needs to be promoted when India is emerging as a global leader. The path ahead is to understand the Indian in India, the ethnicity in the city and the genius in the indigenous. Whatever be the nomenclature or the classification, sustainable – green – resilient or smart, the way forward is to emphasize on the lacuna in the existing cities and enhance the credentials and expertise in the upcoming cities simultaneously to strike the smart equilibrium.
This venture could forge a union between urban local bodies striving for a common goal and efficient governance could encourage this proactive stand. The smart city initiative could become an interconnected triad of economy, society and environment, with new avenues for investments, global influx of technology and universal outreach. Planning has a live context to cull out the strong foundational base, experiment, put to test and realize a vision that could surge the nation forward. Time tested models of proactive planning, interventions, renewal missions could be collectively or partially exploited, exhausted or experimented on the podium for smart cities. A viable, potent opportunity that could become a dream or nightmare lies in the hands of the planning fraternity to take the threads and weave the magic.

REFERENCES


Draft Concept Note on Smart City Scheme, Revised on 14th October 2014 (work under progress), http/www.indiansmartcities.in


I like the idea of trying to look after great cities, trying to raise their level, of making them beautiful cities, not only with beautiful buildings, but with healthy, efficient human beings, or loving people, co-operating with each other and not trying to knock each other down and exploit each other and make each other miserable. That is the ideal of the great city that I should like to have and I like to work for.

Jawaharlal Nehru
Walkability for Urban Sustainability: Advocating the Green Transport Paradigm in India

Meenakshi Singhal Nohria and Karamjit Singh Chahal

Abstract
The current trends of increased auto ownerships and complex mobility patterns in the urban areas are being viewed as absolutely unsustainable. While, on one hand, the need to reduce travel seems imminent, there is a need to look into mobility patterns that might have the potential to address the sustainability aspects of urban settlements. The paper attempts to question the sustainability of prevailing mobility trends and development practices. Since walkability which is so intrinsic and pervasive among humans offers itself as an appropriate paradigm for a greener transport, it is being evaluated in the present context of Indian cities. The paper emphasizes on the need to enhance walkability of Indian cities considering its social, economic, health and environment related benefits.

1. INTRODUCTION
Automobile dependence is one of the greatest challenges facing cities in the 21st century. The urban areas in India in recent past have witnessed a sharp growth in auto ownerships and the much inflated mobility demands. While the number of registered motor vehicles increased from about 0.3 million in 1951 to 159.5 million in 2012, the compound annual growth rate of the registered vehicles was estimated at 10.5 percent between 2002 and 2012 (Ministry of Road Transport and Highways, 2013). Transport engineers and planners have responded to the escalated demand in terms of road widening, new or alternative routes, fly-overs, transport management measures and several other expansion and development strategies.

The expansion of transport infrastructure is widely acknowledged as a symbol of progress and prosperity, and therefore grabs immediate attention of the politicians, bureaucrats and professionals alike who all join hands in addressing the issue. The cities transform and grow at an unprecedented pace to accommodate and facilitate the increasing number of vehicles on roads; but then fall in their own vicious traps since increased infrastructure elicit more vehicles on roads demanding further enhancement of transport infrastructure. It is being realized that no development effort can keep pace with transport demands which is proving absolutely unsustainable because of its adverse impacts on the healthy growth of cities.

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Transportation is critical to human activities and greatly determines the city shape, structure and growth pattern. In India, the penetration level of two wheelers is much higher as compared to other transport modes. In 2012, two-wheelers accounted for the largest share of 72.4 percent, followed by cars, jeeps and taxis having share of 13.5 percent; while all other vehicles accounted for only 14.1 percent (Ministry of Road Transport and Highways, 2013). In order to accommodate an ever-increasing number of private transport modes and their associated infrastructures, the transport networks cut through the urban landscapes neglecting the historic fabric, destroying neighborhoods and encroaching upon the open spaces, thus badly bruising the city fabric. The cities expand into the countryside causing urban sprawl. The result has been unbalanced land use developments, spatial segregation of activities and a dispersed urban structure meaning thereby increased trip lengths, an inefficient public transport and increased dependence on the private modes.

Automobile dependence has extremely high environmental and socio-economic costs. The environmental consequences of unlimited mobility are frightening. In urban India, while the transport sector is considered as the major contributor to air pollution, the level of suspended particulate matter in all metropolitan cities exceeds the limit set by the World Health Organization (Singh, 2005). As per a study of Delhi by the Central Pollution Control Board, India, the transport sector contributes to 76.2 percent of CO, 96.9 percent of hydrocarbons and 48.6 percent of NO2 in air. Further, prevalent traffic congestion in Indian cities, particularly during peak hours, causes reduced vehicle speeds, and a consequent higher level of vehicular emission. The quantity of all three major air pollutants viz CO, hydrocarbons and nitrogen oxides, drastically increases with reduction in motor vehicle speeds (Centre for Science and Environment, 2009).

Increased traffic has led to increased congestion levels exposing the population to traffic hazards, high levels of noise and disturbing vibrations and air pollution. This is adversely affecting the human health, local ecology as also the quality of urban life. Transport being almost wholly dependent on the use of fossil fuels contributes to global warming in a big way. The urban areas, today, are designed related to the scale and pace of the fast moving vehicle. Use of space by traffic facilitates the movement of the motorist, but reduces the accessibility of pedestrians, cyclists and those with disabilities. Traffic and the accompanying menace threaten pedestrian safety, impact negatively on societal activities and create discontent among the city inhabitants, the cost of which is social stress, rising crime rates and a threatened community.

2. RECREATING LIVABILITY THROUGH WALKABILITY

While on one extreme are those who view enhancing mobility as the ultimate intent considering the enormous benefits of automobile; on the other extreme are a growing number of planning scholars and practitioners who argue about the
associated social and environmental costs (Balsas, 2002). The current levels of mobility are considered to be a contributor to excessive resource consumption. There is a growing realization that no development effort can keep pace with transport demands, and the need to reduce travel is imminent in order to achieve high quality livable cities. Banister (2000) recommends reducing travel through increased use of technology utilizing tele-activities, local provision of services and facilities, and prioritizing public transport. While the potential of tele-shopping, tele-business and other forms of tele-activities for substitution of travel is being explored, it is sensed that these may provide greater choice and flexibility to the computer-literate but will not affect all people in the same way. Therefore, the technology would have only a marginal impact on reducing the demand for travel in cities.

The local provision of services and facilities shall go a long way towards achieving sustainability. This would impact upon shortening the trip lengths, thereby promoting walking and cycling as feasible options. Like bicycling, walking is a green mode of transport that has low environmental impact in terms of air and noise pollution. Besides environmental concerns, walkability would have several other benefits as well. In addition to its utilitarian value as transport mode of travel for trips to work, school or shopping, it has great socio-cultural and recreational significance as well. It is a socially equitable mode of transport available to a majority of the population across various classes. Many recent health studies have demonstrated that walking can promote mental and physical health including cardio-vascular fitness, reduced stress, stronger bones and mental alertness and creativity.

Walkability implies shorter distances to destinations; an environment which shall be traversable to children, elderly and the physically disabled; safety from perceived crime or traffic; full pedestrian infrastructure such as sidewalks or separated trails, marked pedestrian crossings, street furniture and street trees; and pleasantness (Forsyth, 2008).

3. WALKABILITY IN THE INDIAN URBAN CONTEXT : FACTS AND ISSUES

Past studies related to traffic and transportation in India indicates deficient walkability related data. In 1994, with a view to help the Ministry, a traffic and transportation study was undertaken by RITES on 21 sample cities that sought to establish the urban transport scenario and forecast the anticipated issues in the urban areas of India. In 2006, the National Urban Transport Policy strove to address the unprecedented increase in transport problems in the major cities in the country. NUTP recognized the centrality of people in the Indian cities, and intended to provide safe, affordable, quick, comfortable, reliable and sustainable access to the people. It also focused on a more equitable allocation of road space with people rather than vehicles (Ministry of Urban Development, 2007).
The most recent task of carrying out national level survey was undertaken in 2008 by the US consultancy Wilbur Smith Associates, on behest of the Union Ministry of Urban Development, Government of India, for the purpose of formulating traffic and transportation related policies and strategies in the urban areas of India. A total of 30 cities of varied sizes (Table 1) were identified for the purpose. In addition to several important aspects of traffic and transportation, walkability too was studied through various surveys such as household interview surveys, pedestrian opinion surveys, road network inventory, etc. Various parameters such as walk trips, trip lengths, walkability index and several others were considered in relation to the size of the cities.

### 3.1 Mode Share of Walk Trips

A trip, in the study, refers to the complete journey through stages from origin to final destination. Where multiple modes are used in a single trip, the predominant mode in the journey is considered as the mode of travel. The study of mode share (Fig. 1) for selected 30 cities revealed that there is a considerable share of walk trips in all cities. Barring the immensely walkable hills cities, walk trips range

<table>
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<th>Cities</th>
<th>Population in lakhs in 2001</th>
<th>Walkability index</th>
<th>Walk trips (%)</th>
<th>Trip length (kms)</th>
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<tr>
<td>29 Kolkata</td>
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<td>0.81</td>
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<tr>
<td>30 Mumbai</td>
<td>177.02</td>
<td>0.85</td>
<td>27</td>
<td>11.9</td>
</tr>
</tbody>
</table>

*Source: Ministry of Urban development, 2008*
from 16-46 percent in the other Indian cities. Panaji, Pondicherry, Bikaner, Raipur and Madurai have a high share of walk trips which is more than 30 percent. Only two cities Kolkata and Kochi have walk share less than 20 percent that is probably due to higher patronage of public transport (PT) in these two cities.

### 3.2 Average Trip Length

Trip length is the average distance travelled during a trip. This has been estimated as the ratio of total passenger km to the total number of trips. Trip length is found to be directly related with the city size. As city size increases, trip length increases. Average minimum trip length is for Gangtok (2.1 km), while the maximum trip length is for Mumbai (11.9 km) (Fig. 2). About 24 cities have average trip length less than 6 km. As per Tiwari (2011), 'Indian cities have mix land use structure with substantial informal settlements (15-60 percent population living in slums). This has resulted in short trip lengths irrespective of city size'.

![Source: Ministry of Urban development, 2008](image1)

Fig. 1: Share of Walk Trips for the Selected Cities

![Source: Ministry of Urban development, 2008](image2)

Fig. 2: Average Trip Lengths for the Selected Cities
3.3 Walkability Index

A walkability index (Fig. 3) has been developed for evaluating performance of pedestrian infrastructure taking into consideration the availability of foot path on major corridors and overall facility rating by pedestrians (Fig. 4). From the facility rating and footpath availability, the index is formulated as follows:

Walkability Index = [(W1 x Availability) + (W2 x Facility rating)], where, W1 and W2 are the parametric weights (assumed 50 percent for both);

Availability is the ratio of footpath length to the length of major roads in the city;

Facility rating is the score estimated based on opinion on available pedestrian facility.

Fig. 3: Walkability Index for the Selected Cities

Fig. 4: Average Pedestrian Facility Rank of Cities based on Population

Source: Ministry of Urban development, 2008
The higher the index, the better is the level of pedestrian facilities in a city. It is observed from Fig. 3 that Chandigarh has the highest index among all selected cities, reflecting its better pedestrian facilities. Larger cities generally have higher walkability index though this too is embarrassingly short when compared with that of cities in developed countries (1.5 to 1.7 for London as per rough estimates). Average index for all cities made together is found to be 0.52. It is clear from the figure that cities with values lesser than the average are more in small and medium size cities, indicating the importance of developing better pedestrian facilities in these cities.

The condition of pedestrian facilities were assessed based on various parameters viz availability of foot path, foot way width, presence of obstruction, maintenance of footpath, street lights and other amenities, security from crime, walking path conflicts, availability of pedestrian crossing and safety in crossing. The final rank was derived on a 1-5 scale. A low rank indicates inadequate and substandard pedestrian facilities. The figure 4 represents the average for various categories of cities. In general the larger cities were found better in terms of pedestrian facilities, whereas the smaller cities were found to be grossly lacking in this aspect.

3.4 Apathy of the Pedestrian

It is observed that a significant number of trips in Indian cities are made on foot (16 percent - 58 percent). However, the pedestrian infrastructure, amenities and services are neglected and not given adequate focus in municipal planning and budgets. Pedestrian planning gets the least priority for the reason that there are few incentives in this regard. As per Goodman (2003), there hardly lies any technological or engineering challenge or any economic incentive in planning to walk. Being so universal, it does not attract any ‘powerful lobbies or advocacy groups’ that could vouch for the cause. Walking is ‘so basic and so undemanding in terms of finances that it slips through the net in strategy formulation’. Further, ‘lack of a clear understanding regarding the economic impacts of non-motorized modes is a major reason why they are excluded from the transportation development agenda of cities in India’ (Rahul, 2013).

With the government policies and initiatives favoring the vehicle, a general decline of non-motorized modes is evidenced on Indian roads (Rahul, 2013). However, a large number of cyclists and pedestrians would have no other option because of their poor socio-economic status but to bear the brunt of deficient pedestrian infrastructure (Tiwari, 2001). Inadequate planning for pedestrians has many negative consequences, the most notable being unnecessary fatalities and injuries. Figure 5 indicates the share of pedestrians as percent of the overall traffic related fatalities in the selected cities in India. The perception of an unsafe physical environment reduces the propensity to walk which further impacts in the social and economic sense as ‘traveling long distances along physically daunting corridors reduces the time and energy residents can spend on jobs, families, studies and other productive activities’ (Krambeck, 2006).
4. WALKING AS A VIABLE CHOICE IN INDIA CITIES

The fact that Indian cities have a fair share of walk trips in spite of the poor infrastructural provisions partly indicates the helplessness of large number of commuters because of their poor socio-economic status. Though many non-motorized commuters have resorted to motorized modes which are generally perceived safe (Rahul, 2013), there are others who constantly struggle for space with the motorized traffic impacting adversely on their safety, health and efficiency. Such people would have to be provided with such infrastructure that may enhance their safety perceptions while also affording a pleasant walking experience. The walkability data also shows a high percentage of short trips. High share of short trips even in the large and sprawling cities creates potential for enhancing walkability for short distance commuting for everybody in spite of their socio-economic status. Further, the high cultural significance of walkability combined with increased awareness as regards its environmental and health benefits may become instrumental in reversing the trends of increased auto-centric development practices. In this context, following becomes inevitable if we have to respond to the sustainability concerns in Indian cities.

4.1 Recognition of Pedestrian as an Important Road User

The pedestrian forms the largest group of road users, therefore must find recognition in all transport related plans and policies. Right to walk safely is a basic human right that should not be infringed upon. Everybody is a pedestrian at one time or the other. For a person having minimum level of mobility, walking should be feasible, implying safety concerns. For the others, the environment needs to be enhanced to bring in behavioral changes in favor of walking since it offers several health, social and other benefits.
4.2 Policies for Pedestrians

Pedestrians should become the first step in an enlightened urban transport policy, or at least may be treated equitably with other transport modes. The policies for development of road infrastructure shall be people-centric rather than auto-centric with greater emphasis on public transport and non-motorized transport. Any such policies shall duly acknowledge the dignity of a pedestrian. Instead of reducing pedestrian facilities, policies must be oriented so as to reduce need for individual motorized travel. Suitable and exhaustive guidelines for planning, design and construction of safe, convenient and comfortable movement of pedestrians should be prepared and strictly enforced.

4.3 Planning and Designing for Pedestrians

Pedestrian facilities shall form an integral part of road design, construction and improvement plans. Pedestrian facilities should not appear as afterthoughts or add-on facilities. No plans should be approved unless road safety audit is carried out specifically concerning safe pedestrian facilities. While segregated right of way may enhance the perceived pedestrian safety, creative facilities like shady trees, provision of drinking water and resting points along walking corridors would mitigate, to a large extent, adverse weather conditions. Planning may also seek spatial segregation of pedestrian traffic, and develop an exclusive pedestrian network independent of the road network, thereby yielding a pleasant, safe and cleaner walking environment. Encroachments on the footpaths should be checked through proper planning coupled with strict enforcement. National level database related to pedestrians need to be created at macro and micro level, and regularly updated so that the pedestrian issues may be realistically addressed.

Speeding vehicles in the residential areas often threaten the safety of residents, especially the kids and the elderly. Extensive traffic calming techniques may be employed to make the residential areas pedestrian friendly. Traffic is the pulse of the city and lends its first impression. How civilized a city is, can be gauged by the manner in which pedestrian facilities are provided and function. Lot of order and safety can be introduced if pedestrian facilities are designed and operated properly.

4.4 Community Involvement

Community participation is an inevitable part of any development endeavor so as to evolve solutions that enable greater use by the potential beneficiaries. Since walking affects everyone, irrespective of age, gender, caste and economic status, so all should voice their concerns for effective walkability practices.

5. CONCLUSIONS

In the context of present socio-economic realities of Indian cities, pedestrians cannot be eliminated from the urban landscape. Rather it may form the starting point for rethinking and propagating walkability for addressing the sustainable transport agenda.
However, since the Indian cities are quite diverse especially in terms of population characteristics, role of non-motorized traffic must be considered respecting this diversity. Planning in general terms will lead to failure in providing an effective and efficient pedestrian infrastructure. It would be worthwhile to explore as to which planning and design factors could enhance walking or how the existing auto-oriented environments be retrofitted for pedestrian access. Further the urban forms should also comply with walkability requirements of short travel distances and accessibility to livelihoods, education and other social needs, for the benefit of the pedestrians.

REFERENCES


Opportunities and Challenges of Employing Crowd-mapping in Bicycle Mobility Projects

Neelakshi Joshi, Prof. Dr. Ing. Helmut Bott and Prof. R. Shankar

1. INTRODUCTION

Classically citizen participation in the mobility projects has been restricted to feedback and opinions. These are collected in town hall style meetings or surveys conducted via face to face interviews of a predefined sample size. This results in restricting the planning process to ‘tokenism’ and ‘non-participation’ (Arnstein, 1969). Also, route data collected via origin-destination surveys involves complex procedures that interrupt traffic on the road.

Today, global connectivity via the internet presents an additional platform to constructively engage with a vast group of citizens. Equipped with powerful smartphone devices and connected through social media websites, the role of citizens in contributing data to planning projects is an emerging concept (Evans-Cowley, 2011). Furthermore, enabling citizens to pro-actively contribute and engage in the planning process is a step in realizing true democratic planning (Brabham, 2009).

Crowd-sourcing is defined as the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people and especially from the online community rather than from traditional employees or suppliers (Merriam-Webster, 2012). Crowd-mapping is an application of Crowd-sourcing data geospatially on a map.

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Bicycle mobility projects stand to benefit from this technology as they depend on up-to-date field data for their success. Collecting Crowd-sourced geo-spatial and real time route data, reports on infrastructure quality and constructive user feedback lie at the heart of these attempts. Data collection in Crowd-mapping is different from the conventional method of one surveyor following cyclists. Rather, cyclists source their real time routes to the surveyor on a central shared map (Fig. 1).

2. BACKGROUND
Crowd-map’s first popular application was used in time of post-election fallout in Kenya in 2008 (Ushahidi, 2008). People reported cases of violence through their phones which were then recorded on an online map and enabled relief agencies to provide help. Today, Crowd-mapping is being employed for collecting variety of data ranging defunct infrastructure to pollution levels in different parts of the world. Anyone with a device having an internet connection can contribute requested data to a central map. In non-motorised mobility projects, Crowd-mapping promises to be a powerful tool for gathering route information, problem points and user suggestions.

Recording data is getting easier with a phenomenal increase in smartphone usage. It was estimated by Business Insider that by the end of 2013, 6 percent of the global population will own a tablet, 20 percent will own PCs, and 22 percent will own smart phones (Business Insider, 2013). Indian citizens have not been immune to this phenomenon with 81 percent mobile phone users out of which 10 percent are smart phone devices and 80 percent are multimedia phones (Nielsen, 2013). These numbers are predicted to climb as smart phones become affordable and easily available.

3. EXISTING APPLICATIONS OF CROWD-MAPPING
Cities, both big and small, have begun experimenting with bicycle Crowd-maps. Some are internet based maps while others provide a dual access through mobile phone applications as well as the internet. Shared here are two popular applications:

3.1 Dynamic Connections, Berlin
Dynamic Connections is a successful application of Crowd-mapping bicycle routes in the city of Berlin. It is part of the BMW Guggenheim Lab and intends to empowering everyday citizens to create and improve their own cities (Smith, 2013).
The Dynamic Connections Map rates different Berlin streets on their amenability for cycling based on a variety of criteria including traffic volume, topography, and safety considerations. Users are able to identify which streets should have future biking infrastructure, creating a Crowd-sourced map of the potential future biking network in Berlin (Dynamic Connections, 2013a). The project recorded 5,211 routes (Fig. 2) that provide for interesting analysis (Dynamic Connections, 2012b). The project intends to advise any future efforts in the city to improve bicycle environment.

3.2 Traffic Travel Interactive Platform, Beijing

Beijing Transportation Research Center in collaboration with World Bank has launched Traffic Travel Interactive Platform to collect data on non-motorized mobility from citizens employing a Crowd-map (World Bank, 2012). Besides sharing routes, citizens can also report bad infrastructure, problem points and share images (Fig. 3). The data collected is being used to advise further infrastructure and policy changes in the city.

4. APPLICATION

To further test the Crowd-mapping as a tool for participatory mapping, a web-page was set up on a free mapping platform. Wikimapping is used to record bicycle routes for the city of Bangalore, India. Previous transportation studies on cyclists restricted to reports approximating the number of bicyclists in the city (Rites, 2011). No major efforts to map exact routes or record frequent problems have been undertaken by government agencies. The map is open source and can be accessed at: http://wikimapping.com/wikimap/Bangalore-Biking-and-Walking.html#.Uy2fD6hdXw8. The map was popularized through social media websites for two months between 15 October 2013 to 12 December 2013.

<table>
<thead>
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<th>Target Group</th>
<th>Platform</th>
<th>Group Size</th>
<th>Views</th>
</tr>
</thead>
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<td>Google Group</td>
<td>4784</td>
<td>84</td>
</tr>
<tr>
<td>Praja</td>
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<td>Ride a Cycle Foundation</td>
<td>Facebook</td>
<td>376</td>
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<tr>
<td>Bangalore Bicycle Commuters</td>
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<td>53</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5716</td>
<td>1905 (approx.)</td>
</tr>
</tbody>
</table>
4.1 Participation

The map was popularized on social media sites aimed at cyclists in Bangalore (Table 1). A group of 5,716 people was targeted for this project. It was difficult to know how many members viewed the post for participation. However, a safe assumption of one third of the group being active and viewing the post can be made. This makes for approximately 1,905 views.

Following the publicity on social media sites, 103 users logged on to the Crowdmap. Out of these, 90 cyclists actively contributed by recording their routes, sharing infrastructure points or problems areas on the map. Cyclists contributed 50 routes, 8 problem points, 10 repair stations, 8 parking station and 14 photographs (Figure 4 and 5). 4.7 percent of the initial target group ended up actively contributing to the mapping efforts.

Fig. 4: Bicycle Routes (in red) on the Crowd-map (2014)

Fig. 5: Bicyclist Crowd-sourced Data on Crowd-map (2014)
4.2 DATA
A total of 470 km of routes were recorded on the map. Besides routes, users also shared images of routes and marked problem points. Based on user inputs, the point category was further elaborated to include parking spots and repair stations.

4.3 Survey
Besides collecting route information, the users participated in sharing basic demographic and route quality information. The aim was to understand who was participating and their basic bicycling preferences. Of the 50 respondents who participated in the survey, the following data was gathered:
- Gender: 88 percent male and 12 percent female
- Average age: 30 years
- Average Trip Length: 9.4 km
- Primary trip destination: Work (72 percent)
- Primary reason for cycling: Health (34 percent)
- Rate the riding environment: Average (53 percent)

4.4 Opportunities
Compared to conventional data collected on cycle routes in the city, a Crowd-map presents some additional advantages:
- Geo-spatial routes: User routes are immediately available on the map.
- Time saving: Once the initial project is set up and publicized, the data collection is automatic, till the map is made available online.
- Cost effective: The tools used in this mapping exercise were open source and free. Publicity on social media sites was also free. This makes it excellent for campus or neighborhood mapping exercises where the community is easy to reach. Larger city level efforts will involve an initial cost for publicizing the concept. Furthermore, participation can be boosted by offering incentives and rewards.
- Open source: All data are shared openly and can be used for further research, maintaining a continuity of efforts.
- Mutually beneficial: Data (repair stations, problem points and parking stations) shared by one cyclist is helpful to others who participate or access the map.
- Engaging: The onus of producing data lies on the cyclists. This is the first step in sharing responsibility for further attempts at improving the bicycling environment in the city.

4.5 Challenges
Crowd-mapping is an emerging concept and attempts like setting up Bangalore’s Crowd-map aim to understand and recommend suggestions to fine tune this tool.
**Small response:** Although the map was publicized on social media sites to a target group of 5,716 cyclists, 90 constructive hits were recorded on the map in 2 months. Low participation has been the Achilles’ heel of any participatory process and the primary aim of applying Crowd-sourcing was to facilitate higher participation. This is done by making the process of participation easier i.e. via the internet and second by making it more engaging and user-centric. Low participation here indicates that stronger attempts need to be made to popularize it among users.

**Data Authenticity:** Since the data source is an anonymous web user, we do not have means to check the authenticity of data shared. Although this was partially regulated by publicizing the map only on specific bicyclist groups, the possibility of non-authentic data inputs exist.

5. **RECOMMENDATIONS**

The success of good Crowd-mapping application is directly proportional to a large crowd response. Although a powerful tool in itself, most applications reviewed and used by the author tend to have a small user group. Also, incentivizing participation both by physical rewards as well as non-physical ones like action by the city on most frequently reported problems can elicit greater response. The following recommendations are made for future design of Crowd-maps for cities:

- **Publicizing beyond the internet:** Although this project was restricted to publicizing the map on social media platforms, a stronger response can be elicited if these attempts are augmented by real-life publicity in schools, offices and public places frequented by cyclists.

- **Complete package:** A complete Crowd-map should cover all aspects of a cycle trip. It should provide for route recording, calorie counting, option for rating infrastructure and posting problems. Also, forums for discussion on possible solutions should be facilitated.

- **Riding Environment:** Air quality and sound levels are crucial to a good riding environment. Cyclist can constructively engage to produce air quality and noise level maps. Current smart phones are equipped to record decibel levels. Sensors are being developed to record air quality (Livescience, 2013).

- **Use of data:** A successful Crowd-map should be action oriented. It is an added incentive for cyclists to participate if they know that the routes shared will be used to advice the bicycle mobility improvement projects by the city.

- **Gamification and Incentives:** Introducing game elements like rewards for participation or design challenges for street design improvement can further encourage participation.

6. **CONCLUSIONS**

Mobility planning in cities brings the focus back to improving bicycle and pedestrian environment. Crowd-mapping route data for mobility projects promises to be
an engaging tool for this process. Besides increasing awareness about such projects, it helps create a participatory platform for future interventions. Many smartphone and internet based applications already exist and are contributing in this. However the challenge in the near future remains to elicit a good response from users and encourage planning agencies and researchers to adopt this as a serious tool to connect to its citizens.

REFERENCES
Methodological Enforcement of Specifically Planned Spatial Traffic Law: An Appropriate Approach to Decongest, Manage and Regulate the Traffic - Case Study of Dehradun

Jugmohan Singh

Abstract

Traffic law enforcement is an indispensable tool for increasing road safety, decreasing congestion, management and regulation of traffic in planned and unplanned urban area. Therefore, it is utmost essential that traffic enforcement should be done in a methodological and spatially planned nature. The theme of this research paper is to scientifically highlight and precisely pinpoint the various parameters to be considered by the traffic law enforcement agencies / organizations while enforcing the traffic laws in these cities. Accordingly, the author is of the opinion that it is an incredibly vital to have significant knowledge of traffic laws to recognize all concerned factors, while enforcing the traffic laws which in-return will help the traffic law enforcement agencies for enhancing increasing road safety, decongestion, management and regulation of traffic.

1. INTRODUCTION

Dehradun city is located at 78°55′ to 78°5′E and 30°12′ to 30°23¢N. It is an interim capital of the state Uttarakhand besides being the district headquarters. It is the only municipal corporation of the Uttarakhand. It is strategically located at the foothills of the Himalayas and serving as a gateway to the hills, which has made it an important hill station in India. Dehradun has emerged as the premier business as well as service centre within the hilly region of the state. The functional character of the city is changing from an educational town to a service and commercial hub for the entire state.

2. TRAFFIC AND TRANSPORTATION ISSUES

Introduction and need for implementation of spatial traffic law enforcement approach in Dehradun city to decongest the city traffic appears to be great. Dehradun, the interim capital of Uttarakhand state, houses numerous government and prestigious educational institutions of high repute of the country namely, Forest Research Institute (FRI), Indian Military Academy (IMA), Indian Institute of Petroleum, Survey of India, Wildlife Institute of India, Indian Institute of Remote Sensing and the Oil and Natural Gas Corporation (ONGC).

Dehradun has urbanized manifolds after being declared as the interim capital of Uttarakhand State in 2000. Municipal Corporation area have population of 4.26
lakh as per Census 2001 and has grown to 5.66 lakh in 2011. Considerable growth of population and registered Motor Vehicles coupled with a marginal increase in the transport infrastructure apart from construction of bus and truck terminals has been observed since the inception of a new capital. Due to rapid ribbon development along various corridors and concentration of activities in the core area, traffic problems has increased tremendously and become critical.

Increase in city’s traffic due to unprecedented growth in the number of registered motor vehicles, influx of motor vehicles on city roads from surrounding areas has caused traffic problems. Poor conditions of the roads, lack of basic road infrastructure facilities like footpaths, parking area, traffic signs, FOBs, street lights, etc; puts the safety of road users at stake. Not only this, the traffic jams in the city core area has become a common feature. The average speed of the motor vehicles has approximately decreased to 5 to 15 kmph. The bottlenecks in some areas have also aggravated the traffic situation. The city traffic rather than moving seems to be crawling during peak hours. Thus, there is a pressing demand to solve the problems, which create congestion in the city.

The 3Es i.e. education, engineering, enforcement (Fig. 1) act like the mainstay for efficient traffic and transport planning and to achieve the efficient traffic and transport planning all the 3Es have to work in simultaneously in a same direction. It is the duty of all major stakeholders like Police, PWD, CPWD, Development Authority, Municipal Corporation, National Highway Authority of India, Transport Department, etc; to plan for efficient traffic and transport planning. Efficient road traffic management is closely linked to a strong traffic law enforcement strategy. Increasing urban population along with daily influx of vehicular traffic from neighboring areas and cities further compounds the challenge.

One of the essential aspects of traffic and transport planning is the enforcement of traffic rules and regulations. The enforcement of rules and regulations is a key to change the behavior of road users. The road users have to be challaned for the violations they commit on roads for their and safety of other road users. Traffic law enforcing agencies have to understand that it is not about the severity or the number of the punishments; it is about the surety of the punishment, which in simple terms can be denoted as intentional enforcement, where the objectives are prefixed for enforcing specific traffic laws. Most of the traffic law enforcing agencies are concerned with the number of fines done against traffic law violations and the income generated by enforcement drives against those
violations. One has to understand that it is not about the number of **challans** done by the traffic law enforcing agencies, it is about the way the enforcement is initiated. The impact of the enforcement has to be such that road users feel that they will be fined if they commit traffic law violations. To achieve a specified objective it is more important to hit the bull’s eye with few arrows rather than shooting the number of arrows away from the target in disarray.

Traffic law enforcement being an important tool can help in decongestion of the Dehradun city traffic if this important tool is specifically and spatially planned and implemented. Therefore, it is utmost essential for traffic police and other traffic law enforcing agencies to spatially identify the area and violations related to that specific area which affect the free flow of the traffic in that area and in turn cause congestion, bottlenecks and traffic jams. So it is essential to study the city and prepare a methodologically spatial traffic enforcement plan of the city. Once the spatial traffic law enforcement plan is prepared, spatial enforcement can be done accordingly. Time is ripe enough for traffic law enforcement agencies to move from general traffic enforcement methodology to specific and spatial methodological enforcement system. To understand specific and spatial methodological enforcement system and how it is better than the present enforcement system, it is highly recommended to investigate, analyse the present enforcement system, and its impact on overall traffic condition of the city.

3. **TRAFFIC LAW ENFORCEMENT SCENARIO AT DEHRADUN**

Present scenario of traffic law enforcement in Dehradun city is not much different from that of the other cities of India. The same formula of enforcement is being used in every city. The impetus of traffic law enforcing agencies is to **challan** more and more road users and in case of Dehradun city in year 2014 (Table 1) from the month of January 2014 to March 2014, 13,819 road users were **challaned** for various traffic law violations. Detail of traffic **challans** done by traffic police from the month of January 2014 to March 2014 (before the Formation of City Petrol Unit) is given below.

- Enforcement is not specifically area based;
- **Challans** are done for 27 Traffic Violations;
- Number of **challans** done on private vehicles is more than that of the commercial vehicles;
- Data does not specify the area where **challans** were recorded;
- Police also does not collect and maintain the data about regular traffic law offenders;
- Police does not serve **challans** for many other traffic violations prescribed in acts and rules which can help in free flow of traffic and reduction of congestion at Dehradun city; and
Table 1: Detail of Traffic Challans Done by Traffic Police from the Month of January 2014 to March 2014 (before the Formation of City Petrol Unit)

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>WITH OUT HELMET</th>
<th>TRIPFLING</th>
<th>WITHOURL NUMBER PLATE</th>
<th>OVER SPEEDING</th>
<th>BLACK LIM</th>
<th>WITHOUT PERMIT</th>
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| TOTAL        | 1253           | 228       | 1365                   | 72           | 1345     | 1463          | 1144      | 303                      | 1322       | 982               | 46        | 5981                 | 307       | 300    | 4805               | 10080       | 455    | 3005              | 281307       | 1881 |

Jugmohan Singh
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Table 2: Traffic Challans Done By Traffic Police from the Month of April 2014 to June 2014 (after the Formation of City Petrol Unit)

Jugmohan Singh
In the month of April 2014 Police Department Uttarakhand formed the City Petrol Unit. After the formation from the month of April 2014 to June 2014 the number of challans suddenly increased and total challans done by police were 34,726. After the formation of city petrol unit the impetus have not changed and with the increase in number of personals in traffic law enforcement the number of challans increased drastically. Detail of traffic challans done by Traffic Police from the month of April 2014 to June 2014 after the formation of City Petrol Unit is given in Table 2, from which one can notice the following points:

- Enforcement is not specifically area based;
- Challans are done for 26 Traffic Violations;
- Challans done on private vehicles is more than that of the commercial vehicles;
- Data does not specify the area where challans were recorded;
- Police also does not collect and maintain the data about regular traffic law offenders;
- Police don’t challans for many other traffic violations prescribed in acts and rules which can help in free flow of the traffic and reduction of congestion; and
- Impetus is mainly on the number of challans.

To understand the enforcement system in a holistic way, comparison between challans done before the formation of City Petrol Unit and after the formation of City Petrol Unit has been done to analyze deeply the situation from all the possible angles. The challans done by the traffic police has increased but the traffic condition remains same as it was before the advent of City Petrol Unit. The challans done on commercial vehicles which ply on Doon roads round the clock have decreased and challans on private vehicles (two wheelers and cars) have increased. Traffic congestion is still a familiar feature in Dehradun city traffic. Vehicles are plying at the snails speed in the city core area. Now the question arises, can the present traffic law enforcement approach decongest the city traffic? Can the traffic move smoothly in the city area? Has the traffic jams scenario changed? Simple and sure answer to all these questions is no. Traffic law enforcing agency is working 24x7 and still the condition of traffic is not improving, The reason is that the traffic law enforcement agencies are not planning enforcement drives in the city spatially and with the motive to achieve smooth and free flow of vehicular movement and curbing those violations of road users, which create traffic congestion and traffic jams in the city.
4. METHODOLOGY TO PREPARE SPATIAL TRAFFIC LAW ENFORCEMENT PLAN

To decrease traffic congestion in Dehradun city it is essential that traffic law enforcement agency has to move from general traffic law enforcement methodology to specific and spatial law enforcement methodology. Once the spatial traffic law enforcement plan is prepared, spatial enforcement can be done accordingly which will definitely help in decongesting the city traffic. To prepare spatial traffic law enforcement plan, the following steps have to be followed:

Step I: Conducting the Reconnaissance Survey of the City

Conducting a reconnaissance survey of the city is imperative to understanding the scenario of the city. The survey helps in visualizing the accurate picture of the road network, traffic and its movement, road junctions, type of junctions, road users behavior, condition of roads’, etc. To plan something for the city one has to understand the city, its functions and other various factors as nothing can be planned in isolation. A survey has to be conducted as it acts as a fundamental material for any study to be impeccable.

Step II: Defining and Demarcating the Zones

The first and foremost step towards initiating the methodological and spatially planned enforcement drive is to demarcate the zones. All the stakeholders like the Police, MDDA, Nagar Nigam, RTO and PWD, etc. should participate in formulating the plan for the core city area and for the demarcation of core area the following parameters may be adopted.

- Defining places where traffic congestion is frequent;
- Earmarking the temporary and permanent bottlenecks;
- Road conditions;
- Traffic volumes;

Fig. 2: City Petrol Unit - Traffic Police Dehradun
In case of Dehradun city core area demarcation has already been done (Singh, 2013), which is again used to formulate the methodologically spatial enforcement plan. The core area in case of Dehradun city is surrounded by the following boundaries.

- **Haridwar Bypass Road in the South:** This road stretch starts from ISBT and ends at Rispina Junction. The length of this road stretch is 6.3 kilometer
- **NH 72 Road in the South East:** This road stretch starts from Rispina Bridge and ends at Nehru Colony Chowk. The length of this road stretch is 350 kilometer

### Table 3: Comparision Between the Numbers of Challans Done by Traffic Police before and after the Formation of City Petrol Unit

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<th>S.No</th>
<th>Vehicle Type</th>
<th>Challans done from the month of Jan 2014-March 2014</th>
<th>Percentage out of Total</th>
<th>Challans done from the month of April 2014-June 2014</th>
<th>Percentage out of Total</th>
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</table>
• Nehru colony Road in the South East: This road stretch starts from Nehru Colony Chowk and ends at Balbeer Chowk on Balbeer road. The length of this road stretch is 1.3 kilometer

• Balbeer Road in the East: This road stretch starts from Balbeer Chowk and ends on EC road Junction. The length of this road stretch is 1 kilometre

• Eastern Canal Road in the East: This road stretch starts from EC road Junction and ends at survey Junction. The length of this road stretch is 1.7 kilometre

• Raipur Road in the North East: This road stretch starts from survey chowk and ends at Sahastradhara crossing. The length of this road stretch is 1.3 kilometer

• Sahastradhara Road in the North: This road stretch starts from Sahastradhara crossing and ends at IT park. The length of this road stretch is 4.3 kilometre

• IT Park Road and Dhoran Road: This road stretch starts from IT park and ends at Dhoran Junction on Rajpur Road, The length of this road stretch is 1.7 kilometre

• Rajpur Road in the North West: This road stretch starts from Dhoran Junction on Rajpur road and ends at Nain Singh Road / Rajpur Chowk, The length of this road stretch is 3.8 kilometre

• Nain Singh Road and New Cantonment Road in the East: This road stretch starts from Nain Singh Road/ Rajpur Chowk and ends at Cheerbagh Bridge on Bindal Rao (new cantonment road), The length of this road stretch is 2.65 kilometre

• Bindal Rao in the East: This stretch of core area boundary starts from Cheerbagh Bridge and ends at Bindal Bridge on Chakrata road. The core area in the east is bounded by Bindal Rao, The core area in this part is
curvilinear in nature because the course of the river.

- **Chakrata Road in the East:** This road stretch starts from Bindal Bridge on Chakrata rod and ends at Kishan Nagar Chowk. The length of this road stretch is 1 kilometer.

- **Ballupur Road in the East:** This road stretch starts from Kishan Nagar Chowk and ends at Ballupur Chowk. The length of this road stretch is 2.7 kilometres.

- **General Mahadev Singh Road East and South:** This road stretch starts from Ballupur Chowk and ends Shimla bypass road, The length of this road stretch is kilometres.

- **Shimla Bypass Road in the South:** This road stretch starts from Shimla bypass road and general Mahadev Singh road intersection and ends at Shimla Bypass junction on Saharanpur road. The length of this road stretch is 300 meter.

- **Saharanpur Road:** This road stretch starts from Shimla Bypass junction and ends at ISBT junction. The length of this road stretch is 500 meter.

Once the core area is formulated it will help the traffic law enforcing agency to focus on specific area where traffic law enforcement is highly needed. In an unplanned city like Dehradun, problematic areas are mostly in the old city where width of roads is generally narrow, abutting land uses are generally commercial plus residential, high pedestrian movement, least open spaces for parking. Places like Jhandawala, Dhamawala, Kotwali, Paltan Bazar, etc.; are the prime example where the characteristics of old city can be easily noticed. The characteristics of the new city area in the periphery of the old city area are quite different from the characteristics of old city area, for example, road width in new city area is more than the old city area. So for spatial enforcement plan it is essential to differentiate all the area of the city according to their characteristics. Same traffic law enforcement approach should not be adopted as it will not lead to achieving our objectives.

**Step III: Mapping the City Road Network**

Once the core city area is demarcated, the next step to follow is to map the road network of the city including all major and minor roads. Mapping of the road network can easily be generated by using GIS based tools, Google Earth, Google Maps, Yahoo Maps, etc. As we know that the enforcement can be a key tool to decongest the city traffic if implemented spatially, and for that it is very necessary to study the road network of the city and collect information about the road network, road user behaviour, and violations in specific area of the city. It is very
essential to correlate all these violations with the road users and road network of the city. It is also essential to identify all major and minor road networks of the city. During the collection of primary data in Dehradun city all the road networks major and minor were identified (Fig. 3).

Step IV: Analyzing the main corridors and related problems
In the above given map of the Dehradun city, one can easily distinguish that few major roads bisect or pass through the city. Major roads which pass through the city are Chakrata road, Rajpur Road, Gandhi Road Haridwar Road, Saharanpur Road, Haridwar Bye pass road, GMS Road and East Canal Road. To implement traffic law enforcement spatially, it is highly recommended to further divide the road network of the city into major route corridors for macro level study and to understand the major problems of each corridor as given below.

- **Problems in Corridor - I; Saharanpur - Mussoorie Road:** Saharanpur-Mussoorie Road is one of the major corridors of Dehradun city. This is link road between Delhi Saharanpur to Dehradun and Mussoorie. This road divides Dehradun into two equal parts, and passes through the centre of old Dehradun. Most of the development of the city is taking place along this road. This stretch witnesses a mixed land use thereby generating larger volume of traffic and parking. There are many important government offices, police stations, traditional commercial area, malls, schools and colleges, hotels, service and repair shops, hospitals and saw mills, etc. It serves the whole population of the city and experiences heavy traffic. The second major factor is that it also serves high volume of through traffic for Mussoorie and Haridwar. Therefore, this road faces many problems regarding traffic and parking. Central and old parts of the city has narrow roads, high density of population, old vacant buildings, and heavy commercial activity and small industries. Factors affecting free movement of traffic in this route area as following;
  - Absence of demarcation of parking areas through signs and markings;
  - Shopkeepers have encroached upon the road for displayed their products, which affects free flow of the traffic;

![Fig. 5: Map of the Road Network Dehradun City.](image-url)
- Certain sections of the corridor are being encroached upon by vendors and slum dwellers thereby eating into precious space from right of way;
- There are certain sections of corridor, which are narrow coupled with encroachments; and
- It was observed during the reconnaissance surveys that bandwagons are parked alongside roads thereby forcing the LMVs and other vehicles to park on the carriageway leading to decrease in the width of road available for movement of vehicles and hence causing congestion.

- **Problems in Corridor-II; Chakrata Road, Ballupur Road, General Mahadev Singh Road and Shimla by Pass Road:** Chakrata road is densely populated commercial area. This corridor predominantly has commercial and residential area. This corridor has lesser volume of traffic as compared to Corridor - I.
  - This corridor has presence of mixed land use in terms of residential and commercial areas thereby leading to specific parking needs and parking problems;
  - A part of the right of way is encroached upon by vendors, slum dwellers thereby leaving lesser space for free movement of the traffic;
  - During reconnaissance surveys it was observed that vehicles are parked in a haphazard and unorganized manner thereby reducing the optimal utilization of right of way;
  - Gross violation of 'No Parking Zone' has been recorded at certain sections. It has been observed that people park their vehicles where a No Parking Sign is installed indicating total absence of enforcement;
  - In the same way all other major corridors have to be specifically examined. Spatial study will help the law enforcement agencies to analyze the major corridors properly which in return will help them to minutely study each section of a major corridor. So after analyzing all the corridors, the next step for the preparation of methodological and spatial enforcement plan is to sub divide major corridors into micro road sections; and
  - In the same manner other major road corridors have to be understood at macro level along with the related problems. Once all the major corridors are identified and studied, it is better to further divide these major corridors into smaller sections for micro level studies.

**Step V: Division of Road Network of the City into Smaller Section for Micro Studies**

For spatially planned traffic law enforcement, Dehradun city’s road network has been further divided into various sections for detailed study purposes and also for recommending proposals at the micro level. For spatial and methodological enforcement, it is important to subdivide major road corridors into minor road sections for proper micro level study and for preparation of micro level spatial
traffic law enforcement plans. Major road junctions can be used as the starting and end points as road junctions act as landmarks, and are easy to identify. Various smaller sections of major routes (Table 4, 5 and 6) for micro level analysis are enumerated below.

- **Smaller Sections of major corridors and Major Junctions**
  - **Saharanpur Road:** 1. MDDA office to ISBT Junction, 2-ISBT junction to Shimla Bypass junction, 3-Shimla bypass junction to Niranjanpur Sabzi Mandi Junction, 4-Niranjanpur Sabzi Mandi to Saharanpur Chow, 5-Saharanpur Chowk to Prince Chowk.
  - **Gandhi Road:** 1-Prince Chowk to Tehsil Chowk, 2-Tehsil Chowk to Darshan Lal Chowk, 3-Darshanlal Chowk to Clock tower
  - **Chakrata Road:** 1- Clock tower to Natraj Cinema, 2- Natraj cinema to Bindal Chowk, 3-Bindal Chowk to Yamuna colony Chowk, 4-Yamuna colony to Kishannagar Chowk, 5- Kishannagar Chowk to Ballupur Chowk
  - **GMS Road:** 1-Ballupur Chowk to Balliwala Chowk, 2- Balliwal Chowk to Kamla palace Chowk, 3-Kamala palace Chowk to Niranjanpur Mandi Chowk
  - **Rajpur Road:** 1-Clock tower to Ashly Hall Chowk, 2- Ashly Hall Chowk to Eucalyptus Chowk, 3-Eucalyptus Chowk to Dilaram Chowk, 4- Dilaram Chowk to RBI Chowk, 5-RBI Chowk to Hotel Aketa Chowk
  - **Raiipur Road:** 1-Darshanlal Chowk to Lancedown Chowk, 2-Lancedown Chowk to Kanak Cinema Chowk, 3-Survey Chowk to Sahastradhara Chowk
  - **EC Road:** 1-Kanak Cinema Chowk to Nainy Bakers Chowk, 2-Nainy Bakers Chowk to Eucalyptus Chowk, 3-Nainy Bakers Chowk to Survey Chowk, 4-Survey Chowk to Aaraghar Chowk
  - **Haridwar Road:** 1-Prince Chowk to CMI Chowk, 2-CMI Chowk to Aaraghah Chowk, 3-Aaraghar Chowk to Agarwal Chowk, 4-Agrawal Chowk to Fountain Chowk, 5-Fountain Chowk to Nehru colony Chowk, 6-Nehru colony Chowk to Rispana bridge to Vidhansabha Chowk, 7-Nehru colony Chowk to Dharampur Chowk, 8-Daharampur Chowk to Agarwal Chowk

Subdivision of major corridors into smaller sections helps in identifying problems in specific area with specific violations. This study helps in understanding and differentiating between general and specific problems of route stretches, and traffic law violations rampant in specific area and affects of those violations. Now enforcement agencies can think of what has to be planned to curb those violations. For specific and micro level studies of each section, road inventory of each section has to be collected, complied and analyzed.

**Step VI: Identifying and Earmarking the Specific Problems in Micro Road Sections**

Once a details about the micro sections is collected through primary data, secondary data, pictures, graphs, charts, tables, traffic volume counts traffic law
Table 4: Road Inventory of the Smaller Sections

<table>
<thead>
<tr>
<th>Loc. No.</th>
<th>Name of Location</th>
<th>Left Footpath (In mts.)</th>
<th>Left Carriageway (In mts.)</th>
<th>Median (In mts.)</th>
<th>Right Carriageway (In mts.)</th>
<th>Right Foot-Path (In mts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saharanpur Road (Raja Ram Mohan Rai Academy To M.D.D.A Office)</td>
<td>0.00</td>
<td>11.40</td>
<td>1.30</td>
<td>10.10</td>
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</tr>
<tr>
<td>2</td>
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<td>11.60</td>
<td>1.30</td>
<td>11.50</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>Saharanpur Road (I.S.B.T. Chowk TO Raja Ram Mohan Rai Academy)</td>
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<td>12.30</td>
<td>1.30</td>
<td>11.70</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>Saharanpur Road (Majra Chowk TO I.S.B.T. Chowk)</td>
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</tr>
<tr>
<td>5</td>
<td>Saharanpur Road (Hotel Laxmi Palace To Majra Chowk)</td>
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<td>13.10</td>
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<td>9.60</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>Saharanpur Road (Hotel Laxmi Palace To Majra Chowk)</td>
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<td>13.90</td>
<td>1.30</td>
<td>10.60</td>
<td>0.00</td>
</tr>
<tr>
<td>7</td>
<td>Saharanpur Road (Mandi Chowk To Madur Milan Wedding Point)</td>
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<td>13.90</td>
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<td>9</td>
<td>Saharanpur Road (Hotel Laxmi Palace To Majra Chowk)</td>
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<td>1.30</td>
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<td>Saharanpur Road (Hotel Laxmi Palace To Majra Chowk)</td>
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<td>3.50</td>
<td>0.00</td>
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<td>1.30</td>
<td>3.10</td>
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<td>1.30</td>
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<td>26.30</td>
<td>1.30</td>
<td>2.30</td>
<td>0.00</td>
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<td>29</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>26.90</td>
<td>1.30</td>
<td>1.90</td>
<td>0.00</td>
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<tr>
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<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>1.30</td>
<td>1.50</td>
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<td>31</td>
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<td>1.10</td>
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</tr>
<tr>
<td>32</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>0.70</td>
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</tr>
<tr>
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<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>1.30</td>
<td>0.30</td>
<td>0.00</td>
</tr>
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<td>34</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>1.30</td>
<td>0.90</td>
<td>0.00</td>
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<td>35</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>1.30</td>
<td>0.50</td>
<td>0.00</td>
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<tr>
<td>36</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>31.10</td>
<td>1.30</td>
<td>1.10</td>
<td>0.00</td>
</tr>
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<td>37</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>38</td>
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<td>32.30</td>
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<td>39</td>
<td>Saharanpur Road (M. G Road (Arhat Bazar (Post Office) To Saharan Pur Chowk)</td>
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<td>32.90</td>
<td>1.30</td>
<td>0.90</td>
<td>0.00</td>
</tr>
</tbody>
</table>

challans counts spatially, etc.; the next step is to compile and then analyze the data. To identify and earmark specific problems in a micro road section, we have
Table 5: Road Inventory of the Smaller Sections

<table>
<thead>
<tr>
<th>Loc. No.</th>
<th>Name of Location</th>
<th>Left Foot-path (In mts.)</th>
<th>Left Carriagway (In mts.)</th>
<th>Median (In mts.)</th>
<th>Right Carriagway (In mts.)</th>
<th>Right Foot-path (In mts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chakrata Road (Clock Tower to Doon Bible Church)</td>
<td>0.00</td>
<td>11.20</td>
<td>0.70</td>
<td>11.90</td>
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</tr>
<tr>
<td>2</td>
<td>Chakrata Road (Bible Church to Bindal Pull)</td>
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<td>13.40</td>
<td>0.50</td>
<td>10.70</td>
<td>4.60</td>
</tr>
<tr>
<td>3</td>
<td>Chakrata Road (Bindal Pull to Yamuna Colony Chowk)</td>
<td>0.00</td>
<td>8.90</td>
<td>0.50</td>
<td>8.10</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>Chakrata Road (Yamuna Colony Chowk to Punjab National Bank)</td>
<td>1.50</td>
<td>6.60</td>
<td>0.50</td>
<td>7.70</td>
<td>1.40</td>
</tr>
<tr>
<td>5</td>
<td>Chakrata Road (Punjab National Bank to ONGC Hopital)</td>
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<td>7.90</td>
<td>0.50</td>
<td>7.60</td>
<td>1.50</td>
</tr>
<tr>
<td>6</td>
<td>Chakrata Road (ONGC Hospital to Ballupur Chowk)</td>
<td>1.80</td>
<td>8.80</td>
<td>0.50</td>
<td>8.70</td>
<td>1.60</td>
</tr>
<tr>
<td>7</td>
<td>GSM Road (Ballupur Chowk to Wadia Institute of Himlaya Gelogy)</td>
<td>2.70</td>
<td>11.20</td>
<td>0.30</td>
<td>8.70</td>
<td>0.00</td>
</tr>
<tr>
<td>8</td>
<td>GSM Road (Wadia Institute of Himlaya Gelogy to Balliwala Chowk )</td>
<td>0.00</td>
<td>11.20</td>
<td>0.30</td>
<td>9.80</td>
<td>0.00</td>
</tr>
<tr>
<td>9</td>
<td>GSM Road (Balliwala Chowk To Sangam Vihar Chowk)</td>
<td>0.00</td>
<td>8.70</td>
<td>0.30</td>
<td>9.60</td>
<td>0.00</td>
</tr>
<tr>
<td>10</td>
<td>GSM Road (Sangam Vihar Chowk To Janak Puri (Near Doon scottish Academy) )</td>
<td>0.00</td>
<td>11.20</td>
<td>0.30</td>
<td>8.50</td>
<td>0.00</td>
</tr>
<tr>
<td>11</td>
<td>GSM Road (Janak Puri (Near Doon scottish Academy) To GSM Road (Near Gramin Bank) )</td>
<td>0.00</td>
<td>8.90</td>
<td>0.30</td>
<td>9.70</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td>GSM Road (Near Gramin Bank) To Mandi Chowk</td>
<td>0.00</td>
<td>11.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>13</td>
<td>Chakrata Road (Bindalpul Near Drain)</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 6: Road Inventory of the Smaller Sections

<table>
<thead>
<tr>
<th>Loc. No.</th>
<th>Name of Location</th>
<th>Left Carriagway (In mts.)</th>
<th>Median (In mts.)</th>
<th>Right Carriagway (In mts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Haridwar Road (Prince Chowk to Bus Depot)</td>
<td>9.20</td>
<td>0.00</td>
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<td>2</td>
<td>Haridwar Road (Prince Chowk to Bus Depot)</td>
<td>14.10</td>
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</tr>
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<td>3</td>
<td>Haridwar Road (Bus Depot to Araghar Chowk)</td>
<td>8.80</td>
<td>0.90</td>
<td>8.40</td>
</tr>
<tr>
<td>4</td>
<td>Haridwar Road (Araghar Chowk to Dhampur Chowk)</td>
<td>14.10</td>
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</tr>
<tr>
<td>5</td>
<td>Haridwar Road (Dhampur Chowk to Rispina Phul)</td>
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<td>0.90</td>
<td>10.10</td>
</tr>
<tr>
<td>6</td>
<td>Haridwar Road (Nehru Colony Chowk to Fountain Chowk)</td>
<td>13.80</td>
<td>0.50</td>
<td>9.50</td>
</tr>
</tbody>
</table>

To study route sections and compare between routes for specific enforcement which can lead towards achieving the aim behind enforcement. No two road sections are similar in nature in all aspects and similarly no two routes have similar problems. Therefore, it is important for traffic law enforcement agencies to prepare a comparison chart of the route and accordingly enforce traffic laws. For explanation comparison between two specific routes, problems present, and type of enforcement required is detailed in the Table 7.
### Table 7: Identifying and Earmarking the Specific Problems in Micro Road Sections

<table>
<thead>
<tr>
<th>Road Section</th>
<th>Present Scenario of the road section.</th>
<th>Type of violations for which enforcement has to be done in specific area</th>
</tr>
</thead>
</table>
| Paltan Bazar to Lakhi Bagh            | • Width of ROW is narrow, ROW not more than 11 meters.  
• High Pedestrian Movement  
• No entry for Heavy Vehicle  
• Congestion  
• Low Speed of vehicle  
• Encroachment on footpath  
• Mixed land use  
• High Hawker Movement  
• High Density  
• On street parking space available  
• Traffic Movement Low to Moderate. | Enforcement required to reduce Parking Violations  
Enforcement required for No entry violations & Encroachment has to be removed by Nagar Nigam. etc |
| Mussoorie Diversion to Sai Baba Temple| • Width of ROW is narrow  
• Low pedestrian Movement  
• All the vehicle area allowed  
• Least congested  
• High Speed of vehicles  
• Least encroachment  
• Mostly Residential  
• Least Hawker Movement  
• Low Density  
• No parking space available.  
• Traffic Volume High | Enforcement for over speed violations  
Enforcement for wearing protective gear. etc |

As no two route sections are similar in nature therefore it is important to understand that implementing same strategy for all road sections will not result in achieving the target. In the above Table, the major road sections of Dehradun city were analyzed further to simplify how methodological and spatial traffic law enforcement has to be opted. This methodology can help traffic law enforcement agencies in understanding routes and traffic law enforcement required in each section.

#### Step VII: Collection of Spatial Data on Traffic Violations by Road users in Specific Area

Before analyzing the data regarding traffic law violations done by road users spatially in specific area, the first and foremost thing is to change the format of *challaning* receipts. *Challaning* receipt format should include the exact location where violation occurred and impact of that violation on traffic. It is important to correlate the type of violations and impact of traffic law enforcement. One has to study impacts of traffic violation as illustrated here.
Step VIII: Categorization of Traffic Laws for Enforcement to Achieve Specific Objective

Traffic law enforcing agency has to be very precise about their motive behind the initiation of traffic law enforcement drives. To achieve desired objectives traffic enforcement has to be further classified into smaller sections. Motives for traffic law enforcement can be different as described below in the Fig. By further analyzing traffic law violation records of Dehradun traffic police will get to know what they are able to achieve.

Step IX: Curbing the Violations in Specific Areas with Spatial Traffic Law Enforcement Approach

To curb the specific spatial violations, which cause traffic congestion, traffic law enforcement agencies has to definitely adopt and adhere to this new methodology of spatial traffic law enforcement system. Time has come when old approach of

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Traffic Law Violations</th>
<th>Impact of enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Without helmet</td>
<td>Enforcement for this traffic law violation is important for road safety but can’t help in decongesting the city traffic.</td>
</tr>
<tr>
<td>2.</td>
<td>Without Seat Belt</td>
<td>Enforcement for this traffic law violation is important for road safety but can’t help in decongesting the city traffic.</td>
</tr>
<tr>
<td>3.</td>
<td>Without Number Plate</td>
<td>Enforcement for this traffic law violation is important for road safety, identification of vehicle and its owner etc but can’t help in decongesting the city traffic.</td>
</tr>
<tr>
<td>4</td>
<td>Using Black Film on window panes</td>
<td>Enforcement for this traffic law violation is important but can’t help in decongesting the city traffic.</td>
</tr>
<tr>
<td>5.</td>
<td>Parking Within junction area yellow box.</td>
<td>This traffic law violation hinders traffic movement and by enforcing for this traffic law violation, can help the traffic police in decongesting the traffic movement</td>
</tr>
<tr>
<td>6.</td>
<td>Parking in No parking Zones</td>
<td>This traffic law violation hinders traffic movement and by enforcing for this traffic law violation, can help the traffic police in decongesting the traffic movement</td>
</tr>
<tr>
<td>7.</td>
<td>Boarding and alighting of passengers in Junction area.</td>
<td>This traffic law violation hinders traffic movement and by enforcing for this traffic law violation, can help the traffic police in decongesting the traffic movement</td>
</tr>
</tbody>
</table>
Table 9: Spatial Traffic Law Enforcement Tabular Format

<table>
<thead>
<tr>
<th>S. No</th>
<th>Act, Rules, &amp; regulations</th>
<th>Violation of Section</th>
<th>Impact of enforcement</th>
<th>Where to enforce spatially</th>
<th>Major objectives.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 2</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Every where</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>2</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 3</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Near Road Junctions</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>3</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 6 (a,b)</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Near Road Junctions, if he is near a point, bend of corner or hill or other obstructions.</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>4</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 7</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Road Sections</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>5</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 9</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Road Junctions</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>6</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 12</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Locations where U turn is prohibited</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>7</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 14</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Near Road Junction, Gaps in the median &amp; U Turns</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>8</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 15</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Road Junctions, Narrow Roads, Places where no parking is specified Etc as specified in RRR Section 14.</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>9</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 17 (i, ii)</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic,</td>
<td>Where traffic signage is installed, places where this offence is committed</td>
<td>To decrease the traffic jam and congestion</td>
</tr>
<tr>
<td>10</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 18</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic</td>
<td>Channelized roads</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>11</td>
<td>The Rules of the Road Regulations, 1989</td>
<td>RRR- Section 31</td>
<td>Increases road safety, decreases congestion, increases smooth movement of traffic,</td>
<td>places where this offence is committed</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>12</td>
<td>The Motor Vehicle Act, 1988</td>
<td>MVA- 1988 Section 3</td>
<td>Increases road safety, increases smooth &amp; safe movement of traffic.</td>
<td>Near schools, tuition centres, college, parks, etc</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>13</td>
<td>The Motor Vehicle Act, 1988</td>
<td>MVA- 1988 Section 122</td>
<td>Increases road safety, increases smooth &amp; safe movement of traffic.</td>
<td>City area mostly city core area. Places where traffic jam &amp; congestion is common.</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>14</td>
<td>The Motor Vehicle Act, 1988</td>
<td>MVA- 1988 Section 127</td>
<td>Increases road safety, increases smooth &amp; safe movement of traffic.</td>
<td>All Public spaces</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>15</td>
<td>The Motor Vehicle Act, 1988</td>
<td>MVA- 1988 Section 201</td>
<td>Increases road safety, increases smooth, safe &amp; free flow of the traffic. Removes un- necessary bottle necks.</td>
<td>Any public space</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
<tr>
<td>16</td>
<td>The Motor Vehicle Act, 1988</td>
<td>MVA- 1988 Section 117</td>
<td>Increases road safety, increases smooth, safe &amp; free flow of the traffic. Removes un- necessary bottle necks.</td>
<td>Junctions &amp; All public spaces</td>
<td>To decrease the traffic jam &amp; congestion</td>
</tr>
</tbody>
</table>

Jugmohan Singh
traffic law enforcement has to give way to new spatial traffic law enforcement system. To decongest city traffic, city’s traffic police have to start the enforcement drive against the violations which cause traffic congestion in the city. To make spatial traffic law methodology easier to understand, it is excellent to prepare a table which specifies what kind of enforcement is required to attain a certain objective. Detailed specific and spatial tabular set up for implementation of traffic law enforcement to attain optimum results from traffic law enforcement in Dehradun city will be useful (Table 8 and 9). Categorization of offences, impact of enforcement, and objectives to be achieved are scientifically described.

There are x number of sections, notifications, codes, rules and regulations related to vehicles, road users for which enforcement can be done. But if our objective is to decongest the city traffic and for smooth movement of traffic without any obstruction along with safety, the focus has to be concentrated towards some of the violations elaborated above in the table. For achieving other objectives enforcement agency has to focus on other sections, notifications, codes, rules and regulations related to vehicles, road users. By analyzing violations and impacts of enforcement against each violation, we can state that traffic law enforcement drives can achieve different objectives. To achieve other objectives it is important to select specific rules and regulations in a methodological manner.

**Step X: Analysis of the violations after spatial traffic law enforcement drives**

Once this approach is implemented in few model cities, data regarding the same has to re-evaluated and change in the overall traffic scenario has to be checked, and before and after scenario has to be analyzed. Analysis of this data can help to in educating, enhancing enforcement system strategy and the police personal in other cities. This approach will help traffic law enforcement agencies in Dehradun (Uttarakhand) and other state in India to plan enforcement drives to attain planned objectives for their cities. In this manner results can be achieved in less time with less confusion and absolute precision.

**5. CONCLUSIONS**

Methodologically specific and spatial traffic law enforcement plan is a better approach and strategy to achieve the objective of decongesting a city traffic and to enhance free flow of traffic in urban areas. This strategy can help in achieving other goals as well. The only thing which is required to be changed is the approach in which traffic law enforcement agencies enforce traffic laws. Time is ripe to move from the old enforcement strategy to new and advanced enforcement, planning and implementation strategy. To implement spatial traffic law enforcement strategy no additional infrastructure or manpower is needed. This systematic methodology is cost effective, simple and objectively precise in nature. Famous, prestigious and influential departments like the Bureau of Police
Research and Development, New Delhi, Home Department and Police Department of all states, and police training academies can facilitate in achieving this goal across India. It is exceptionally vital to impart training and to educate traffic law enforcement agencies about this advanced approach of enforcement. Planners of reputed organization with minimum about 5 years of experience should be engaged to prepare spatial traffic law enforcement plans, and encourage training to traffic law enforcement agencies for better understanding of this approach.

REFERENCES

*Development plans reflect the changes which are taking place in the country’s economic and social structure as well as the directions in which the structure has to be reorganised and strengthened. In a democracy the pace of change depends to a large extent on increase in public understanding and in public response and on the growth of a scientific outlook on the part of large numbers of people. Besides the economic and social objectives, the educational aspects of planning are, therefore, of great importance.*

*Jawaharlal Nehru*
Impact of Urbanization on Urban Lakes: 
A Case of Hyderabad

R. Nageshwar Rao and Nauman Najammuddin

Abstract
Water bodies are an integral part of urban landscape all over the country and are important aquatic ecosystems, constituting an important source of fresh water. Water bodies served several needs of rural life, serves as water harvesting structure impounding surplus rain water, recharging ground water and feeding wells, providing protective irrigation water, Domestic water supply and drinking water for cattle bathing and washing. In urban context Water bodies recharging ground water, urban water supply, flood control, Water bodies provides recreational activities, provides open space with greenery in urban area. The environmentally and hydrological degradation of water bodies in urban area has bad impact on basic urban needs like domestic water supply, recreational activities and irrigation water. Therefore it is necessary to preserve and develop these large open spaces i.e. water bodies.

1. INTRODUCTION
Water is one of the major structural components of the human body. Similarly water bodies are very important components of ecological and environment structure of nature system. The first human settlement around 6,000 years ago began a twofold struggle with water: on the one hand people had to protect themselves against floods, and on the other hand they had to ensure safe water supply for domestic use and irrigation. Water is the most important input for survival and growth of not only human beings, plants, animals and other living beings on the earth but also economic development and environmental sustainability. At the same time water is a dynamic component of the soil and plant systems. Water is most scarce and precious natural resources.

Cities are gifted with innumerable lakes, but due to urbanization and lack of concern for the natural resources, these assets are getting depleted. Many have been shrunk in size due to encroachments by slums and urban settlements and many others are getting polluted due to discharge of sewage and industrial wastes. Due to construction activity like roads and buildings, natural drainage gets blocked and leads to water logging and flooding. Excessive paved areas in the city also lead to less percolation of water. Rain water, which is a source of fresh water, is not being harvested properly and hence drains into rivers and ultimately joins the sea. This is sheer wastage of fresh water which can be consumed but due to lack of proper tapping facilities it is getting wasted. If
rainwater is not trapped in lakes, ground water recharge does not take place. Hence, water table depletes which leads to water crisis.

Regulations are getting formulated to protect water bodies but the biggest lacuna is non-implementation of these guidelines in any of the plans. Also, there is a lack of integration of natural topography. Either there is complete land use change or encroachment by the commercial settlements or by slums in the water body. There is a need to not only restore water bodies but also integrate it with the surrounding land uses. Consequently, ground water along with surface water is reducing. Few lakes which are being restored and integrated with the surrounding land uses have become successful. There will be an increase in social and economic activity as well along with healthy environment.

Oceans, seas, lakes and ponds are few examples of water bodies, while several natural water bodies find a mention in mythology. Many man-made ponds, lakes and reservoirs boast of a royal origin as they were built by kings from different eras. Water bodies, the resources of water locally, are important to the local ecology and environment. As diverse as the country’s heritage, these water bodies integrate culture with traditional wisdom to harvest rainwater and replenish water tables. The quality and quantity of water in the water bodies is getting affected by increasing urbanization and insensitivity to ecology.

Water bodies are an integral part of city’s open spaces and connected to various traditions and religious functions. At the same time larger open spaces in the city also maintain eco-system. It provides immense potential to tourism in the city. Many times human interface with the water front of these water bodies may be liable to contaminate and pollution. Therefore, it is necessary to preserve and develop these large open spaces i.e. water bodies.

Water bodies are an integral part of urban landscape all over the country and are important aquatic ecosystems, constituting an important source of fresh water. Water bodies served several needs of rural life, serves as water harvesting structure impounding surplus rain water, recharging ground water and feeding wells, providing protective irrigation water, domestic water supply and drinking water for cattle bathing and washing. In the urban context water bodies recharging ground water, urban water supply, flood control, Water bodies provide recreational activities, and provide open space with greenery in urban area. The environmental and hydrological degradation of water bodies in urban areas has badly impacted basic urban needs like domestic water supply, recreational activities and irrigation water.

2. A CASE STUDY OF HYDERABAD
The Hyderabad Metropolitan Development Authority (HMDA) was constituted on 25 August 2008 for an area of 7,228.09 sq km. The jurisdiction of HMDA is the
Fig. 1: Location of Hyderabad

Source: HMDA, 2011

Fig. 2: Master Plan of Hyderabad, 2031
third largest in India after the jurisdiction area of the National Capital Region around Delhi (45,000 sq km) and Bangalore Metropolitan Region Development Authority (8,005 sq km).

With the undulating topography of the Deccan region, Hyderabad city and its environs were dotted with a number of natural water bodies such as lakes and tanks. Hyderabad is located in southern India (17°22’ N, 78°-27’ E, 525.5 Mtrs MSL). It is the capital city of the state of Andhra Pradesh. Hyderabad population is 8 million in 2011. River Musi flows west to east. Hussain Sagar Lake is the heart of the city.

2.1 The Lakes of Hyderabad

Hyderabad, once known as city of lakes. But due to chaotic urbanization, rampant construction, burgeoning legislations, absence of an effective administrative system, lack of concern for the natural resource and lack of awareness amongst the people have adversely affected the urban lakes and these are getting depleted. Unplanned and unregulated urbanization and industrialization has led to large scale degradation of the surface water bodies in both quality and quantity.

Encroachment of the lakes both planned and unplanned / unauthorized on natural drainage channels. Urban lakes and its catchment are mostly receptacles of untreated / partially treated sewage On one hand the city is facing acute water crisis with the dwindling surface and groundwater resources on the other, water logging and urban floods are a common sight after short spells of rains accompanied with storms.

Historically, the semi-arid nature of Hyderabad's topographical location called for an optimized approach to its natural water resources. The city boasted of the traditional cascading system of water bodies whereby all the lakes were connected through a network of canals that ran through the landscape. Water supply for city and agricultural fields were irrigated directly by the water from these water bodies or from open wells which depended on these tanks for recharging. The open landscape that surrounded the lakes acted as a natural watershed to recharge the lakes with fresh precipitation.

This legacy was forgotten in the grip of urbanization, much of the landscape around these lakes gradually got covered by impervious surfaces. Poor attention was paid to preserving the existing lake system and eventually the lakes network got encroached. Instead of inflows from the catchment due to precipitation, untreated sewage and effluents from urban dwelling units started filling the lakes, drastically affecting the lake biodiversity.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Growth Rate%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>1,796,000</td>
<td>—</td>
</tr>
<tr>
<td>1981</td>
<td>2,546,000</td>
<td>41.8%</td>
</tr>
<tr>
<td>1991</td>
<td>3,059,262</td>
<td>20.9%</td>
</tr>
<tr>
<td>2001</td>
<td>3,637,483</td>
<td>31.2%</td>
</tr>
<tr>
<td>2011</td>
<td>6,809,970</td>
<td>67.2%</td>
</tr>
</tbody>
</table>

Source: Census of India, 2011

R. Nageshwar Rao and Nauman Najammuddin
Spatial development strategies and regulations should be considered for the water bodies as a part of the urban ecosystem with special context for the preparation of development plan. Keeping in view all the above issues, there is a need to conserve and manage the fresh water available on earth. Thus, there is a need to conserve the existing water resources.

2.2 Growth Rate of Hyderabad’s Population

The decadal growth rate of Hyderabad Urban Agglomeration (HUA) was a high of 41 percent during seventies and eighties respectively. But it came down to 31.2 percent during 1991-2001.

Much of the spatial expansion in the last two decades in the HUA has occurred in the surrounding municipalities. These areas recorded a high growth rate of 71 percent in nineties as compared to only 18.7 percent by the core city (MCH). Several of these areas have been growing at high rates from eighties onwards. Together, their share of population in the HUA has increased from about 23 to 30 percent while there is a corresponding decline in that of the MCH.

2.3 Loss of Water Bodies

As the city has grown, urban sprawl has encroached vacant lands and water bodies due to the increasing pressure on land for housing and other activities. There were 932 water bodies in 1980 which decreased to 834 in 1990 and to 400 in 2010. And the percentage reduction of geographic area of lakes during the same period amounts to 2.51%; 2.40% and 1.57% respectively as per Revenue Department (2010). Channels that used to carry floodwaters from one lake to the next in a catchment area, have also been encroached by private and government agencies. Discharge of untreated industrial effluents has led to the total degradation of the water quality in many water bodies. Non-implementation of building regulations and pollution control laws has encouraged encroachment and pollution of water bodies.
It is estimated that there were 932 water bodies in 1980 which decreased to 834 in 1990 and to 400 in 2010. Urban areas have lost several lakes during the process of development, which were earlier natural sources of water for agriculture and several other economic activities.

A study on land use and land cover for Hyderabad and a large area around reveals that the area under water bodies has come down from 2.51 percent of the geographical area in 1980 to 2.40 percent in 1990 and to 1.57 percent in 2010.

### Table 2: Lakes Proposed for Conservation Category -I

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Name of the Lake</th>
<th>Village</th>
<th>Notified</th>
<th>Additional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Category - 1 lakes with special problem (18 lakes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Safilguda lake</td>
<td>Malkajgiri</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Saroornagar lake</td>
<td>Saidabad</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Langerhouse</td>
<td>Langer House</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Kapra Lake</td>
<td>Kapra</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Durgam Chreuvu</td>
<td>Raidurg paigh</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hasmanpet</td>
<td>Hasmanpet</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Nalla Cheruvu, Uppal</td>
<td>Uppal Khalsa</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pedda Cheruvu, Nacharam</td>
<td>Nacharam</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Medchal lake</td>
<td>Medchal</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Patancheruvu</td>
<td>Patanchrulu</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Amber Cheruvu</td>
<td>Bhaghmeri</td>
<td>148</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Rayasamudram Cheruvu</td>
<td>R.C. Puram</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Ragadamini lake</td>
<td></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Patel Cheruvu, Nacharam</td>
<td>Nscharam</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Chinnarayanan Cheruvu, Alwal</td>
<td>Cheruvu</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Yellama Cheruvu, Kukatpally</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Sudulavani kunta, Allapur</td>
<td>Allapur</td>
<td>166</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Mir Alam Tank</td>
<td>Mir Sagar</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Source: [www.hmda.gov.in](http://www.hmda.gov.in), 2011
Hyderabad has 169 notified lakes which has more than 10 hectare of water spread area. They are classified according to their water spread area into very large, large, medium, small and very small lakes. HUDA has initiated a lake conservation programme with the assistance of Royal Netherlands Government under the Green Hyderabad Environment Programme.

87 lakes have been identified for conservation based on their pollution levels. They are grouped into Category-I or highly polluted lakes, which number 18. The remaining lakes are put into Category-II or moderately polluted. This area suffers from urban industrial intrusions and the water quality in the lakes is degraded due to the discharge of the effluents without any treatment.

Comparing all the circle of Hyderabad the growth rate of Uppal, Rajendranagar and Kapra are more and the most polluted lake is Nalla Cheruvu which comes in Uppal Circle.

3. WATER BODIES IN UPPAL CIRCLE

Uppal Circle is located in Rangareddy district of Andhra Pradesh. Uppal Municipality was brought under the administrative control of the HUDA. The Municipality then was merged with Municipal Corporation of Hyderabad along with 8 other municipalities from Medak and Rangareddy districts forming the Greater Hyderabad Municipal Corporation in April 2007. This resulted in a rapid growth of population along with change of economic activity from primary to secondary and tertiary sectors. GHMC takes care of the civic amenities in Uppal. The circle is located between residential, commercial, industrial sectors. The neighboring circles area are Kapra (Circle 1) and L.B. Nagar (Circle 3).
Geographically, it is located east of the state’s capital city of Hyderabad, specifically on the National Highway 202 to Warangal and the northern bank of the river Musi, the longitude 17° 22’ 48” N and latitude 78° 33’ 0” E.

There are four water bodies in the Uppal Circle: Nalla Cheruvu, Ramanthagur Pedda Cheruvu, Ramanthagur Chinna Cheruvu, and Pedda Cheruvu.

Nalla Cheruvu

The site is surrounded by the residential colony (Sriram Nagar, Shanti Nagar, Gandhi Nagar) on the north side, Bhagya Nagar, Boduppal, Buddha Nagar on the Northeast, slum area on the west side, Vegetable market on west side. Musi on south side and Shanti Nagar, Sai Ram Colony on the south side. This area is surrounded by the residential land use, manufacturing zones, multiple use zone, public and semi-public zones, Commercial zones. Most of the land use which is encroached is the residential and these are in the form of small row houses. Some other areas are occupied by the slum areas.

There have been rapid changes in the land use patterns covered by the Nalla Cheruvu catchment area. In the 1990s there was a rapid growth in the number of residential use in Uppal area. This made dominant land use type in catchments area. There has been a significant reduction in the areas of water bodies since 1990 to 2001 and 2011. There is a major percentage of swamp land were grass is being grown for cattle towards south side of Nalla Cheruvu. As much as

<table>
<thead>
<tr>
<th>Land use</th>
<th>1990</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>26</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td>Commercial</td>
<td>3</td>
<td>4.5</td>
<td>12</td>
</tr>
<tr>
<td>Industries</td>
<td>5.1</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Water body</td>
<td>3.1</td>
<td>1.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Public &amp; Semi Public</td>
<td>3.8</td>
<td>4</td>
<td>5.2</td>
</tr>
<tr>
<td>Roads</td>
<td>3.2</td>
<td>6</td>
<td>7.9</td>
</tr>
<tr>
<td>Agriculture/ Swamp land</td>
<td>28</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Conservation</td>
<td>0</td>
<td>0</td>
<td>1.5</td>
</tr>
</tbody>
</table>
4.61 hectare of land under water bodies have been lost in the past 2 decades due to the encroachments. It was 30.11 ha in 1995 and in 2011 it got reduced to 25 ha, reduction of 5.11 ha.

Uppal Nallacheruvu is situated near Srinivasa Colony, Uppal. Nalla Cheruvu was built by Nawab Asman Jah Bahadur. This was supporting the agriculture, Irrigation of the local farmers. It is one of the oldest and Hypereutrophic lakes shared by Uppal circle. Density pattern of the area lies within Hyderabad limits. Many industries have come up, developed factories, townships, etc; are formed in the nearby areas.

Nalla Cheruvu lies on North-East Basin of Musi River. Uppal and Kapra circles share its total catchment area. Total catchment area is 40.93 sq km. Stream channel carries sewage from Uppal area and enter as inflow. Here slope is from NW to SE.

Main Inlet Channel- Pedda Cheruvu (50.4 ha) Nacharam. Two outlets for surplus water to cater SE corner crossing the NH- 201 road about 30 meters a part and joining after crossing to form single channel leading towards Musi river.
Another outlet through a sluice gate is located at SW beyond wetland area joining Musi river. Existing inlet and outlet channels are earthen channels and are inadequate for maximum flood discharge. Inflow is from Inlet Channel which is connected with most of the residential as well as Institutional areas. Most of the houses in the catchment area have on site disposal systems of sewage. Maximum flow is from Inlet Channel-1, which is connected with most of the residential as well as industrial areas.

The major pollutants identified in the water of Nalla Cheruvu are Sulphate, Calcium, etc. The dissolved oxygen levels are very low and consequently the C.O.D and B.O.D of the lake are very high due to the extensive pollution. It is showing Hyper Eutrophication status in lake. Annual average rainfall of Hyderabad is 821.7 mm. Factors like, higher densities in the residential areas, growth of industrial sector, improved roads with storm water drains, have contributed to an increase in storm water runoff.

Water quality of the lake has been drastically degrading due to the exorbitant amounts of pollutants present due to the direct discharge of industrial effluents from liquor, steel, wood industries industrial area as well as with untreated domestic sewage and from storm water runoff which carries all solid wastes, liquid wastes, cattle dung, automobile wastes, hospital wastes, waste material from commercial areas, wedding halls in rainy seasons.

Inlet and outlet channels are in bad and unhygienic condition. The existing sewage system cannot support amount of sewage generated in the catchments area. The lake is losing its depth and becoming shallower due to the accumulation of silt where the nallahs meet the lake. Undesirable activities such as dohabi ghats, animal washing are contributing to sedimentation and pollution. Storm water drains are choked. Absence of lake water quality monitoring also contributes to this.

There is no proper buffer zone left surrounding the lake on two sides and there are degraded ill maintained bund. No fencing is there, while there are high rise residential areas around the lake. Green spaces, recreational and institutions are very less seen with only 4.1 percent. Refuse and sewer water pour into lake...

Table 4: Physical Conditions of Nalla cheruvu

<table>
<thead>
<tr>
<th>Surface area of Lake</th>
<th>25 HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.T.L</td>
<td>+473 Mts Lvl</td>
</tr>
<tr>
<td>Maximum Depth</td>
<td>5 Mts</td>
</tr>
<tr>
<td>Colour</td>
<td>Turbid brown</td>
</tr>
</tbody>
</table>

Source: Irrigation Dpt. I& CAD, Hyd

Table 5: Inflows at Inlets of Nalla cheruvu

<table>
<thead>
<tr>
<th>Inlet Drains</th>
<th>DWF Flowing into the lake in in MLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet I</td>
<td>32.96</td>
</tr>
<tr>
<td>Inlet II</td>
<td>3.27</td>
</tr>
<tr>
<td>Inlet III</td>
<td>21.32</td>
</tr>
<tr>
<td>Total</td>
<td>57.55</td>
</tr>
</tbody>
</table>

Source: Ngri, Uppal Municipality, Lpc

Table 6: Decadalwise variations in FTL Lvl of Nallacheruvu

<table>
<thead>
<tr>
<th>Decades</th>
<th>FTL (in HA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>27</td>
</tr>
<tr>
<td>2001</td>
<td>23</td>
</tr>
<tr>
<td>2011</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Irrigation Dpt. I& CAD, Hyd

Fig.14: Decadalwise Variations in FTL Lvl of Nallacheruvu

Source: Irrigation Department, Hyderabad

R. Nageshwar Rao and Nauman Najammuddin 55
from industries and hotels constructed on its banks.

For a given rainfall, increased volume of runoff and increased peak discharge are two effects attributable to urban development. Reduction of the watershed storage capacity, and the increased efficiency of runoff flow paths, is a direct consequence of elimination of porous soil surfaces, infiltration and surface depressions,

Table 7: Comparison between Present Conditions to the Standards of Water Quality.

<table>
<thead>
<tr>
<th>S.no.</th>
<th>Substances</th>
<th>Existing</th>
<th>Standards(CPCB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PH Value</td>
<td>7.2</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>2.</td>
<td>NO3 (Nitrate)</td>
<td>5.5</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>PO4 (Phosphates)</td>
<td>3.9</td>
<td>0.01</td>
</tr>
<tr>
<td>4.</td>
<td>COD in mg/lit</td>
<td>136</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>BOD in mg/lit</td>
<td>46</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>DO</td>
<td>2.57</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: AP-PCB

Table 8: Storm water Runoff Nallacheruvu

<table>
<thead>
<tr>
<th>Land use Type</th>
<th>Runoff m3/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>12.1</td>
</tr>
<tr>
<td>Industrial</td>
<td>3.6</td>
</tr>
<tr>
<td>Open Space</td>
<td>1.0</td>
</tr>
<tr>
<td>Public Semipublic</td>
<td>2.015</td>
</tr>
<tr>
<td>Commercial</td>
<td>2.35</td>
</tr>
<tr>
<td>Roads</td>
<td>2.72</td>
</tr>
<tr>
<td>Total</td>
<td>23.78</td>
</tr>
</tbody>
</table>

Source: AP-PCB

Fig. 15: Comparison between Present Conditions to the Standards of Water Quality.

Fig. 16: Degraded Inlet Chaneels

Fig. 17: Nallacheruvu and Surroundings
holding areas and providing paved channels for runoff flow. 78 percent of land is impervious and leads to rapid storm water runoff, while 21 percent is pervious surface.

Total waste water generated is 58.03 MLD. Total coverage UGD is 66.4 percent. The rest of the 33 percent households have individual toilets, the effluent from the septic tanks is carried into the open nallahs by open drains into the major nallahs and lakes. Existing STP of 30 MLD constructed is not sufficient for the total sewage generated in the area. Waste water and sewage is the main source of nutrients that set in a chain of events leading to degrading water quality.

High density is seen in the Uppal circle. High population density has resulted in excessive stress on existing infrastructure and services causing unhealthy and unhygienic living conditions.

Shrinking of lake area is a cause for concern. In 1995 it was 71.22 ha, which became 50.4 ha in 2011, a reduction of 20.82 ha. There is a change in drainage pattern due to unplanned constructions. Drainage channels are being obstructed by civil structures like roads, building, etc. Storm water runoff is getting mixed with sewage and disposed off via drainage networks. There is less ground water recharge. Water is not available in dry weather. There is an increased dependency on ground water for irrigation as well as domestic purpose. High

Fig. 18: Nallacheruvu and Surroundings

Fig. 19: Sewerage Details of Uppal

Source: Uppal Municipality

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ground water depletion rate results in lowering of water table and increase in cost of ground water exploration. Dry lakes are being converted into area for solid waste disposal. Total waste water generated is 48.7 MLD.

Dumping of solid waste into lakes is worrisome. Disposal of waste water through pipe network or open channels in lake is being done and also disposal of household refuse by the people residing on the encroached land of lake, and surface runoff. Open defecation by the nearby residents and villagers further pollute. Unhygienic living conditions in the surrounding area, contamination of ground water aquifer, breeding of mosquitoes, loss in economic value of water and spreading water born diseases in the area are some of the major impacts.

Availability of vacant or unused land around the lake, improper demarcation of land of lake and absence of any monitoring agency for lake are major reasons. Increased flood hazard for the residents and their waste refusal causes pollution in lakes. Rehabilitation and relocation issue during the development of lake should be taken up.

4. PROPOSED STRATEGIES FOR RESTORATION OF LAKES

- Development of recreational and public spaces, lake front development recreational spaces, parks landscape gardens and planting of various trees, shrubs, flowering plants, etc.
- Boating facilities such as construction of dock piers, etc.
- Rentable stalls, theme parks, restaurants, food courts, kids play areas
- Administrative offices, security chambers
- Fountains, aerators, small joy rides for kids, paths ways, road ways seating facilities, pergolas and shelters
- Adequate toilets, each being a twin unit for ladies and gents
- Electrification cabling, lighting, etc; and parking.

Water logging species such as Barringtonia can be planted to withstand prolonged inundation. Planting tree saplings like Neem, Jambolana, etc.; be encouraged and opportunities of livelihood through development of eco-tourism be also encouraged.

Development of recreational facilities such as walkways, guided boat rides, angling spots, landscape gardens and facilities for aquatic sports in the lake would be an effective tool for diversification of livelihood opportunities for local communities and generating awareness about importance of lake within basin. Educational and visitor interpretation services to be established at the critical locations particularly along the bund known as third line of defense to facilitate closer look at the lake and enjoying the boat rides within the lake. Specific training programs for various
target groups would be part of eco-tourism activities. Signages, communication and transport facility and visit to catchments would be part of eco-tourism development. In addition following issues be addressed for restoration of lakes.

- Improvement of water quality, suggested interventions and intake treatments
- Improvement of storm water drainage in catchment area and prevent and control of pollution in lakes
  - Nutrient and storm water volume absorbing rain gardens
  - Solid waste management in the catchments area
• Selection of technologies for the treatment of waste water for lakes
  - Soilscape filter
  It is the simulation of natural filtration process of water through the good vegetated soils and fragmented rock materials below which purified water percolates. Area required is only 50 sq m. Very cost effective as far as electrical consumption is required for conventional mechanistic systems.

• Hydrasch Succession Pond can be used for improvement of Sewerage System in Catchment Area and Prevent and Control of Pollution in Lakes; and

• Up-Gradation of Existing Sewage Treatment Plants

5. CONCLUSIONS
The existing water quality is not meeting the standards. Proposals for up gradation of STPs and continuous monitoring is required. This measure is also expected to improve the lake water quality to the level suitable for domestic secondary usage like flushing, gardening, bathing, contact water sports, fishing, etc., for the catchment area.

The existing lake water treatment is not adequate, because the incoming waste water shall be addressed using bye pass arrangements. The STP could be designed using bio-remediation concepts, where land area for treatment plant shall be reduced.

In densely populated urban regions where adequate wastewater treatment systems do not exist and uncontrolled discharge of wastewater endangers water resources, the measures be taken to treat wastewater adequately on-site before it is discharged into the environment and the treated wastewater is finally supplied to the houses for inferior domestic uses like toilet flushing and gardens.

Active participation from local community, citizen groups, conservation organizations, NGOs, media, etc; is necessary. Various stakeholders shall be involved in maintenance plan. A core group be formed comprising of all the users such as industrialists, citizen group, fishing firms, educational institutions, and government departments so that maintenance of lakes could be made sustainable.

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World Class Cities: An Overview

Anwesha Chakrabarty

Abstract
Cities world-wide are experiencing the dynamic processes of urbanization and globalization. The major cities of the world have been transformed in recent decades. This paper gives inference of growth and development in cities like New York, London, Canberra, Berlin, Mexico and Seoul. Large cities have to respond to some basic challenges: active economy, urban infrastructure, quality of life, social integration, institutional mechanism and governance. The capacity to response to these challenges and adaptation of new technology; makes the urban area a World-Class enterprise.

1. INTRODUCTION

In 1950, New York with a population of at least 10 million people was the only city in the world. According to the UN estimates, there were at least 16 cities or city regions with population in excess of 10 million by the year 2000. The projections for the next 50 years indicate that urban growth rates will rise steadily, particularly in the developing world. They range from familiar metropolitan agglomerations dominated by a strongly developed core such as the Greater London or Mexico City, to more polycentric geographic units as in the cases of the urban networks of the Randstad (conurbation of four cities i.e. Amsterdam, Rotterdam, Hague and Utrecht) in Holland. This development poses many deep challenges to researchers and policymakers in the context of increasing population, infrastructure provisions, urban governance and management.

The term world class cities is widely used to provide competitive advantage in the process of economic globalization by the city leaders and policy makers. The planning approach is embedded in the institutional structures and processes of governance of each city. These vary from city master plans or strategic policy frameworks, through to vision or mission statements, focusing on balanced development involving economic, environmental and social objectives. The world city concept has a strong focus on connectivity, networking, governability and polarization; generating ample employment, facilitating world-class physical infrastructure such as water, sewerage, drainage, power and tele-communication, and social infrastructure like health, education, recreation, safety and security provisions, accommodation for all, and sustainable environment.

Anwesha Chakrabarty, Urban Development Specialist, New Delhi
2. CASE STUDIES

The world’s mega-cities are merging to form vast mega-regions, which stretch hundreds of kilometers across countries and home to more than 100 million people. The world’s 40 largest mega-regions cover only a tiny fraction of the habitable surface of our planet, and are home to fewer than 18 percent of the world’s population but account for 66 percent of all economic activity and about 85 percent of technological and scientific innovation (UN, 2002). Some selected leading world cities are reviewed below.

2.1 New York

At the beginning of the nineteenth century, New York was a simple small compact mercantile city of 60,000 people, clustered in a square mile at the southern tip of Manhattan island. This was basically a pedestrian city. By 1830s New York witnessed elaborate network of transportation including toll roads, canals and rail roads. The first steps toward metropolitan regional plan began in 1920s with the following physical developments:

- Railway Transportation System with trunk line railroads and rapid transit lines for accommodation of both passengers and freight;
- Port and shipping facilities;
- Highway system with bridges, tunnels and waterways;
- Parks and recreational facilities;
- Location of public and semipublic buildings; and
- Establishing industries outside congested areas with suitable housing of employees

This Regional Plan for New York and Environs in 1929, got a setback due to the ‘Great Depression’ of 1930s which lead to crash the stock markets, halting all the development

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1 Based on www.wikipedia (2009) information
2 Article on New York City & the New Deal, Thomas Kessner, City University of New York

Anwesha Chakrabarty
works. In 1968 the New York State Joint Legislative Committee on Metropolitan and Regional Areas stressed the need for strong county government in metropolitan areas, and the creation of comprehensive planning systems. The Committee recommended that the state develop a policy of regionalism under which the state must encourage the creation of regional agencies, beginning with comprehensive planning bodies, adequately staffed to coordinate federal, state, local and private development activities with a regional impact \(^3\) (Thomas Kessner).

By 1950, the population in New York City (NYC) reached 7.9 million. Sub-Urbanism began to pull of new, single-family homes in Westchester, Long Island and New Jersey. This continued for subsequent decades. In 1989, a consolidation of the five Boroughs emerged as modern NYC with an area of approximately 790 sq km. The New York Metropolitan region has an estimated population of 8.4 million \(^4\) in 2009 and area of 17,400 sq km. It is the most densely populated region in USA and exceptionally diverse.

Of recent, New York City’s ‘Long Term Sustainability’ Plan released in April 2007 for the horizon period 2030, assumes continued growth in the city, with the appropriate infrastructure development, sustainable and beneficial to the environment producing public health benefits.

The Plan’s main goals are:

- **Housing**: Create homes for almost a million more New Yorkers, while making housing more affordable and sustainable.
- **Open Space**: Ensure that all New Yorkers live within a 10 minute walk of a park.
- **Brownfields**: Clean up all contaminated land in New York City.
- **Water Quality**: Open 90 percent of waterways for recreation by reducing water pollution and preserving natural areas.

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\(^3\) Regional Planning in New York State, Patricia E. Salkin, Government Law Center of Albany Law School

\(^4\) US Census Bureau, Population Division
• **Water Network:** Develop critical backup systems for aging water network to ensure long-term reliability.

• **Transportation:** Improve travel times by adding transit capacity for millions more residents, visitors, and workers. Reach a full "state of good repair" on New York City’s roads, subways, and rails.

• **Energy:** Provide cleaner, more reliable power for every New Yorker by upgrading energy infrastructure.

• **Air Quality:** Achieve the cleanest air quality by encouraging mass transit, fuel efficiency, cleaner or upgraded engines and installation of anti-idling technology.

• **Climate Change:** Reduce our global warming emissions by 30 percent.

The concentration of new development around existing transit nodes ("Transit-Oriented Development") to accommodate a million new residents by 2030. The new development would be accompanied by improvements to public transportation and open space, better air and water quality and reduction of the city’s contribution to global warming.

New York has managed to achieve high economic growth by positioning itself as a centre for financial services, tourism or leisure and entertainment, media, fashion, retail, sports, etc. This plan mainly curtails the major planning issues within the NYC and provides an opportunity to launch a meaningful regional planning exercise for the much larger New York Metropolitan Region.

### 2.2 London

London is a world city region. Like NYC, it also plays a significant role in the world economy. It is the main generator and source of jobs as well as of culture, leisure and other recreational activities. London’s diversity is one of its great historical, social, economic and cultural strengths and makes it one of the world’s most multi-racial cities.

The Greater London ‘Mega-City Region’ accommodated 21 million people in 2004. There are a vast number of linkages and networks between all the settlements. London functions as the central city in the region. In 2006, London’s
population was 7.57 million people\textsuperscript{5}. The London Plan, estimates population of ranging from 8.26 - 8.71 million by 2026.

Regional Planning guidance mainly focuses on sustainable development, achieved through the objectives of social progress, effective protection of the environment, prudent use of natural resources and maintenance of high and stable levels of economic growth and employment.

Planning concept includes thematic policies which have a particular spatial impact and are addressed in other specific parts of this plan namely:

- Increasing the provision of affordable housing;
- Addressing the needs of a diverse population
- Protection and enhancement of social infrastructure and community facilities;
- Promoting public health;
- Higher or further education;
- Integrating community strategies and the development process;
- Assessing community impact and ensuring community benefit; and
- Protecting Open spaces

Spatial Development Strategy of the plan is a spatial development strategy for the Greater London area and has six objectives:

- To accommodate London’s growth within its boundaries without encroaching on open spaces;
- To make London a better city for people to live in;

\textsuperscript{5} Based on www.london.gov.uk , The London Plan, Spatial Development Strategy for Greater London

Anwesha Chakrabarty
### Table 1: Planning Provisions in London Plan

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Focus</th>
<th>Measures</th>
</tr>
</thead>
</table>
| **Economy** | • Improving employment opportunities  
• Improving technologies and skills  
• Removing barriers to improvement | • Creative industries  
• Key creative industries in London include design, publishing, music, fashion, new media, film and broadcasting  
• Promotion of e-London amid e-government and e-business activities |
| **Land** | • Areas for Regeneration  
• Promoting world-class architecture and design  
• Sub-Regional Implementation Frameworks | • Mixed use development |
| **Transport** | • Enhancing international, national and regional transport links  
• Integrating transport and development  
• Matching development to transport capacity  
• Promote greater use of low carbon technologies  
• Improved National Rail services  
• Improved Underground and Light Railway (Tram) Services  
• Airport and Heliport development  
• Improving strategic rail services  
• Improving conditions for cycling  
• Freight strategy | • Strategic transport investments, such as new runways and terminals, port expansion and new major roads and railways, have enormous impacts upon development and the environment.  
• Increasing the capacity, quality and integration of public transport to meet London’s needs |
| **Housing** | There were 3.15 - 3.20 million households in London in 2006. Based on the latest available projections, London’s population could increase by 0.79 million to 1.14 million between 2006 and 2026. This requires additional households of 27,000 - 36,000 per year. | • Maximize the use of scarce land |
| **Recreation** | • Development and promotion of arts and culture | • Provision for retail and leisure activities in all proposed Town Centres  
• Development of Olympic and Paralympics Games and sports facilities |
| **Environment** | • Reduce the level of carbon dioxide emissions 15% by 2010, 20% by 2015, 25% by 2020, 30% by 2025 and a target of 60% reduction by 2050.  
• Sustainable design and construction  
• Blue ribbon network - linking water spaces  
• Waste management  
• Biodiversity and nature conservation | • Promote alternative sources of energy - renewable energy  
• Alternatives to car  
• Greenfield development  
• Decentralised Energy: Heating, Cooling and Power |
• To make London a more prosperous city with strong and diverse economic growth;
• To promote social inclusion and tackle deprivation and discrimination;
• To improve London’s accessibility; and
• To make London a more attractive, well-designed and green city

Major planning provisions adopted in London Plan is given in Table 1

London Metropolitan Plan promotes conservation and restoration of prominent greenbelts along with planned decentralization.

2.3 Canberra

Canberra, the capital city of Australia is a planned city. The inner-city area was originally designed by Walter Burley Griffin, a 20th century American architect. Within the central area of the city near Lake Burley Griffin, major roads follow a wheel-and-spoke pattern rather than a grid. Griffin’s proposal had an abundance of geometric patterns, including concentric hexagonal and octagonal streets emanating from several radii. However, the outer areas of the city, built later on due to urban sprawl, are not laid out geometrically.

Canberra covers an area of 814.2 sq km. The population of Canberra was 323,056 in 2006. The 2006 census showed that 1.2 percent of Canberra’s population was of indigenous origin and 21.7 percent were born overseas. The median age is 34 years, and only 9.8 percent of the population is aged over 65 years. It is expected that in 30 years’ time there will be more old people living and lot less younger people.

The city’s design was heavily influenced by the garden city movement and incorporates significant areas of natural vegetation that have earned Canberra the title of the “bush capital”. The urban areas of Canberra are organized into a hierarchy of districts, town centers, group centers, local suburbs as well as other industrial areas and villages. There are seven residential districts, each of which is divided into

![Fig. 6: Plan of Inner Canberra along Lake Burley Griffin](image)
Table 2: Goal, Objectives and Policy in Canberra Spatial Plan

<table>
<thead>
<tr>
<th>Goal</th>
<th>Objective</th>
<th>Policy Response</th>
</tr>
</thead>
</table>
| Create and maintain a healthy community | • Provide opportunities for a diverse range of housing for the full range of households’ types and lifestyle preferences.  
• Facilitate the equitable distribution of services and facilities, including education and health care, arts and recreation  
• Maximize safety and perceptions of safety within the community  
• Facilitate an environment that provides shared access to public spaces and promotes healthy activities | • Consolidation of development to meet the additional dwellings, maintaining balance between green-fields development, redevelopment and development within existing urban areas  
• Ensuring new residential areas to access community facilities and services  
• Urban development will not be permitted in areas that are at high risk of major natural hazards  
• Equitable distribution of recreational areas |
| Sustain Employment Opportunities | • Facilitate a prosperous city  
• Facilitate a vibrant, robust and culturally stimulating city centre  
• Support viable town centers’ as a focus for each district  
• Provide flexible opportunities and appropriate locations for establishing and growing business | • To provide activity nodes for encouraging economic and employment growth  
• Encourage employment growth in the town centre by freeing up development control  
• To encourage sustainable urban form and a mix of land uses |
| Retain ease of movements and facilitate good travel connection | • Establish a more sustainable and more responsive transport system  
• Maintain and enhance the ease of getting around  
• Maximize linkages and access to services and employment for the population  
• Minimize travel time and journey distance between urban residential areas and the main employment centers’ | • Maintain and enhance connectivity services from local to regional level  
• Encouraging public transport in trunk public transport routes  
• Improvements in local cycling and walking infrastructure  
• Parking policies to minimize private motor vehicles  
• Improvements in pedestrian safety and amenities |
| Maintain a unique sense of place | • To support role of Canberra as the national capital  
• Retain and strengthen the open space network, including the hills, ridges, natural watercourses and gullies  
• Recognize the importance of culture and natural heritage  
• Facilitate high quality built environment | • Retaining the garden city principles  
• Landscaping hills, ridges and gullies  
• Creating clear sense of arrival into the National territory  
• Preservation of open space with no additional urban development on hill tops and sloping ridges |
| Respect the natural environment | • Create and establish a built form and city layout that minimizes resource consumption, including water and energy use  
• Protect and enhance biodiversity  
• Maintain water quality and availability  
• Maintain air quality | • Encourages built form that minimizes the consumption of water to assist in improving water resource management  
• All new developments to meet five star energy efficiency rating consistent with national standards  
• Conservation strategy for endangered species  
• Use of renewable sources of energy |
| Ensure fiscal responsibility | • Facilitate the provision of physical, social and cultural infrastructure in a coordinated and cost effective manner  
• Facilitate improved efficiency of existing urban infrastructure such as schools, health care, transport systems, water supply, wastewater management, storm water management, electricity and telecommunication | • Infrastructure will be provided to correspond with land release and development to meet the projected demand for additional developments  
• Planning and installation of infrastructure through Capital Works Program  
• All water catchments for potential future water supply will be protected. |
smaller suburbs, and most of which have a town centre which is the focus of commercial and social activities.

In early 2010, the unemployment rate in Canberra stood at 3.9 percent which is substantially lower than the national unemployment rate of 5.3 percent in Australia. As a result of low unemployment and substantial levels of public sector and commercial employment, Canberra has the highest average level of disposable income. The city’s main industry is government administration and defense, which accounted for 31 percent of Gross Territory Product in 2008-09 and employed over 40 percent of Canberra’s workforce. A consortium of private and government investors is currently making plans for a billion-dollar data hub, with the aim of making Canberra a leading centre of such activity in the Asia-Pacific Region.

The city is laid out so that arterial roads connecting inhabited clusters run through undeveloped areas of open land or forest, which results in a low population density; this also gives scope to develop land for future transport corridors without the need to build tunnels or acquire developed residential land.

Canberra is home to many national monuments and institutions such as the Australian War Memorial, the National Gallery of Australia, the National Portrait Gallery, the National Library and many Museum and Art Galleries.

Canberra is Australia’s political reportage with all the major media houses, the commercial television networks, press and metropolitan newspapers maintain local bureaus. A number of radio broadcasting stations are also present.

Canberra has numerous sporting ovals, golf courses, skate parks; tennis courts and swimming pools open to the public. There series of bicycle paths are available to cyclists for recreational and sporting purposes. Canberra Nature Parks have a large range of walking paths, horse and mountain bike trails. Water sports like sailing, rowing, dragon boating and water skiing are held on lakes. The Rally of Canberra is an annual motor sport event and a facility for drag racing is currently being planned for construction.

Goals and objectives of the Canberra Spatial Plan are given in Table 2. Canberra Spatial Plan reflects the community’s aspirations for the future of the city and planning policies with spatial dimensions.

### 2.4 Berlin

Berlin is an urban laboratory. It is a world city of culture, politics, media and science. The city’s economy is primarily based on the service sector, encompassing a diverse range of creative industries, media corporations and convention venues. It serves as a continental hub for air and rail transport and is one of the most visited tourist destinations in the European Union. Significant industries include IT, pharmaceuticals, biomedical, engineering, biotechnology, optoelectronics,
Around one third of the city's territory is composed of forests, parks, gardens, rivers and lakes.

The metropolis is home to renowned universities, research institutes, sporting events, orchestras, museums and personalities. The urban and historical legacy has made it a popular setting for international film productions. The city is recognized for its festivals, diverse architecture, nightlife, contemporary arts, public transportation networks and a high quality of traffic engineering and renewable energy.
living. Berlin has evolved into a global focal point for young individuals and artists attracted by a liberal lifestyle.

Berlin is a city as well as a federal state. The city state of Berlin and the state of Brandenburg, which surrounds Berlin, have entered into a two-state comprehensive agreement for spatial planning, which has resulted in the “Berlin-Brandenburg Joint Comprehensive Spatial Development Plan”. This region is one of the 11 metropolitan regions of Germany. The region comprises 5 million people from over 190 nations6.

The priority area for spatial development set by the Territorial Agenda in 2007 includes:

• encouraging measures to link metropolitan regions and urban centres with each other;
• promoting urban-rural partnerships, in particular by integrating regions whose development is lagging behind;
• developing transnational clusters of regions of innovation and promoting a knowledge economy;
• developing Trans-European networks (transport and energy);
• avoiding natural development risks in coastal areas and river basins; and
• improving the profile and image of areas of ecological and/or cultural value.

As concerns in spatial planning, Germany has been attempting regional planning since the early 20th century to address urbanization, including centralized spatial planning. Although a spatial planning system was put in place after the world war, the Basic Law for the Federal Republic of Germany designated spatial planning as one of the area where when the federal government seeks to exercise its legislative jurisdiction over a matter, the State Government may legally adopt provisions different from those of the Federal Government. In fact, the Federal Government is going no further than to set forth overall guidelines, with the states implementing diverse planning systems.

As regards regional policies, the improvement of regional economic structures is positioned by the Constitution as a joint operation wherein the federal government is required to collaborate with the State Government and bear half of the costs. The concepts and strategies for spatial development include:

• Development policy aiming at growth and innovation;
• Ensuring services of public interest;
• Promoting the European perspective of “the metropolitan” regions;
• Areas and networks of the knowledge economy;

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6 German Urban Audit, 2008
Joint responsibility in large spheres of influence; and
Conservation of resources and shaping of cultural resources.

Berlin’s transportation system is an important component of the quality of life and economic vitality of the community and the region. Berlin has developed a highly complex transportation infrastructure providing very diverse modes of urban mobility. Long-distance rail lines connect Berlin with all of the major cities of Germany and with many cities in neighboring European countries. Berlin is known for its highly developed bike lane system. Berlin has two commercial airports i.e. Tegel International Airport and Schönefeld International Airport.

The role of public sector as an active agent in the development process particularly in land and finance has been achieved through suitable policy and investment framework.

2.5 Mexico

Greater Mexico City is a single conurbation of the biggest municipalities in Mexico, with population of 21 million in 2009, the most populous metropolitan area in the Americas and the third largest metropolitan area in the world with an area of 7,346 sq km. As an “alpha” global city it is one of the most important financial centers with population density of 2,784 persons per sq km in the Americas.

The settlement of México was founded on several islands within a lake in the central plain of present day Mexico city. The basic morphological urban structure was a grid-iron system. The city population was nearly 5,00,000 inhabitants when the Spanish arrived in 1519. During the nineteenth century, Mexico City was shaped by foreign investment, industrialization and demographic trends that led the way for urban transformation. The city design was heavily influenced by European ideas, especially French architecture and urbanism. By the second half of the nineteenth century, new urban axes were planned and urban interventions took shape, following some of the principles on which the plans for Paris, Vienna, and industrialized London, were designed. According to these new ideas, several main boulevards and avenues radiating from the city centre were designed and landscaped. These boulevards and avenues led to developing areas in the southern portion of the city.

Mexican urbanism, encompassing a wide range of scales and projects ranging from the urban design of housing states to regional and national planning. Newest innovations of planning techniques were adopted which includes diffusion of theoretical ideas that occurred in magazines and journals during the early Modern period. There were various city planning and urban design models tried out with regard to local culture and put into practice. The ideas for integrating knowledge from various sources and models were asserted that aimed at in planning and designing, considering responsive cultural and social issues.

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7 Based on www.wikipedia (2009) information
<table>
<thead>
<tr>
<th></th>
<th>National-level</th>
<th>Regional-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>designs, promotes, regulates and coordinates urban development</td>
<td>improves regional planning through a modern, updated and efficient urban planning system</td>
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<tr>
<td></td>
<td>• regional planning and land use policies</td>
<td>• redistribute the population across the territory by establishing priorities, locations and sizes for human settlements and redirecting the migratory fluxes towards medium and small cities</td>
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<tr>
<td></td>
<td>• implement the habitat program</td>
<td>• respond to the demand of urban land through the integration of territorial reserve</td>
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<tr>
<td></td>
<td>• conceives and coordinates regional/urban and land (-use) policies</td>
<td>• formulates and executes the State policies on urban development and housing</td>
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<td></td>
<td>• defines urban areas which require primary attention</td>
<td>• formulates and executes state/ regional plans</td>
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<td></td>
<td>• demarcates territorial reserves</td>
<td>• promotes the introduction of municipal urban development plans</td>
</tr>
<tr>
<td>2.</td>
<td>Region-level</td>
<td>• supervises the accordance of municipal, regional and partial plans with the State Plan</td>
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<td></td>
<td>Federal District (DF)</td>
<td>• supervises technical norms for urban development, housing and construction</td>
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<td></td>
<td>plans and coordinates policies and actions in urban development, regional</td>
<td>• establishes the guidelines for land regularization</td>
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<td></td>
<td>planning and housing for the DF, conceives program for the supervision of the above</td>
<td>• regulates all matters related to thoroughfares and roads</td>
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<td></td>
<td>• guarantees equilibrium between land uses, settlements and environment in a democratic context</td>
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<td></td>
<td>• coordinates planning activities of the federal level, states and municipalities</td>
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<td></td>
<td>• promotes investments in housing infrastructure</td>
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<td></td>
<td>• protects the DF’s historical and cultural heritage</td>
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<td></td>
<td>• formulates and executes urban planning policies and program</td>
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<td></td>
<td>• coordinates the issuing of land use and zoning certificates</td>
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<td></td>
<td>• assesses all matters related to thoroughfares and roads</td>
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<td></td>
<td>• urban and environmental studies together with the Ministry of the Environment of the DF</td>
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<tr>
<td>4.</td>
<td>Borough level</td>
<td>• issues land use certificates and construction licenses</td>
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<tr>
<td></td>
<td>• city level functions alike DF</td>
<td>• initiates urban regeneration program</td>
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<tr>
<td></td>
<td></td>
<td>• acquires land for territorial reserves for lower income group</td>
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<td></td>
<td></td>
<td>• proposes modifications to various urban development programs</td>
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<td>5.</td>
<td>Municipalities</td>
<td>• formulates and executes municipal development plans</td>
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<tr>
<td></td>
<td>• city level functions alike DF</td>
<td>• issues private construction licenses</td>
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<td></td>
<td></td>
<td>• participates in the creation and administration of ecological and territorial reserves</td>
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<td></td>
<td></td>
<td>• intervenes in land regularization, supervises and controls land use</td>
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<tr>
<td></td>
<td></td>
<td>• plans and regulates the development of con-urban localities</td>
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</table>
Modern Mexico City is the cosmopolitan and vibrant cultural, economic, political and industrial centre of Mexico. It is characterized by impressive avenues and colonial buildings, fine museums and galleries and the huge city square, which is the energetic focal point of Mexico City. Alternatively, it is also known for its congestion and air pollution, and as one of the largest urban areas in the world. Mexico City accounts for 45 per cent of Mexico’s industrial activity, 38 per cent of GNP, and 25 per cent of the population within the country.9

Major planning issues are:

• Because of this pattern of growth, the political jurisdictions of Mexico City do not necessarily correspond with its geography. This complicates an already complex administrative situation, and makes it extremely difficult for officials and planners to provide services for Mexico City’s enormous population.

• Due to uncontrolled urban expansion, Mexico City and its surrounding experiences combination of natural resource constraints and environmental impacts.

Planning Initiatives

Urbanisation in Mexico City is mainly due to two factors i.e. migration and population growth. The government must implement effective housing strategies, in particular upgrading the quality of housing in the shanty settlements. The government of Mexico is working together with the World Bank to address some of these issues, although Mexico must attempt to tackle some of its problems in sustainable manner internally.

2.6 Seoul

Seoul, the capital of South Korea is located on the banks of Han River Basin. The growth of Seoul began in early 1960’s when Korea’s capacity was fully mobilized

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8 Based on report on “Planning System in Mexico City”, Oct 2006
9 Mexico City: Opportunities and Challenges for Sustainable Management, December, 2004
for rapid industrialization and nationwide population migration started from rural to urban areas. Being the political, economic, cultural and educational centre, Seoul became the most attractive city for people to search for better employment opportunities. This resulted in its sharp increase in population i.e. net increase of 13.6 lakh population during 1960 to 1966.

Seoul expanded physically from 597 sq km in 1963 to 627 sq km in 1973 which corresponds roughly to its present area. Recognizing the need of an integrated urban living space due to rapidly expanding urbanized region, the boundaries of Seoul Metropolitan Area officially known as Seoul Capital Region have been delineated. The total area of the region in 1985 was 11,235 sq km which includes three upper-tier local governments i.e. Seoul, Inchon and the province of Kyonggi and 64 lower-tier local governments with a population of 16 million.

The population share of Seoul Capital Region to that of Korea has rapidly increased from 23.7 percent (i.e. 6.9 million population) in 1960 to 45.4 percent (i.e. 20.27 million population) in 1995\(^\text{10}\). The mega-city of Seoul encompasses a population of 10,208,302 in 2009\(^\text{11}\).

Korean Government has worked out the following policies and implementation tools to manage urbanization and metropolitanization of Seoul. The policy objective / main concern of Government about the growth management policy is 'how to steer the location of people and industries away from the Seoul Metropolitan Area (SMA) and to ultimately achieve the balanced development among regions in the nation'. They have evolved the four stages as given below:

**Stage I - Set up of Policy Direction for managing the growth of Seoul (1960-1971)**

The main objective of this stage was to manage the growth of Seoul. Policy direction to manage the growth of Seoul was announced in 1964. Government intension was to restrict the growth of Seoul with the help of following measures:

- Relocating government offices from Seoul to other major cities of Korea;
- Develop growth poles in terms of garden cities or new industrial cities at strategic location. Under this strategy government started developing Industrial Parks mainly in South-Eastern part of the country; and
- In 1969 government adopted Comprehensive Decentralization policy.

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\(^{11}\) Seoul Statistics (Population), Seoul Metropolitan Government, 2010
Stage II - Green belt and New town strategy (1972-1979)

First comprehensive National Physical Development Plan was prepared for the period 1972 - 1981. It highlights the importance of developing large scale industrial estates, expansion of power, water, roads, harbor, communication and other social overhead capital in rest of the Korea. The existing tax laws were revised to discriminate development of industries in urban centres. Several industrial new towns were developed in remote provincial areas. Within the Capital Region, two new towns were developed. These new towns were, Aman to relocate manufacturing industries and Kwachon to relocate government offices from Seoul. Although the population increased rapidly from 1970 to 1980 but it had its dampening effect subsequently.

Stage III - Inter-regional decentralization policy (1980-1988)

During this stage more systematic approach was adopted to facilitate orderly spatial development of SMA. The entire Capital Region was delineated as a planning unit and the regional land use control system, which still works in a slightly revised form, was newly introduced in the middle of 1980’s. Sociopolitical changes since the end of 1980’s have made the system vulnerable. President Park proposed the relocation plan for New Capital City but this plan was dropped with the assassination of its chief proponent. During this period second National Physical Development Plan was formulated for the period 1982-1991. The new administration, which took over offices after assassination of late President Park, formulated new strategies. These strategies were addressed in the second National Physical Development Plan implemented in 1981 and Capital Region Management Law enacted in 1982. In the second plan, two key strategic concepts were suggested which are as below:

- **Integrated living sphere strategy:** This strategy adopted to mitigate intra-regional inequality by providing social and physical arrangements to maximize the mutual contact between major urban nodes and its surrounding rural areas. It was expected that by linking the two areas through improved transportation networks, urban services and job opportunities agglomerated in major urban nodes could be shared by rural as well as urban residents.

- **Growth centre strategy:** The key concept of this strategy was concentrated decentralization to handle inter-regional inequality. Counter magnets were created to curb the excessive concentration in SMA. These counter magnets would be created by allocating limited investment funds to intensify growth potential of selected fifteen provincial cities. Create enough counter magnets in other urban centres across the country which could help to interrupt migration flow into SMA.

- **Important features of Capital Region Management Law:** The capital region management law was the most tightly written device to cope with the issue of decentralization. Three specific noteworthy features of this law are as follows:
Preparation of Capital Region Management Plan: This plan is prepared to ensure effective land use, desirable distribution of industrial population and harmonious placement of social overhead capital across the region. The plan would set the guidelines and detailed directives for the lower order local plans (urban plans). It was the first Capital Region Plan made public in 1984 and adopted five zonal system approach for development. It highlights development performance guidelines for each zone as given below (see map):

- Relocation promotion zone
- Restricted rearrangement zone
- Development inducement zone
- Nature preservation zone
- Development reservation zone

Creation of Capital Region Management Committee (CRMC): The committee chaired by Prime Minister would coordinate regional planning and management issues. It would consist of cabinet members, mayor and private representatives. Considering the necessity of handling rapidmetropolisation of Seoul, the law intended to provide overall and effective management devices for physical developments, land uses and arrangement of infrastructure for entire metropolitan area. Recognizing the region as an integrated urban living space glued to the city of Seoul by close economic, functional and social interactions, the law required an integrated planning dealing with the entire region as a unit while management consideration would be based on inter-governmental coordination.

Preparation of population impact statement: It would be required for development projects of certain categories to forecast the adverse effect upon population growth within the region.

Five new towns proposed outside the green belt to manage the growth of Seoul are Bundang, Ilsan, Pyungchon, Sambon and Joongdong (Fig. 10). These towns were developed to accommodate 1.2 million population. The main reason for Government decision to develop new towns was to check / halt the rising housing prices coupled with labour dispute at that time threatened the social stability as well as the economy. The government also modified / revised the growth management policy. Five category of development sub-regions were streamlined into the following three zones (Fig. 11):

- Over concentration management zone (I)
- Growth management zone (II)
- Nature preservation zone (III)

Criticisms on the past policies

The uncurbed growth of SMA during the last thirty five years has generated problems of growing inequality between SMA and other region and overgrown metropolitan itself. In the early 1960’s when Korean Government declared to fight against the growth of Seoul, various policy measures based on green belt and new town strategy in 1970 and the concentrated decentralization strategy in 1980 to handle these problems have been formulated and implemented. In spite of lots of efforts of government, there are gaps between the reality and policy intentions. SMA is pressed with overgrown problems of income inequality, housing shortage, traffic congestion, high land price, degrading quality of urban amenities and environment pollution. The critics also argue that government has not made much effort to provide required investment for development of alternative locations where
population and industries could be accommodated. Government did not do its best to arouse political support for the success of decentralization policy.

As a result of government policies, new trend of relative decentralization of population in the suburban areas of Seoul started and began to grow faster than that of Seoul. These suburban areas became the integral part of Seoul Metropolitan area. As a consequence of this rapid urbanization in Capital region, five new towns were developed. Fig. 12 of Seoul Metropolitan Region with green belt and five New Towns.

Although the population of Seoul has decreased but the Capital Region is growing faster than any other region in the nation. Facing complex social, political and economic changes, the importance of SMA cannot be overlooked in keeping Korean economy thriving and growing continuously. This may accelerate the region-wide metropolitisation of Seoul. One important inference of the study is that to cope with the problem of inequality, it would be better to invest in selective provincial centres having growth potential.

3. STRATEGIC APPROACH FOR DEVELOPING WORLD-CLASS CITIES

Innovative and sustainable city management will provide a mechanism to achieve healthy urbanization, help promote equitable society, manage land and its resources, transgressing individual, political and administrative boundaries and in coordination with local boundaries.

There is a need of an integrated cascaded planning system covering all the urban and rural settlements. Hierarchical approach is a suitable system for balanced growth of a substantial regional planning. An effective and systematic planning is the fabric of growth and progress. The purpose of this process is to sustain the socio-cultural values, conserve heritage and improve infrastructure. This will make a city productive, competitive and bankable. Based on the above case-studies, a strategic approach for efficient development will include:

- Land Use
- Introduce zones to phase development and to coordinate development with a programme for extension upgrading of infrastructure networks / services
- Formalize improvement plans and introduce standards for compliance with strategic development requirements
- Target selected regional centres as growth poles (satellites / new towns) and coordinate their priority development with other strategic plans (economic, transport and infrastructure in particular)
- Introduce measures to encourage development of infill areas and vacant land
- Projects of a specified size to be in accord with strategic plans and receive approval from appropriate authority, before land is requisitioned for construction
- Estimate future land requirements and prepare a programme for further requisitioning in relation to land already available.

Anwesha Chakrabarty
• Initiate measures for land assembly and develop land bank
• Prohibit additional requisitions in zones with abundant vacant or underutilized land
• Decentralize jobs to locations closer to residents

Economic Development

• Coordinate operations of local administrations by adoption of a policy for the location of economic activities and link these with strategies for land use, transportation and infrastructure, as well as programs for social welfare
• Renovate, relocate or redevelop requisite sites using various incentives including grants / loans / others
• Adopt clustering concepts in association with other developments, in particular land use, infrastructure and transportation
• Strategic approach to outward marketing for promoting the collective comparative advantages of the region
• Allocate funds to assist business in research and development
• Ensure comparative / competitive advantages by streamlining bureaucratic procedures and smoothing the public participation

Infrastructure

• Assess needs and identify priority areas for upgrading and extension of strategic infrastructure and services
• Assist the administrations of priority areas to improve local services by using development funds as grants and subsidies
• Facilitate private sector investment / involvement in the financing and operations of infrastructure through Public Private Partnership modalities
• Limit the practice of land requisitioning as a means of raising funds for projects

Fig. 14: Efficient City
• Phase the extension of infrastructure systems to match the spatial progression of physical development
• Introduce incentives and penalties to ensure that vacant serviced land is developed
• Joint approval of locations for mega-projects in line with land use and other relevant policies and strategies

Transportation

• Prepare an integrated multi-model transportation strategy
• Integrated package of proposals to upgrade and rationalize road network, limit the use of private vehicles (congestion charges) and improve public transportation
• Coordinate land use and transportation strategies to improve private and public transport services to and from major workplace concentrations
• Improve the capacity of the regional road and rail networks i.e. both internal and external nodal movements.

Social Welfare

• Target skill training (to meet shortfalls in available labour) to the unemployed and disadvantaged
• Subject to the requirements of other strategies, locate growth poles and economic clusters in an effort to redress inequality
• Encourage the supply of affordable rental units for the economically weaker section of the community
• Initiate housing associations to operate as intermediaries for the poor within the housing market
• Oblige real estate developers to include social facilities in developments, or pay the equivalent for others to provide the same
• Requisitioning of farmland should be justified in relation to local land use plans and in accord with the strategic land use plan

Environment

• Restrict activity locations in water catchments.
• Support local management and enforcement mechanisms
• Prepare waste management plan. This will include measures to reduce and recycle waste, collection and sanitary disposal
• Prioritize natural resource areas to be preserved and incorporate measures to protect them within all strategies
• Closure of polluting process/activities, or the introduction of measures to reduce their impact to within acceptable standards
• Relocation of polluting activities to more appropriate locations with scientific waste discharge techniques

Finance
• Monetize regional land resources
• Widen the tax base and introduce more effective taxes to generate regional own source revenues. Property tax has clear advantages, especially if mounted on GIS systems that capture other urban management information. Higher taxes could be levied on vacant or underdeveloped land to encourage a more compact urban form.
• Review cost recovery systems for existing infrastructure and utility services and adjust user charges accordingly.
• Consider the introduction of “user pays” principal across the board, for all services, and move towards sustainable financial management.
• Unless the means to meet liabilities are assured, minimize loan financing of projects and issuance of municipal bonds.
• Encourage the private sector to contribute funds through appropriate Public Private Partnership modalities.
• Projects in excess of a specified cost should accord with strategic plans, and receive Metropolitan Authority approval, before land is requisitioned for construction.
• Government banks and financial institutions should seek the confirmation of the Metropolitan Authority before issuing loans (in excess of a specified sum) for financing projects of the local administrations.
• Lending criteria for project loans should be reviewed and more commercial principles applied.
• Introduce regional taxes to generate revenue for redistributed among the administrations to compensate and balance any inequalities.
• Introduction of a standard of a development impact fees to generate revenue for the funding of infrastructure and social services associated with new developments
• Adopt differential monetary, fiscal and tariff policies between the city and other parts to promote location and shift of activities into the other parts

Institutional
• Establish a metropolitan authority with strategic responsibility for the entire region
• Revise boundaries of administrations (if necessary) to encompass urban conurbation and other regional attributes

• Clearly demarcate roles, functions and jurisdictions between the Metropolitan Authority and subordinate administrations

• Define operation and funding procedures / financing on the understanding that the plans and programs of subordinate administrations will comply with the guidance and directions given strategic plans

5. CONCLUSIONS

• The process of developing a world class city capable of creating sustainable wealth and quality of life for the residents and investors includes building an internationally competitive, dynamic and inclusive economy; deploying world class infrastructure and utilities for the region; optimizing mobility to enhance linkages and accessibility through effective transportation; building a skilled and responsive labor force; creating a sustainable world class living and working environment; enhancing the quality of life and inclusiveness in the region; delivering a unique image and identity through effective place branding; ensuring a safe and secure environment; and employing world class governance systems.

• This requires an undertaking with an active focus on economic growth on high-impact projects. Second, policy makers should create additional jobs with thrust areas of high end services such as IT, ITES, media, entertainment, telecom, low end services (construction, recreation, retailing, hinterland based manufacturing and logistics hub including SEZs, EPZs, and formation of consumption markets or centers. Third, expand mass and private transport infrastructure with mass rapid transit system connecting railway, roadway and airways. Fourth, increase housing availability and affordability; provision for rental housing market; slum rehabilitation and resettlement; special integrated housing zones for economically weaker section of the society. Fifth, infrastructure upgrading with safe drinking water, proper disposal of waste, adopting alternative or renewable energy sources, access to quality education, improve healthcare services, safety and security etc. Fifth, adequate financing mechanisms through increase in user charges and collection efficiency in property tax and others; better contracting procedures for private public partnership projects and hiring; reduction in administrative expenditure; and proper utilization of government land assets. Last, a committed leadership and a coordinating body is needed. Building effective, efficient and responsive governance system by adopting top-down and bottom-up approach is necessary. We must also introduce result oriented control over various departments like roads, water, environment, urban development etc. Transparency in building approval processes is at the heart of a world city.

Anwesha Chakrabarty
Indian Real Estate : Will Awarding an Industry Status, Improve its Prospects?

Dr. Mona N Shah, and Thilak Babu Gottipati

Abstract

In India, the construction and real estate sector is the second largest employer next only to agriculture; its size is close to US $12 billion and growing at a rate of about 30% per annum. Five per cent of the country's GDP is contributed by the real estate sector. In construction, the average profit in India stood at 18%, which is twice the profitability for a construction project undertaken in the USA. During 2010-11, the Indian real estate and housing sectors received US$ 1.12 billion in Foreign Direct Investment (FDI), according to the Department of Industrial Policy and Promotion India (DIPP). As a known fact, Indian real estate has been beleaguered with opaque practices and consumer apathy, unqualified suppliers entering the market due to lower barriers to entry, resulting in the absence of good standards of business practice amongst the majority, due to which the existing state of Indian Real Estate is inadvertently endeavouring its own potential to grow.

1. INTRODUCTION

The real estate sector in India has the potential to achieve unprecedented growth and contribute hugely to India’s development initiative. Over the last decade India experienced high growth on account of several reasons such as increasing demand due to sustained economic growth, liberalization initiatives, and also the permission for foreign direct investments. The high potential of investment marks the need for rapid property development on the one hand, while mitigating the problem of finance for real estate projects. Locked up in real estate projects are huge personal and private equity commitments by a growing number of foreign investors and home grown financial institutions. However, the situation is far from ideal due to the opaqueness of real estate ventures and projects, absence of proper land records and titling methods, excessive documentation and legal compliances, existence of unaccounted money and undervaluation of assets (Fig. 1).

With a focus on the Indian real estate, we examine the shortcomings of the existing system. It attempts to assign the probable causes for deviations from regulatory standards in development, the rate of marketing and financing of real estate in India when compared with the best global standards. These shortcomings may be
acting as road blocks in acknowledging real estate as an industry, unleashing its maximum development potential and preventing it from effectively contributing to the economic development of India.

2. POTENTIAL FOR DEVELOPMENT OF INDIAN REAL ESTATE

Potential for the systematic growth of Indian real estate has been accepted by all. However, when compared with existing practices witnessed in real estate, it may not appear so. Government of India categorizes real estate along with financial and insurance services in its gross domestic product calculations. According to data available from the Economic Survey of India, this sector has shown a consistently high contribution barring a few times, when the growth has dipped considerably low (Fig. 2 and Table 1).

2.1 What constitutes an ‘Industry’?
Definitions differ for describing an industry, depending upon which party is viewing it. However, most of the literature is found in the work of Industrial Economics which covers areas of industrial organizations and policy. Thus the economists, the businesses,
the sociologists, and the government are not always in complete agreement when it comes to the definition (IDBI Act, 1964). Industrial economics covers areas of industrial organization and policy, commerce and business economics. Due to the efforts of the construction industry and the Planning Commission, the government has recently awarded a partial industry status to construction but not real estate implying it does not have a full industry status, but only under the IDBI Act 1964. That means that it can access finance from formal sources. From the financial point of view, the sector will get benefitted. However, critics aver that, this status does not automatically guarantee a complete change for the construction sector for the better. This does not guarantee that industry standards related to its operations, wages and working conditions, training and skills development, transparency in accounting, licensed practitioners, quality and safety standards, customer satisfaction will be assured. The excessive regulation is also not sure of diminishing.

### Table: Current Status of Indian Practices with Global Best Practices in Real Estate

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Attribute</th>
<th>Best Practice</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Land Title</td>
<td>Computerised, Clear titles with no discrepancy and long record history available.</td>
<td>Manual, ambiguity prevails in the entire titling process. records of earlier dates not available.</td>
</tr>
<tr>
<td>3.</td>
<td>Approvals</td>
<td>Single Window</td>
<td>Multiple Windows</td>
</tr>
<tr>
<td>4.</td>
<td>No. of Clearances</td>
<td>Approximately 5</td>
<td>Approximately 52</td>
</tr>
<tr>
<td>5.</td>
<td>Time Required</td>
<td>30 days</td>
<td>Several months to an year &amp; more</td>
</tr>
<tr>
<td>6.</td>
<td>Regulatory Body</td>
<td>Single Authority</td>
<td>No specific regulatory authority for real estate, several bodies at national, state &amp; local levels.</td>
</tr>
<tr>
<td>7.</td>
<td>Laws</td>
<td>Flexible to adapt with market scenarios</td>
<td>Archaic laws, not up to date at any given time</td>
</tr>
<tr>
<td>8.</td>
<td>Financing</td>
<td>Easy and simple, REITs are prevalent, variety of sources</td>
<td>Complex no REITs, sources maybe questionable.</td>
</tr>
<tr>
<td>9.</td>
<td>Foreign Direct Investment</td>
<td>100%</td>
<td>Laws pertaining to minimum requirement and exit makes investment difficult</td>
</tr>
<tr>
<td>10.</td>
<td>Valuation</td>
<td>Matches with actual purchase rates.</td>
<td>Under valuation in most cases with the difference paid through unaccounted practices.</td>
</tr>
<tr>
<td>11.</td>
<td>Property taxes</td>
<td>Levied on all properties</td>
<td>Exemptions for various properties like vacant land etc.</td>
</tr>
<tr>
<td>12.</td>
<td>Risk in Finance</td>
<td>Minimal</td>
<td>Very High</td>
</tr>
</tbody>
</table>

*Source: Compiled from National Government Agencies, Planning Commission-India, Doing Business in India (World Bank Publication, PTI, Thomson & Reuters*)
In case of real estate, which has very strong construction linkage as well as infrastructure for housing being accorded the status of industry would mean a host of possibilities. Players in real estate sector have been clamoring for industry status with large developers and associations like Builders Association of India, RICS and ASSOCHAM taking up the matters with the government. However, according to Anuj Puri, Chairman of the Task Force on Construction and Real Estate, Confederation of Indian Industry(CII), 75 percent of the industry consists of smaller and unorganized operators. Thus introducing corporatization to these operators is necessary. Increased corporatization would benefit foreign direct investment and rating of all projects at various levels. Rationalization of taxation is also another issue with the operators and associations alike. It is recommended that the General Sales Tax replaces the multiple indirect taxes that make it difficult for the sector to be competitive in the international market. It is interesting to note that investors, who are interested in investing in real estate in India are critical of the sector’s functioning. Managing Director of Cresa Partners says that foreign investors keen on investing in Indian real estate find the lack of transparency and non-availability of the right kind of project basket a dampening proposition.

The Capital Housing Stock in India constitutes mere 5 sq m per capita, which is one of the lowest when compared with other developing and developed countries. It has been estimated that there would be shortage of 26.53 million houses during the Eleventh Five Year Plan (2007-2012), which provides a big investment opportunity, according to a report by the Technical Group on Estimation of Housing Shortage. The popularity of the Indian real estate sector is also highlighted by a report ‘Emerging Trends in Real Estate in Asia Pacific 2011’ published by Price Water House Coopers and Urban Land Institute. The Federation of Indian Chambers of Commerce and Industry research on foreign direct investment in real estate revealed that the total share of FDI received in India, the share of real estate has been steadily increasing from 4.5 percent in 2003 and reached 25 percent by 2011 due to the liberalized FDI Policy (BBPM Law Report, 2006; DIIP, 2011). According to a report by Jones Lang LaSalle, about US$ 15.8 billion has been invested from 2006 till date on various types of assets in the real estate sector in the country. Of which, US$ 2.7 billion went to residential projects and US$ 2.4 billion to township projects. A sum of US$ 2.3 billion went to commercial projects, US$ 2.1 billion to mixed use and US$ 961.4 million to special economic zones (SEZs). During the current year, private equity funds invested US$ 320 million in commercial, US$ 65 million in mixed use, US$ 44 million in residential, US$ 190 million in SEZs and US$ 122 million in township projects (IBEF, 2011). The prominent growth prospects for the next ten years is predicted to be in affordable housing as 26.53 million dwelling unit shortfall has been estimated by the Technical Group for Housing Estimation in the Eleventh Five Year Plan.
3. CHARACTERISTICS OF UNREGULATED BUSINESS VERSUS ORGANIZED INDUSTRY

3.1. Lack of Standard Industry Practices

In the organized industry, all transactions are recorded as per the industry norms and standards. There are huge barriers to entry for the non-serious and fly-by-night players who have very less long term commitment to business, and have less qualms indulging in malpractices. In unregulated business the accounting entries and business transactions may not be subject to high standards and adequate rigor of third party scrutiny, leading to a rampant prevalence of unauthorized practices. One of the cited reasons for the inability of real estate in India, to function with the same standards as witnessed in other, more evolved sectors could be the fact that most of the real estate companies are privately held proprietary firms and their financial statements are not readily available for public viewing. As a matter of fact, many industrial houses that have been engaged in developing real estate parcels on land held by them in the form of mill lands or factory premises, have stated that corporatization in this industry is necessary. According to Deputy Managing Director of the erstwhile Bombay Dyeing Group, “The industry needs to partner with the government to sort out issues pending since long. Also, corporatization of real estate would follow two routes: one, where existing players move to becoming a corporate entity and two, when corporate enter real estate. He stressed on the need for the industry to take very seriously the development of in-house skill-sets to deal with the regulatory environment”.

A similar sentiment is voiced by the President of GIC Real Estate, Singapore, who says, “It’s not easy to do business in India, its difficult finding suitable partners who have the same long-term objectives, as most firms are small and family run” (Yassir, 2006).

3.2. Myopic View

A businessman’s view may be myopic often conceived only based on a single project or with short term objectives, or alternatively focused merely on monetary gains. In an industry, a firm has long term and integrated sustainable strategies for the stakeholders. Business is not ruled by strong corporate governance, ethical codes and accepted standards of practice whereas the industry stands on publicly known governance and ethical structures and on professional accountable practices. In business, qualified practitioners are not easily found, whereas in industry, professionally qualified practitioners are in abundance who continuously upgrade their skills. Industry values, research and development, and innovation whereas in business the short term outlook prevails. When viewed from this prism, the real estate business in India is found wanting on more of these globally accepted paradigms of industry standards. It would be pertinent to see further the implications of this on many aspects that affect the growth
of this industry and consequently the country as a whole. Table 1 shows the functioning of the real estate sector in India when compared to the best global practices.

4. INDIA AND THE WORLD

Deficiencies in the Indian market have a major impact on the investment sentiment either foreign or domestic. These shortfalls not only affect the global position of India as a potential market but also hinder the economic development of the country. When viewed along with other markets like Singapore, UK, UAE or Germany, Indian real estate practices barely match up to global standards of practice. Aspects related to project management, project planning, and project delivery are presented in the following passages.

4.1 Project Planning Stage

4.1.1 Land Titles and Records

In case of the UK land registry maintains all records. All encumbrances on the title are instantly recorded to maintain enforceability. Private companies are also active in the field of finding out the various encumbrances and charges connected with a particular property, and the title records, for a specific fee. Singapore keeps the entire information about a property and its title for public viewing through government websites and is updated regularly. The entire system of allotment of housing is highly transparent. On the other hand in case of Germany the electronic system for registration of land records is adopted but access is limited to authorized persons only. In case of India, the land records are maintained through a manual recording system at the tehsil level, the lowest level of administrative and land record office in charge of revenue collection, which carries out the first level mutation of the land ownership. The records are open for public viewing only on prior payment of fees. There are multiple government agencies related to land certifications or giving no-objection certificates like Revenue, Municipal Corporations, State Registry Offices, etc. The level of transparency in India is very low as compared to global standards. Fig. 2 also shows the degree of transparency in land dealings in Indian cities along with some other countries.

4.1.2 Approvals

In the UK permissions are required for any kind of planning and the plot of land is required to be registered with the UK Land Registry. It is mandatory for all the builders and developers to abide by the rules and regulations of the Building Control Services stated by the local authority or private sector approved inspectors for compliance with the regulations. On the other hand in Singapore the Urban Redevelopment Authority is the highest authority for approvals. The entire process is network based and carried out through internet for all the five approvals which are required for development. In case of Germany it is found that...
the Planning Law and Buildings Regulations Law is a federal subject, and projects are approved based on the compatibility of the project with the neighborhood considerations and design of building. The local authority is only a supervising body; a ‘single contact point’ process is adopted for any kind of permission and approval. While, in case of UAE the entire process is made up of online systems for all types of approvals. At the same time carrying out the development requires almost 17 different approvals from various regulating bodies. In India, a multiple window system exists and numerous approvals which range between 50 to 55 departmental approvals are required from local to national levels. Land is a state subject in India, thus state level variations in land law exist. Limited information is available for public viewing, while the available information is sometimes outdated due to improper maintenance and updating of records. States do not collect and update land and constructed property valuation data. Thus, contemporary transactions are not based on scientific and up to date information, it is completely left to the market forces. Chances of malpractice are very high due to the absence of price information from government sources.

4.1.3 Licensing and Regulating Body

In the UK, the Architects Regulation Board defines the code for architects and National Association of Estate Agents defines a code of conduct only for agents involved in residential properties. While in Singapore the Board of Architects is the regulating body for designers and architects and the Controller of Housing is the licensing body for developers, brokers and salespersons. In Germany the special State laws for regulation for architects are defined, while no regulating body for developers and brokers is active. On the other hand in UAE the Real Estate Regulatory Authority monitors architects, developers, brokers and salespersons as a single regulating body. In India, the Council of Architecture is the licensing body for architects but licenses from particular municipal corporations are also mandatory. There is no regulatory authority for the developers, brokers and salespersons.

4.2 Financing Stage

4.2.1 Funding

In the UK there are a number of financing options available, however the secondary market funding is strictly restricted to avoid credit crisis. Thus the flow of funds is negatively impacted in this market, while REITs have been the most stable form of funds. When considering Singapore, entire funding is done through Real Estate Investment Trusts (REITs) and Commercial Mortgage-Backed Securities (CMBS). Similarly in case of Germany the funding is done through REITs and CMBS and also mutual investment funds are an option for all kinds of investors. Special investment funds are available for institutional investors. In case of India the REITs do not exist and funding sources include mutual funds.
approved by SEBI (which are not always dedicated real estate funds except HDFC Realty, Tishman Speyer, etc.), project finance companies, insurance companies, savings, private-equity, HNI and venture capital. However all of these are not well-developed and therefore are not able to provide adequate finance for real estate development. Majority of the real estate developers continue to rely on informal sources.

4.2.2 Presence of FDI

In the UK there is 100 percent permission for FDI, the Singapore Government also provides for 100 percent permission, while in Germany the foreign direct investment is permitted but the investors are free to exit through a share deal or asset deal and no approval is required from the German Authority. In India the minimum parcel size of land of 25 acres is prescribed for construction development and serviced housing plots for foreign investments. 100 percent FDI is permitted with a lock-in period of minimum 3 years.

4.2.3 Presence of Multiple Regulating Agencies Body for real estate industry

In the UK there is an absence of a monitoring body and the Financial Services Authority regulates investments through REITs only. While in case of Singapore the land ownership is controlled completely by public sector, various authorities and their prescribed rules are to be followed for different issues and uses. Similarly in case of Germany there is no regulatory body working, but certain restrictions are applicable to funding agencies for risk diversification. In case of UAE the Federal Real Estate Regulatory Authority is in the process of establishment. As of now, there is no regulatory body active in India as a whole. In India, the Ministry of Housing and Ministry of Urban Development are central government lawmaking authorities, the Reserve of India (RBI) regulates monetary policy, thereby interest rates that govern banking, and non-banking financial sector, the Securities and Boards Exchange of India (SEBI) regulates foreign investments in real estate. Association of Mutual Funds (AMFI), decides on the types of mutual funds that are permissible, and their governance; finally the National Housing Bank (NHB) functions as an apex regulatory authority for Housing Finance Corporations and Non-Banking Finance Companies (NBFCs) operating in real estate lending. Apart from the central structures, there exist the State level regulators because Housing and Real Estate is in the State List, so is Land. Multiple laws and duties to acquire, develop, maintain, and dispose real estate exist at the state level. At the local level of municipal corporations and bodies, Development Control Rules (DCRs) and Floor Space Index (FSI) norms, Transfer of Development Rights (TDR) may be in use in certain states, these add to the endless regulation and multiplicity of clearances at different governmental levels. The trademark of Indian real estate regulation is its excessive and splintered nature. As seen in Table 1, on an average, 52 -55 clearances, delay the launch of new projects.
4.3  Project Implementation Stage

4.3.1  Provisions to check the utilization of money for the intended purpose

When considering the UK the proper utilization of money is ensured through individual contractual escrow arrangements to fulfill the purpose. Singapore prescribes formation of escrow accounts. While in Germany, no such provisions prevail but certain binding rules may exist in government related projects. On the other hand in UAE, the federal law checks the guarantee accounts or escrow accounts of real estate developments. In India, no such provision for escrow accounts are known to exist let alone auditing them to find out their intended purpose.

4.3.2  Health and Safety Regulations

The Health and Safety executives work as inspectors in the UK, appropriate certificate is required from the government prior to the occupation of completed developments, and specific duties are stated for contractors and developers under the health and safety legislation. While in case of Singapore, the Ministry of Manpower is the chief regulating body to control working conditions. In Germany the provision for mandatory insurance of employees is in place, and the cost of insurance is paid by the employer as well as the employee equally. Whereas in UAE the federal law is designed to regulate labor matters like injuries, hazards, medical care, facilities, etc. In India, although the Act exists, the enforcement of these Acts and other legislation is not found to be stringent and punitive. Too many loopholes exist and are used to circumvent good legislation.

4.4  Project Delivery Stage

4.4.1  Standard Area Measurement System (carpet / built-up / super built-up).

In the UK, the Royal Institute of Chartered Surveyors which defines the bases of measurement for different uses and purposes, issues the Code of Measuring Practices. In Singapore, the measurement based on built-in floor space. While in Germany the sale area is the same area as registered in land records, and German Public Law defines regulations for measurement. In India a single standard system for calculating the built-up area does not exist and the sale area might differ from the registered measurement in many cities and states.

4.4.2  Provision to Safeguard the Interests of End User

In the UK the provision changes from contract to contract, but typically these provisions include delivery date, and arbitration clauses for dispute. Also the Property Misdescription Act, 1991 prohibits false or misleading statements by estate agencies and property developers, whereas, the contracts are the only basis for details like allotment date and specification in Singapore. In case of Germany, the German Civil Code regulates the property description matter and defines legal means for delayed delivery compensation. In UAE, the real estate
Investor protection law is under review and if passed, this law will provide details for cancellation of contracts, refund or replacement of property by developer. In India, there is absence of a specific law, which is binding on the contractors and developers. As on date the deviations from conditions specified in the contract are the only basis for petitioning against the developers and mostly through consumer courts.

5. ABSENCE OF STRONG REAL ESTATE ASSOCIATION

Associations globally play a significant role in setting industry standards for practice as well as advocacy of industry status and other issues, for business. In case of all mature real estate markets at the global level it has been found that these associations serve as an effective bridge between the business and the regulators. A range of issues covering codes of ethics, standards of practice, legislation, education and training, licensing, self-regulation, etc; help to raise overall standards. The Government too finds it easier to deal with credible associations to dialogue with when introducing reforms or legislation. Another positive effect of recognized industry status is that access to institutional finance would be easier for industry players. CREDAI is the only association, which claims a membership of over 6,000 and representing over 18 member associations. It aims to slowly set quality and service standards for real estate through its 'Preferred Partners’ initiative.

6. FOREIGN INVESTMENT IN THE INDIAN REAL ESTATE SECTOR

In India building construction activity has grown manifold since 2006 when the Government allowed 100 percent foreign investment in real estate industry. The inflow of foreign capital funds in India has created a lucrative opportunity for local developers. In 2010 the net FDI inflow was US$20 billion, which was 11 percent higher than the previous year. As shown in Fig. 3, the flow of funds is marginally higher in the housing sector when compared to other construction activities in the year 2011.

However, the trends in the first quarter of 2011 portend a lower rate of investments when compared to 2010. There may be many reasons for the lower rate of investments and not just the global slowdown. Brazil, Russia, India and Chinese economies are...
growing at a higher rate as compared to the developed countries in Europe and the USA, but amongst them, India’s inflationary problems may not help foreign investment coming to India. Fig. 3 shows a fall in investment while a degree of recovery is witnessed in the second quarter. In spite of the stringent rules in the Indian real estate market, foreign investments view India as a potential market. This was also driven by the global crisis involving the Greek sovereign debt default, followed by Italy and Spain being financially precarious, in the European Union. The American recovery based on quarter on quarter recovery is still not encouraging since 2008, while Japan has taken a hit after the devastating tsunami in 2011. In case of FDI which is vital for India, the sectors worst affected by a predicted reduction in investment are construction, real estate, mining, and business financial services (Fig. 4).

7. ACCOUNTING RISKS AS DETERRENTS FOR GLOBAL INVESTMENTS DIRECTED TOWARDS INDIA

Experts attribute a number of reasons for the slowdown in foreign investment in India ranging from changes in policy, the existence of black money as a parallel economy, and delays in policy and programme implementation, etc. The change in government decisions and actions is not the only factor, but include factors such as labor and material costs that affect the timely completion and success of the projects, which in turn, act as a positive multiplier, inducing further investments. There is another greater perceived risk articulated by many representative bodies such as the Royal Institute of Chartered Surveyors (RICS), and International Valuation Standards Council (IVSC), which has through their various forums pointed to the absence of strong governance structures that hamper the sustained growth of the real estate industry. The regulatory framework in the developed countries is very well established, planned and transparent and it acts as an overseer of all the transactions. On the contrary, the
regulatory scenario is in a very embryonic stage in India. As a result of the above, business analysts fear that investor sentiment over the coming years is likely to be adversely affected by concerns about lack of transparency issues in India, compounded with issues in land acquisition, and inadequate design, planning and project execution capability. This with an historic culture of common scope creep, material cost escalations, non-availability of quality vendors for material supply, and a record of missed delivery dates, could all have an impact on project program and cost. These derail the calculated rate of return on investments by the lenders and equity holders.

Economic growth rate of country’s economy is one of the major factors that is considered by the financial institutions before directing investment into a specific country. It is a well known fact that the demographics of a developing nation are more favorable than those of a developed economy, and the developing economies are resistant to economic crisis to a larger extent due to high pent up demand. The growth rate of population in the developing economies also therefore drives the demand for housing and other property types in such economies. As the demand always supersedes the supply in such countries, the potential for real estate development is high. Therefore, in India the real estate market contains to remain unorganized and fragmented. This results in a yawning gap between the potential for development and the actual level of development of the market.

7.1 Absence of a Market Regulator and its Effects on Real Estate Financing

The real-estate industry not only lacks transparency in its functioning but is also highly speculative in nature. At present in India there is no regulatory body to certify property developers and regulate property transactions. It is claimed by industry experts that developers issue advertisements to launch projects in the absence of fulfilling all the land acquisition and registration formalities and launch projects without obtaining prior approval of competent authorities; etc. Many times they neither specify the total area of the plot, flat or house declaring clearly the carpet area and utility area, nor the date of delivery and consequential remedies available to the consumer in case of project completion delays. Also, the amount collected from the allottees against a particular project is neither deposited in a designated escrow account nor utilized only for the construction of the concerned building. It is a very common practice to divert funds from an ongoing project to buy land for a new project, thus jeopardizing the prospects of the previous project. The information relating to the progress of works and status of account of each allottee is not made available to buyers in a transparent manner. Also, developers build in hidden costs, other than the initial price and do not make relevant information public. There are often inordinate delays in execution of the project beyond previously agreed upon durations. Also, due to the unorganized nature of the real estate sector, lack of yield-generating assets of institutional quality in real estate is a major deterrent to
many investors. According to Competition Commission of India, “The absence of any single sectoral regulator to regulate the real estate sector in totality, to ensure adoption of transparent and ethical business practices and protect the consumers, has only made the situation in the real estate sector worse.”

7.2 Circular Flow of Black Money

Another reason which is attributed for high investment risk in real estate apart from the absence of a market regulator is the circulation of black money in the real estate market in the form of investment. The first step that brings black money into the real estate market is the high stamp duty rates applicable on property transaction. According to the former Prime Minister, Manmohan Singh, “I think as far as black money in real estate is concerned, unfortunately that is a reality and one way out of this would be to lower the stamp duties, so that is one way, in which we can work towards a system whereby black money would be less of a menace in transactions relating to real estate” (PTI, March 2011). High percentage of stamp duty on any real estate transaction results in the firms’ under-quoting the property prices to save on the duty, thereby paying lesser revenue to the government. The difference in the price is paid in terms of unaccounted cash. The entire unaccounted cash from various sources is laundered to various tax free, low tax countries and brought back to India as NRI deposits and foreign investments by non-listed companies. The laundered money along with the unaccounted money is employed in funding of real estate projects and purchase of land banks in the name of builders in form of private equity. Table 2 clearly shows that 20 percent of capital funds are invested in the real estate sector in the first quarter of 2011. It is therefore essential that state level regulators (land being a state subject) should set up to oversee these issues and provide an enabling framework so as to facilitate institutionalizing real estate in India. Although the Real Estate Regulation Bill, which was proposed in 2007 by

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Table 2: Industry wise Cumulative Investment Details of SEBI Registered VCFs and FCIs (INR Crores)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Mar-10</th>
<th>Jun-10</th>
<th>Sep-10</th>
<th>Dec-10</th>
<th>Mar-11 % Share in Mar-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information technology</td>
<td>3,103</td>
<td>3,662</td>
<td>3,324</td>
<td>3,319</td>
<td>3,878</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>6,532</td>
<td>6,612</td>
<td>7,789</td>
<td>7,469</td>
<td>7,865</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>1,442</td>
<td>1,395</td>
<td>1,411</td>
<td>1,325</td>
<td>1,313</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>329</td>
<td>323</td>
<td>313</td>
<td>289</td>
<td>288</td>
</tr>
<tr>
<td>Media/Entertainment</td>
<td>883</td>
<td>1,114</td>
<td>1,166</td>
<td>1,006</td>
<td>1,101</td>
</tr>
<tr>
<td>Services Sector</td>
<td>2,327</td>
<td>2,380</td>
<td>2,606</td>
<td>2,677</td>
<td>2,493</td>
</tr>
<tr>
<td>Industrial Products</td>
<td>1,672</td>
<td>1,924</td>
<td>1,951</td>
<td>1,355</td>
<td>1,735</td>
</tr>
<tr>
<td>Real Estate</td>
<td>7,473</td>
<td>9,590</td>
<td>9,828</td>
<td>9,783</td>
<td>10,379</td>
</tr>
<tr>
<td>Others</td>
<td>15,288</td>
<td>16,686</td>
<td>19,455</td>
<td>20,637</td>
<td>23,656</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39,051</strong></td>
<td><strong>43,686</strong></td>
<td><strong>47,843</strong></td>
<td><strong>47,859</strong></td>
<td><strong>52,688</strong></td>
</tr>
</tbody>
</table>

Source: SEBI May 2011
the Ministry of Housing and Urban Poverty Alleviation (MHUPA), is long delayed, it is yet to pass muster. Based on the past government record of delays, in the meantime chaos prevails in the absence of a single regulator.

Another area is the conversion of agricultural land into urban land. The unauthorized portion of the transaction varies depending upon the location. According to the Economic Survey of India, 2010-2011, "Once conversion from agricultural to urban use is permitted, a difficult regulatory process - land prices can jump twenty times”.

7.3 Property Valuation Challenges at consumer level and project level
With the backdrop of the above-mentioned problems, it becomes even more essential to standardize the valuation procedures. Proper training and awareness programs can be held for improving buyer awareness; a demand for professionally qualified and registered valuation personnel is already very high. Established standards for valuation would reduce the challenges pertaining to market value of land banks and sale of property at rates which are in alignment with the government rates. There is great need of globally accepted valuation practices like the RICS Redbook.

7.4 Adoption of IFRS as One Global Accounting and Valuation Standard
With the globalization of Indian companies in either accessing capital from abroad or making acquisitions abroad, it is essential to follow a standard norm that is accepted worldwide. International Financial Reporting Standards (IFRS) enforces all the companies to disclose valuation of the real estate assets used for their business or operation, assets leased out for any industrial, commercial or residential purpose or taken on lease, valuation of all the investments in properties either for capital appreciation or to generate rental income and value their stock in trade. As Indian companies go global, convergence with IFRS would eliminate the need for multiple reporting in most cases as the same set of financial statements can be used for reporting for all the entities.

Fig. 5 mentions the gradual improvement of transparency levels in Indian cities. The market fundamentals are considerably lower in case of Tier-III cities. The level of transparency can be attributed to the improved accounting standards followed in India. There exist huge differences between India’s accounting standards and practices, the internationally Generally Accepted Accounting Procedures (GAAP) and the IFRS. According to Rajiv Chugh Partner Tax and Advisory Ernst and Young, real estate companies would have to take a re-look at their construction agreements for the purposes of revenue recognition. Under IFRS, a company would be able to recognize revenue with reference to the stage of completion. But the guidance note and accounting standards issued under Indian GAAP considers it appropriate to recognize revenues once there is a legally enforceable agreement for sale.
Under fair value measurement of IFRS in India, property leases may be complicated with limited period or perpetuity leases; government or private leases; sub

Fig. 5: Transparency of Indian Cities by Tiers

Fig. 6: Comparative Construction Costs Breakdown of India and USA (1999)

Fig. 7: Gross Domestic Product at Factor Cost by Industry of Origin (Rs Crores, at current prices)

<table>
<thead>
<tr>
<th>Year</th>
<th>Financing, insurance, real estate and business services</th>
<th>Percentage Change in growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>1162</td>
<td>-</td>
</tr>
<tr>
<td>1955-56</td>
<td>1638</td>
<td>41</td>
</tr>
<tr>
<td>1960-61</td>
<td>2360</td>
<td>44</td>
</tr>
<tr>
<td>1965-66</td>
<td>3517</td>
<td>49</td>
</tr>
<tr>
<td>1970-71</td>
<td>5169</td>
<td>47</td>
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Source: Economic Survey 2010-2011, www.indiabudget.nic.in

Source: S Khan, S Shah, IVCJ, 2006
### Box 1: Nature of Indian Real Estate Market

Real estate markets are fraught with problems of information asymmetry, moral hazard, liquidity and heterogeneity. Market failures are therefore common and state intervention is imperative at many levels to ensure fair economic outcomes. Our assessment is that the share of real estate finance sector, as well as that of cluster of real estate related industries in India’s GDP is significantly less than corresponding shares in market-oriented economics. For example, total outstanding mortgages are on an average about 40 percent of GDP for countries of the European Union, the US and Japan, whereas it is a relatively new activity in India. The recently concluded first ever survey of household amenities and assets by Census of India has thrown up statistics that clearly point to the immense potential that the sectors offer for growth. There are only 179 million houses for 192 million families in the country. There is thus significant gap of 13 million in availability of dwellings. The situation is in fact worse about 10 percent of the dwellings are vacant, perhaps because of the archaic statutes.

Close to 50 percent of the households live in non-permanent constructions. About one in every five houses has a concrete roof and only about a third have cement floors. About two-thirds of the residences do not get water at home and just over 50 percent of houses have electricity connection though they may not be receiving any electricity because of the poor state of the electricity sector. In short, the assessed gap in requirement and availability of housing in fact severely underestimates the real gap if bare minimum standards for space amenities are specified. There is therefore scope and a crying need for action by the Government to improve the situation. Along with appropriate changes in the laws and the regulatory framework, adequate public funding for the sector is called for to act as a catalyst for attracting private capital and management. The value in exchange for the public resources spent and in terms of an active public-private partnership would be immense (Accommodation Times, April 2011).

leases and special leases, like on cantonment land. These complicated lease transactions will need to be reported at fair value, which may not be an easy task, given the limited information available in the public domain. Nearly 90 percent of 143 world leaders from 91 countries, surveyed by the International Federation of Accountants, affirmed that a single set of reporting standards was important for economic growth. In real estate valuation standards implementation of International Financial Reporting Standards (IFRS) requirements for current value accounting on all assets and liabilities is driving the need for truly global
valuation standards. The RICS Red Book provides an implementation or practice framework for the application of International Valuation Standards (IVS) globally ensuring that valuers follow consistent methodologies throughout the world. Foreign investors would have greater confidence due to the transparency in valuation and financial reporting.

8. CONCLUSIONS

Indian real estate has strong potential due to the enormous demand supply gap compared to the saturated global markets. It is indeed strange that activities involving a basic need of human beings is found wanting in fair and wholesome regulation. After decades of Independence, India has been unable to provide access to shelter to the majority of its population. The contradiction of excessive regulation in supply of housing leading to inordinate delays coexisting with absolutely no regulation in granting entry to new entrants defies logical explanation. Current market practices in Indian real estate are not transparent and competitive enough for the long term wellbeing of the players and inclusive growth considerations of the society. The real estate sector is not an independent and closed industry; it is interrelated with multiple industries, services, and stakeholders. To ensure the long term sustained growth of property sector, transparent practices should be established in the industry. For smooth running of the business and fair competition between the players of the industry, and to protect the end users and investors interest, strong diligence systems and rigorous implementation to avoid regulatory capture is essential. The real estate sector is no more limited to the local, state, or national levels as the scope of the industry has broadened to a global level. Hence, it is important for real estate players to keep up with the global best practices in the real estate sector and dispel the predominant belief that those indulging in substandard practices dominate it. The onus lies on the serious and long standing players to transform the industry from a ‘business’ orientation to that of an organized, professionally qualified industry by setting up new benchmarks and standards of practice. It must do so with the help of government agencies much like the many industries in IT and manufacturing sector have successfully done in the past. Self regulation, establishing transparent business practices, a genuine consumer focus, subjecting one’s companies to regular public scrutiny, and actively engaging with the governmental agencies to alter archaic laws and usher in transparency in dealings, are some ways by this could be achieved.

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