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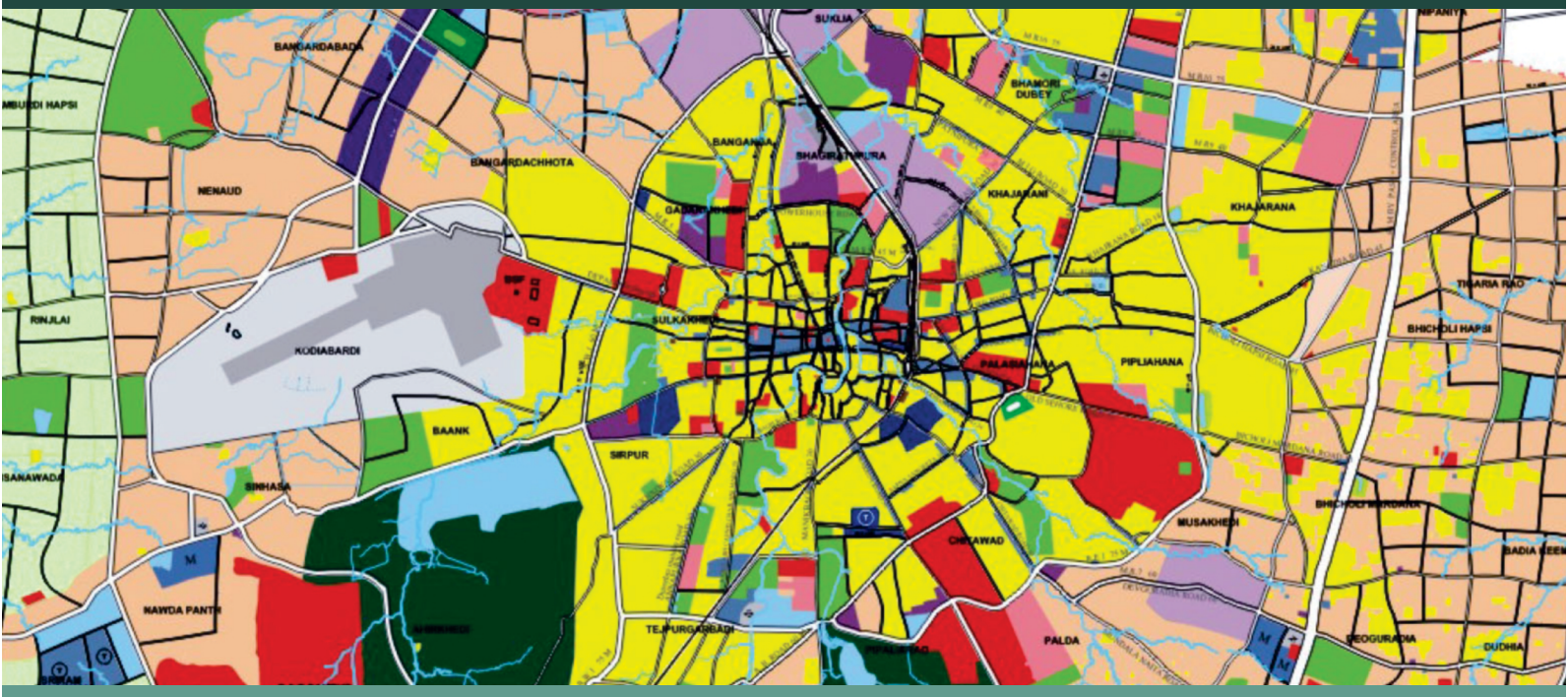


**Disaster Resilient Cities, Building Climate Resilience in Indian Cities, Local Area Plan for Making Cities Resilient in Madhya Pradesh, Building Urban Planning Capacity in India: Role of ITPI**

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The ITPI Journal seeks to provide a medium for expression of views, opinions and ideas about issues, plans, strategies, policies and programs related to urban and regional planning and development. The Journal also aims at promoting views of the Institute of Town Planners, India on town and country planning by disseminating new knowledge in the areas of concern to policy makers, governments, practicing planners, researchers and educationists, etc; in India and abroad.

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# Editorial

*This third issue of 19th volume of the ITPI Journal presents some of the papers received for the 70th National Town and Country Planners Conference held at Bhopal during April, 2022.*

*The first paper written by Amir Ali Khan on the theme "Disaster Resilient Cities – A Way forward" highlights that disaster of various origins are rising, spreading, and escalating day by day across the world including India. Such catastrophic events are clear indication towards lack of disaster safe development planning specially in urban areas, and suggest the framework for disaster resilience for making resilience an integral part of urban planning and management. While Raina Singh and T. Shravani in their paper on "Building Climate Resilience in Indian Cities" underlines that most climate change extreme events have occurred globally and in India since the last two decades, and some of these extreme events are considered to be globally irreversible.*

*Vishnu Khare in his paper on "Local Area Plan for Making Cities Resilient in Madhya Pradesh" argues that a new element in the hierarchy of Master Plans i.e. Local Area Plan, (LAP) have been introduced since the last one and a half decade, which claims to promote innovation and use of smart solutions. With the case of Indore, it is demonstrated that LAPs help in establishing a framework for redevelopment of existing areas; and planned spatial development, among others. While Shivkant Mudgal in his paper on 'Making Cities Resilient in Madhya Pradesh through Local Area Plans' seeks to explore the role of Local Area Plan for making cities of Madhya Pradesh resilient and proposed a framework for creating the public realm for enabling redevelopment of the existing built environment and preparation of a new layout and further emphasized that revamped Central Business District and accessibility enhancing Transit Oriented Zone are two salient features of the Local Area Plan.*

*Manmohan Kapshe in his paper "Planning Climate Resilient Cities in Madhya Pradesh" attempts to put together a brief compilation of various research papers, reports and relevant policy documents in a simple to follow structure for easy understanding of major issues related to developing climate resilient cities with special reference to Madhya Pradesh.*

*In the paper on "Building Urban Planning Capacity in India: Role of ITPI" based on the report of the Advisory Committee of NITI Aayog on 'Reforms in Urban Planning Capacity in India' D. S. Meshram pleads that the creation of 'National Council of Town and Country Planners' will not jeopardize the role and functions of the ITPI. To strengthen his argument, he mentioned that similar situation was prevalent when Council of Architecture (CoA) was created by the Architects*

*Act 1972, at that time also Indian Institute of Architects (IIA) was existing since 1917, and still both the bodies CoA and IIA are working in tandem, accordingly, the ITPI and NCTCP can also function without jeopardizing each other's role and functions.*

*H. S. Kumara in his paper titled "Challenges and Opportunities for Re-imaging India's Urban Future through Smart Cities" amplifies that re-imagining India's urban future should not be limited only to population size but must also encompass governance, planning and management and further argues that Smart technologies on their own cannot solve all planning problems because city governments have a dual role to play.*

*Shanu Raina and Shaila Bantanur in the paper titled "Integrating Urban Villages in Spatial Planning: An Overview of Transformation of Rural villages to Urban Villages - A Case Study of Delhi" provides insight to the concept of urban villages in Indian scenario, and analyzed the process of transformations in these rural villages to urban villages with the aim to study the various planning policies as contained in the Master Plans for Delhi and their role from the last 75 years in shaping the current spatial planning of urban villages.*

*The paper on the theme "Resiliency of Indian Cities" written by Sudhir Singh Chauhan and Gurpreet Kaur, highlights that in India there is a lack of planned environment with respect to desired goals and strategies as is evident from the effects of COVID-19 pandemic which significantly devastated urban life. Therefore, authors pleads that urban planners and policy makers engaged in spatial planning and management should carefully consider how "people-oriented" principles could be incorporated into spatial-planning systems to reduce the negative impacts on both cities and people.*

**Prafulla Parlewar, Ph.D.**
Editor, ITPI

**Ashok Kumar, Ph.D.**
Chief Editor & Secretary Publication

# Content

# Disaster Resilient Cities - A Way forward

**Amir Ali Khan, Ph.D.**

**Abstract**

*Disaster of various origins are rising, spreading, and escalating day by day across the world including India. Such events have not only greater consequences for the physical, socio-economic, and psychological wellbeing, but also expose the level of resilience present in a region. Disasters in recent times have posed a greater challenge to urban areas at national level. Apart from water and climate related disasters, ongoing biological disaster, namely Covid-19, has exposed the poor resilience in the country especially resilience of existing infrastructure. Such catastrophic events are clear indication towards lack of disaster safe development planning specially in urban areas. This paper attempts to analyze the importance of disaster resilience in urban areas with reference to some of the most devastating events like the Bhuj Earthquake (2001), Srinagar (2014), Chennai (2015), Kerala (2018) floods, Cyclone Hudhud (2015), and COVID-19 Pandemic, and provides suggestive framework for disaster resilience for making it an integral part of urban planning and management.*

## 1. INTRODUCTION

Natural disasters cause enormous grief, not just in terms of physical damage but also in terms of social and economic terms and result in loss of lives, property, natural landscapes, infrastructure, public facilities, livelihood systems, and damages to social, economic, and psychological well-being. Natural disasters affect more than 226 million people every year. Approximately 4 billion people have been affected by natural disasters over the last 20 years (2000-2019), with 1.23 million deaths[1]. These disasters also resulted in economic damages totaling over US$ 297 trillion worldwide. Scientific studies have shown that disasters of various origins are rising, spreading, and escalating day by day, pulsing through all seasons and affecting every part of the world.

India's urban population is characterized by a rapid rate of natural growth and immigration. This pattern of urbanization has found a new dimension with the development of industrialization and development of transportation networks leading to higher rates of trade[14].

According to (Horo and Punia, 2018), urban areas have expanded rapidly during the last few decades, with urban population growth rates being higher than the overall growth in most cities. This is because urban areas are centres of economic

***Amir Ali Khan, Ph.D.;*** *Faculty, National Institute of Disaster Management, Ministry of Home Affairs*

activity and transportation nodes. The patterns of urban densification and internal modifications are, thus, a significant concern to sustainable development because they represent the physical manifestations of a range of social, cultural, economic and political dimensions associated with urban dynamics[15]. In addition, need for food, clothing, housing, transportation, sanitation, healthcare, etc.; is being felt in cities[16]. Also, there are environmental, social, and economic threats as the cities expand rapidly. This is further elaborated by Rahman (1998); as per his study, almost 1.7 million people migrate from rural areas to the cities every year in search of employment and other related economic activities, putting acute strains on urban resources, finally leading to environmental degradation[17].

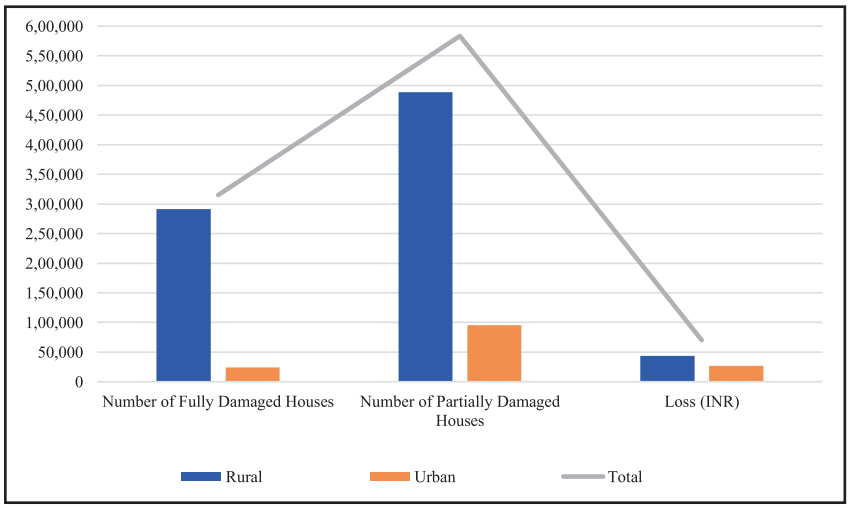
Furthermore, Indian cities are characterized by high population density, heavy construction, lack of infrastructure, informal settlements often regularized which are located where they should not have been. Many cities including Delhi are examples of this characteristic feature of poor urban growth pattern of Indian cities. Apart from urbanization, majority of cities are facing challenges from changing climatic conditions and globalization. India has over 8000 cities located in different geo-climatic and socio-economic conditions. Many big cities including capital cities of several states are located in hilly terrains and about 70 cities, including metropolitan centres like Mumbai, Kolkata and Chennai, are settled on coastal regions. Majority of landlocked cities like Delhi, Patna, Jaipur, etc., face multiple risks due to floods, earthquakes, air pollution, rising ambient temperatures and the growth of infectious diseases.

The changing circumstances, where the intensity and frequency of hazards, particularly extreme weather and climate related events, are posing greater risk for higher level of damages. Seeing the highly vulnerable nature, including climate-sensitivity, of infrastructure, the question whether critical infrastructure at national level is equipped to withstand the impacts of these shocks require further answers.

## 2. IMPACT OF DISASTERS ON INFRASTRUCTURE FACILITIES

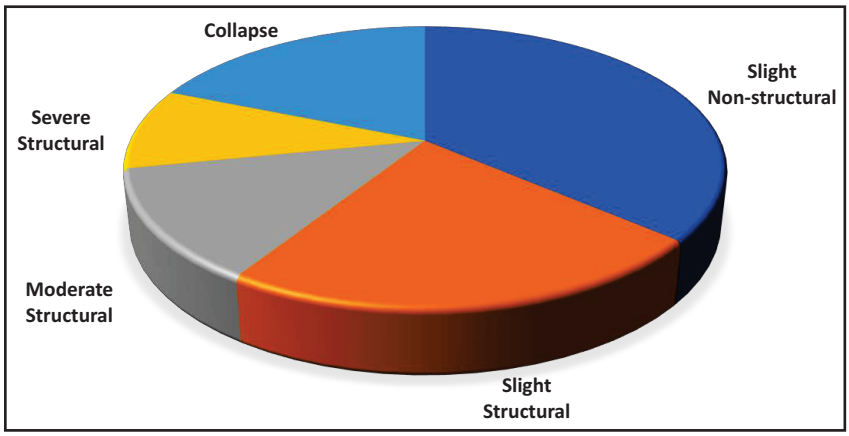
The Indian cities are highly vulnerable to disasters and have witnessed heavy damage and loss to their infrastructure and services during disasters. The most significant impact of recent disasters is increasingly felt regarding the loss and damage to the critical infrastructure[18]. For instance, the Bhuj (2001, M6.9) earthquake in Gujarat resulted in killing of about 9000 people, massive damage to the infrastructure, and the paralyzed of the entire region. The housing sector alone faced damage to nearly one million dwellings[19], causing total damage of about Rs. 5200 crore (US$ 1,111), including household goods. Kachchh District had 70 per cent of its buildings crumbled to the ground, including around 14,000 medical and educational facilities. The health sector, which is the most needed at times of such emergencies, was also wholly collapsed as more than 3500

**Fig. 1: Damage to House in Gujarat, Bhuj Earthquake 2001**




Source: Worldbank27

**Fig. 2: Categorywise Damage to Houses of Kachchh, Gujarat, 2001**




Source: Hausler18

health facilities got severely damaged (Fig. 1 and 2).

Likewise, the Kashmir 2014 floods led to deaths of about 280 people and injuring more than 50,000, leaving approximately 20 lakh people affected. This has caused massive damage to the critical infrastructural facilities, including health, education, power, communications, water supply, sanitation and others. Hospitals in Srinagar remained water stagnant for many days, damaging all the equipment completely. About 70 per cent of the schools in the cities and villages of the Kashmir division were out of function for months, and about 75 per cent reported losses to important educational materials. Prolonged water inundation in some areas badly affected the sanitation and water supply; about 53 per cent of the villages in Kashmir lost access to drinking water, and 85 per cent reported damaged sanitation facilities.

During the same year, the tropical cyclone Hudhud in the month of August wreaked havoc on the eastern coast of India. As a category 3 storm, the cyclone induced considerable damage to the region's physical and socio-economic conditions. Even though the loss of lives caused by this disaster was comparatively low, the failure to the infrastructural system was abnormally high.

Visakhapatnam city was among the most damaged areas, which alone faced partial and complete damages to more than ten lakh of houses, with about seven lacs of them severely affected. The economic losses incurred due to the cyclone were in the tune of Rs. 90,000 crore (approximately US$ 20 billion)[20,21].

The Chennai 2015 floods affected over 2 lakh people and caused damage to numerous infrastructural facilities of the city, leaving it completely paralyzed. The unprecedented rains inundated around 40 per cent of the town, with water depth as high as 11 feet in some areas[22]. Similarly, the state of Kerala experienced its third worst flood in history in 2018, which left the whole state devastated, leaving a mark on the developmental gains achieved by it over decades. The flood has affected each sector of infrastructural systems (residential and commercial buildings, roads, railways, bridges, electricity and communication lines, water supply, health and educational institutions, etc.), making the state wholly paralyzed. It destroyed 280,000 houses (approximately 9.58 per cent of the total houses partially, 81.57 per cent severely, and 8.83 per cent fully), 140,000 hectares of standing crops, 1020 bridges and about 70,000 kilometres of road network[23], making search and rescue operations even more difficult. The educational and health sector suffered the most, and 1051 schools (8.31 per cent of all schools) and 2659 Anganwadi with 1148 toilets and 842 urinal facilities and about 34,251 compound walls were damaged. From buildings to school material such as desks, boards, lockers, grounds, essential documents (learning materials, certificates, examination papers and ICT equipment's), and children's creative works have been destroyed. 68 per cent of the health institutions, including 452 hospitals and 423 Public Health Centres (PHCs) destroyed too. Damage to WASH contributed to 6,88,497 with an economic loss of Rs. 890 crore. The total recovery needs of the state were estimated at Rs. 31,000 crore[24, 25]. Since these floods were deemed one of its kind, unspeakable damage to the State's infrastructural system was observed. Furthermore, as per the Central Water Commission (CWC), the cost of damages from climate-related extreme weather events on infrastructure and housing has been in the range of three per cent of India's GDP[26].

Earthquakes are the most uncanny, unpredictable, and deadly disasters in the world including India. At the time of the Bhuj earthquake, data on housing vulnerability revealed that over 90 per cent of the houses did not fit the disaster resilience standards[19]. And nearly 66 per cent of the population live in "*Kutcha*" houses (houses made of less durable materials including mud, dung, etc.), and others live in "*pucca*" houses (made of more durable materials including cement mortar, brick, block, cut stone, etc.). Nevertheless, it was found that *pucca* houses were more damaged than the *kutcha* houses in *Kachchh* during the Bhuj earthquake. The Bhuj earthquake also impacted the urban areas in Gujarat in a very big way. Many small cities / towns were completely devastated by the impact of the earthquake. Towns like Bhuj, Anjar, Bhachao, Gandhidham, etc., were totally devastated. The damage pattern of the earthquake, and housing vulnerability in Gujarat indicated many details towards poor management of disasters in the country reflecting inadequate resilience, especially of urban cities.

Worldwide floods have the highest frequency of occurrence and are one of the most detrimental and devastating disasters. The increasing trend of floods globally including India, points to the inadequacy of disaster management having poor resilience. Some of the major floods, such as the Srinagar 2014, Chennai 2015, and Kerala 2018, are significant examples pointing towards poor resilience of Indian cities to face a challenge from disasters. Housing vulnerability tables of Kerala indicate about 20 per cent of the housing falls under very high vulnerability and more than 72 per cent comes under highly vulnerable zones for flooding (Table - 1). These figures reflect poor planning, construction, poor land use, and risk-sensitive planning[28]. Similarly, housing vulnerability tables of Andhra Pradesh indicate that housing in low, high and very high vulnerability to cyclones and floods contributed to 24 per cent, 74 per cent and 1.7 per cent respectively. Whereas in Visakhapatnam, the most affected city in cyclone Hudhud, the 23.4 per cent of the houses are very highly vulnerable and 72 per cent are highly vulnerable categories.

From the above discussion, it is evident that the cities of India do not have well-equipped infrastructure (physical, environmental, social and economic) to withstand the shocks of recurrent disasters. The critical infrastructure facilities are a significant determinant of development and the assessment of resilience in a region. Damages to such critical infrastructural elements which leave the

**Table 1: Vulnerability of Housing during Kerala Floods and Cyclone Hudhud**

| House Type | Number of Houses / percentage | | Level of Risk under Floods |
|---|---|---|---|
| | Kerala Floods | Hudhud Cyclone | |
| Rural buildings, mud houses and houses with stone walls without mortar. | 1,966,817 (19.8) | 231,410 (18.2) | Very High |
| Ordinary brick buildings with stone walls packed with mortar. | 7,239,026 (72.9) | 918,902 (72.1) | High to Medium |
| Concrete. | 286,062 (2.9) | 30,076 (2.4) | Low to Very Low |
| Wood. | 104,081 (3.9) | 27.377 (2.1) | High |
| Others. | 339,169 (3.4) | 66,360 (5.2) | Very High |
| Total Houses. | 9,935,155 (100) | 1,274,125 (100) | |
| Roofing material. | | | |
| Lightweight sloping roof. | 1,301,278 (13.1) | 264,779 (20.8) | Very High |
| Heavy weight sloping roof. | 3,736,451 (37.6) | 237,468 (18.6) | High |
| Flat roof. | 4,897,426 (49.3) | 771,878 (60.5) | Damage to such roofs is determined by the type of wall supporting it. |

*Source: (BMTPC, 2019)28*

cities completely paralyzed question the definition of resilience in these regions. The absence of disaster resilience in cities of India, including Visakhapatnam, Chennai, Delhi, and others impacts the development progress achieved by the region, and hence, the overall resilience. Development of the entire urban eco-system is based upon four pillars of comprehensive development, i.e. institutional, physical, social and economic infrastructure[29]. However, the growth of urban infrastructure does not match the growth of the urban population[13]. Poor or inadequate infrastructure such as drainage capacity of rivers, unplanned regulation, and failure of flood control structures to withstand the climate impact have added to their vulnerabilities[26].

## 3. LACK OF RESILIENCE OF INDIA CITIES

Extreme lack of awareness among the communities is a significant aspect of the poor resilience of cities in the country. The whole disaster management approach starts from the community level, which can never become resilient if it remains unaware. The most apparent gaps affecting the overall resilience of cities are poor land-use practices, inefficient use of the available technology, and non-inclusion of hazard, vulnerability, risk, and seismic, coastal and river zoning regulations in the planning processes of the cities[30,31]. Unplanned urban growth, poor material and design of critical infrastructure buildings, designing of cities without the inclusion of multi-hazard and vulnerability status of the region, poor planning for the worst-case scenario, inadequate measures to safeguard the critical infrastructures, the poor drainage system of the city, integration of disaster management plans of different infrastructural elements of the city, no / limited emergency disaster management plan, poor risk mitigation and preparedness measures in place, inadequate early warning systems for cyclone and floods, etc., absence of cyclone resilient emergency shelters, unsustainable heavy infrastructure (such as airports were not designed to sustain high magnitude wind velocity), absence of urban flood models, and inadequate and ill-planned construction on wetlands, floodplains, and exposed areas, are other aspects of the poor city resilience which together lead to massive loss of life and infrastructural losses at times of disaster emergencies[22]. Development of exposed areas including multi-hazard scenarios and no proper regulations and follow-ups produced poor resilience results. Moreover, urban planning without hazard and vulnerability assessment cannot bring desired results. No city can become resilient without proper disaster management and risk mitigation plans.

Lack of risk-sensitive land use planning, updating of the disaster management plans as per the current scenario of the region, inappropriate disaster management policies and programs, poor disaster management policies and plans for safeguarding critical infrastructure facilities, and lack of adequate construction and building practices, etc., are some of the main prevailing issues questioning

the resilience of the cities even today, when the country has already witnessed some of the most devastated disasters (in particular, Tsunami 2004, Super Cyclone 1999, Uttarakhand flood 2013, Kerala flood 2018).

Infrastructural disparities have resulted from the regional differences[32] and response from the government through payments, assistance, etc., which has exacerbated this problem and increased the level of dependency[33]. Furthermore, Indian cities are confronted with a host of challenges, including:

- **Uncertainties in Modelling Future Climate Scenarios:** Policy planners at the national and sub-national levels require definite risk assessment and data of time, probability, occurrence, and the degree of the potential hazard to other infrastructure, to be able to plan for new infrastructure or retrofit existing ones. These assessments are either not available with the government or are not in a usable format that could inform public policies and decisions[34]. Moreover, there are inherent uncertainties in modelling how the climate, and other factors affecting infrastructure resilience, will evolve in the future;
- **Lack of Inventory and Database System:** No Indian state maintains up-to-date records of their current infrastructure. The data on infrastructure and services in India is generally spread across various departments[35]. In the absence of a single repository where the information is either inventoried or maintained, it would be difficult for the decision-makers to use such data to formulate strategic plans and designs;
- **Lack of Integration of Climate Concerns in Land use Planning and Project Planning:** The risks related to climate change and its impact on infrastructure are yet to be integrated into the urban development planning paradigm. With exceptions to small-scale implementation of programs by a few coastal states such as the Heat Action Plan developed by Ahmedabad Municipal Corporation, the early warning system for floods developed by Surat Municipal Corporation, or using rainwater harvesting for recharging bore-wells in Solapur, the focus of a majority of city planning has remained on infrastructure development for better service delivery. Climate concerns come as secondary benefits[36].
- **Potential Misalignments and Non-Compliance with Policies:** Majority of infrastructure planning, such as water, sewage, telecommunication and roads, lies with various government departments with no integration point for multi-sectoral planning[37]. Issues of jurisdiction and overlapping policies and mandates of government agencies often interfere with the effective implementation of development plans. Moreover, one of the primary reasons for the vulnerability of India's infrastructure to severe weather events is the non-compliance with national guidelines and lack of adequate by-laws. The Model Building Bye-laws 2016 of the Ministry of Housing and Urban

Affairs provides for risk classification of buildings and climate-resilient construction[38]; however, most venerable cities do not adhere to these provisions.

- **Gaps in Financing for Resilience:** India's economy has suffered a massive US$ 79.5 billion loss due to climate-related disasters in the last 20 years[39]. In terms of disaster management, data indicate that expenditures on disaster response are always higher than those directed at prevention measures. For every US$ 7 spent on relief, US$ 1 is spent on risk reduction[40].

## 4. RESILIENCE BUILDING OF INDIA CITIES - NEED OF THE HOUR

In general, resilience refers to someone or something's ability to bounce back or adapt quickly in the face of adversity. Business, ecology, engineering, geography, socio-ecological systems, risk management, sustainability, public administration, public health, sociology, and urban planning are just a few fields that utilizes the term resilience. In response to environmental dangers of modifying social and institutional frameworks, the study of urban resilience received attention in the late 1990s in environmental management[41]. Since then, research trends in disaster risk reduction, have shifted away from land-use planning and hazard mitigation towards planning for post-disaster reconstruction and recovery, with a focus on social and physical reconstruction of communities, where resilience is determined by the functioning of complex, interdependent infrastructure systems[42]. The "measurable ability of any urban system to retain continuity across all shocks and pressures, while positively adapting and reforming towards sustainability" has been traditionally defined as urban resilience. While urban resilience, according to Vale and Campenella (2005), involves a physical ability to bounce back from a significant hurdle, similar to a rubber ball placed on the pavement[43]. The ability of any city to cope with any calamity or stress that may come. It is the way and the ability to absorb disruption while maintaining its activities and structures is a vital aspect of urban resilience and planning[44-46]. The term "city resilience" has many definitions. However, in general, it refers to a city's ability to absorb shocks (from extreme events) while still performing its functions (by providing the basis for the well-being of residents).

Cities are built for various reasons, including colonial ambitions, maritime connectivity, historic trade routes, including slavery, learning centres, economic growth, administrative and cultural centres, and religious significance, etc. However, changes in the national and local economies, bad infrastructure, growing pollution levels, and a lack of physical safety all contribute to cities' slow demise. On the other hand, climate change has the potential to wreak havoc on cities, rendering them uninhabitable. The recurrent floods in Mumbai, Chennai, and Kerala, the earthquakes in Bhuj and Jabalpur, floods in Srinagar, flash floods in Uttarakhand and cyclone Hudhud in Vishakhapatnam are only a few examples of how our towns, often hundreds of years old, were paralyzed and inhospitable.

Cities face grave dangers; many cities are at risk of flooding and storm surges each year. Many coastal cities are on the verge of being flooded. When massive flooding devastated Mumbai and Chennai, more than 1,000 people died, and 45 million people lost their livelihoods, houses, and services[47]. There are many capital cities of Himalayan States and cities like Delhi, Patna, Jalandhar, etc., which are highly exposed to severe earthquake impacts.

Cities like Mumbai, Kolkata, Chennai, and Vishakhapatnam are hubs for critical infrastructure and assets that contribute to India's economy and growth; transportation and freight networks, road and rail corridors, industrial zones and parks, maritime and port facilities, petroleum industries, and refineries, to name a few[48]. They have technologically advanced infrastructure as well as vast populations of productive workers. At the same time, they are afflicted by socio-economic and environmental issues. Cities like Delhi, Mumbai, and Kolkata can sustain irreversible damage and take years, if not decades, to recover from natural disasters. Lack of awareness, poor infrastructure facilities, poor risk-sensitive land use planning, limited capacity building initiatives, lack of structural and non-structural risk mitigation measures, and not so up to date early warning systems are significant obstacles in making Indian cities resilient.

Disaster risk management and climate change consequences have long been a significant emphasis of urban resilience. However, recent examples demonstrate how economic crises, biological hazards like health epidemics (COVID-19), and uncontrolled urbanization may all undermine a city's ability to sustain the expansion and deliver services to its residents. Such challenges highlight the need for a new strategy to resilient urban development. As cities face increasing stresses, there is an essential need to improve resilience, as these stresses can turn into disasters.

There are four critical reasons for making cities disaster-resistant:

- For the first time in human history, more than half of the population lives in cities. The number is only increasing, putting a larger population at risk due to a lack of urban resilience. Any shock to cities disrupts the economic system, energy supply, mobility and telecommunications, and information exchange, etc.;
- Cities account for nearly three-quarters of global GDP. They are the engines of the world economy. For millennia, cities have been the primary driver of human prosperity and standard of living. The work 'Triumph of the City,' by scholar Edward Glaeser, establishes how cities are our most significant innovation and how they make us "Richer, Smarter, Greener, Healthier, and Happier." The climatic shock, as well as the complete lack of awareness of its true danger, has the potential to significantly impede humanity's progress;
- The international development agenda and frameworks including Sendai Frameworks for Disaster Risk Reduction (SFDRR), Paris Agreement (COP-23),

New Urban Agenda (HABITAT - III) and Sustainable Development Goals all are advocating building resilience at all levels. The Sustainable Development Goals (SDGs-2030) set an ambitious agenda making urban resilience a critical organ towards the SDG's success[49]. Though targets 1.5 and 13.1 specifically mention resilience, especially for the poor and vulnerable, it is no surprise that resilience is a vital component of the SDGs. Goals 9.1 on infrastructure, 2.4 on food systems, and 11.5 on natural disasters, for example, focus on resilience. Cities are at the heart of attaining these SDGs, which is inextricably linked to resilience; and

- The US$ 94 trillion in infrastructure investments required between 2016 and 2040 will be channelled toward metropolitan centres around the world. Gas pipelines, motor-ways, high-speed rail, dedicated Freight Corridors, Bharatmala and Sagarmala, housing, water and sanitation, and metro transportation systems are investments in India's urban infrastructure. According to one estimate, 70 per cent of Indian cities are yet to be created[50].

Resilient cities should have strong leadership, infrastructure, economic stability, and community participation framework. Social cohesion is one factor that can help a city recover swiftly after a disaster. A few programs concentrate on urban resilience, such as the 100 Resilient Cities initiative, which includes Indian cities (particularly Jaipur, Pune, Surat, and Chennai), UN efforts to mainstream debate on the subject and national disaster resilience agencies. The SFDRR emphasizes the importance of disaster resilient infrastructure. The National Institute of Urban Affairs and the Rockefeller Foundation's 100RC have collaborated to form a "Urban Resilience Unit" to coordinate the intensive efforts required to embed resilience into national and state policies and programs. While the Indian government has promoted the development of resilient and sustainable cities through the Smart City Mission, the Coalition for Disaster Resilient Infrastructure (CDRI) with its establishment and location in India and other initiatives appear to be well-intentioned. These admirable initiatives are still a long way from bringing about the necessary changes to match the magnitude of the task at hand. The urban sector requires evidence-based knowledge, skills, models, and best practices on this topic. Indian cities require initial assistance in developing collaborative platforms - made up of local governments, educational and research institutions, industry and business, civil society, and citizens- to conduct in-depth assessments of their risks and vulnerabilities, as well as to envision the adaptation strategies they will need in the future to anticipate, adapt to, and withstand the shocks and stresses brought on by adverse environmental, economic, or social conditions.

## 5. TOWARDS RESILIENCE BUILDING OF CITIES – A WAY FORWARD

It might be challenging to transform cities and make them more resilient. New and innovative tools, approaches, and concepts that can empower city and

citizens while also backed up by government policies are desperately needed. These solutions, however, are not as challenging to come by.

For Indian cities, multi-hazard analysis, resilience building, river, coastal and seismic zoning, use of modern technology and involvement of local governments and community are essential requirements, ensuring building and overall resilience scenario in any region. Urban development plans and strategies require effective coordination across sectors. Risk-sensitive land use planning is the central theme needed to be adopted by all the cities to develop true resilience. All the necessary aspects should be included within a comprehensive framework that provides for hazard and risk mitigation. This section presents some of the key areas requiring urgent attention for developing resilience in cities, as given below:

- **The Increased Role of Knowledge:** Technical analyses of climate change consequences and vulnerability mapping are critical tools that help policy makers decide on infrastructure design, planning, and location. It would be essential to have access to and disseminate knowledge of traditional or local resilience-building strategies and encourage using a variety of regionally relevant techniques. To get the most out of such events, a well-planned collaboration between government, academics, and industry would be beneficial.
- **Awareness Generation:** Sensitization and awareness-raising among communities is an essential components of city-level resilience planning. Strong community demand and community support can often lead to decision-makers and planners reaching a consensus.
- **Infrastructure Strengthening:** Reducing the burden of background risk by increasing the resilience of infrastructure would generate benefits that extend across sectors to the macro-economic level. For instance, protecting coastal regions, towns, business districts, or ports / airports with flood protection infrastructure will foster economic activity, long-term planning and capital investments. Critical infrastructural elements like hospitals, PHCs, CHCs and local-level health centres and schools and Anganwadi, etc., should be located away from potential hazard sites; it can be done with the help of previous disaster records and micro level hazard maps. Hospitals situated in flood plains, near river beds and low-lying areas sustain even more damage. However, it is sometimes not possible to locate such infrastructures away from the public, in that case, those structures should be made resilient to disasters like floods and earthquakes; structural elements of the hospitals and school buildings such as safe site selection, appropriate design, and use of up to date construction practices, etc., are vital to prevent damages and disruptions during such events. In case of schools and Anganwadi serving as evacuation shelters and food storage, necessary food items and assets

required should be safeguarded. The emergency assets and equipment are usually placed on the ground floor or basement, making them highly vulnerable to damage; hospitals should be designed in a preventive way that includes the construction practice or structural elements and the placement of its assets. Moreover, the medical equipment should be relocated at such times to keep them in the best working order.

- **Risk Sensitive Land Use Planning:** Land use planning and management are essential for building a resilient society. With the help of risk sensitive land use plans and maps, locations of critical infrastructure, the extent of built environment, and forested areas, etc., can be identified and used for current and future purposes. These can also be used in mitigation strategies to minimise the risks and damages such as planting trees in deficient areas. Structural measures for controlling floodwaters, such as reconstructing dams and embankments on the river, etc., are equally critical.
- **Capacity Building of All Stakeholders and Establishing Procedures for Reconstruction and Recovery:** Capacity building at all levels has to be taken up in terms of state and city level decision-makers, community, and critical stakeholders in the cities.
- **Innovations in Technology, Standards and Governance:** To protect India's city infrastructure from damage caused by disasters and extreme weather, creative methods such as elevating road embankments, water treatment works, and improving design and maintenance standards must be implemented. Furthermore, incorporating innovative processes such as improved equipment / materials in construction and operations and environmentally optimized road designs using local and marginal materials could lower infrastructure life cycle costs, improve durability, and improve long-term performance[26]. It is critical to monitor resilience-building by incorporating worldwide standards on resilience and sustainability that can analyze environmental, social, and governance (ESG) performance and impact of infrastructure projects. While creating rules, codes, and manuals to integrate state-of-the-art engineering technology is a priority, there is also a need to develop standards, regulations, and manuals to nurture resilient infrastructure. There is also a need to increase scientific and technology applications that can improve risk and vulnerability assessments, such as Geographical Information Systems (GIS), geological-geographical, and hydrological research capacities.
- **Innovative Financing:** Given the massive budget required, developing resilient city infrastructure is a significant problem for India. Examining the sources and modes of financing is crucial. In contrast, low-cost public finance is critical in the early phases due to related risks, private capital mobilisation in resilient infrastructure. Institutional investors' funds, such as pension funds, insurance premiums, and sovereign wealth funds, are critical

supplemental funding sources. On the other hand, private investors make judgments based on profitable and better returns.

- **Regulatory Mechanisms:** To maintain distinct ecosystems and protect essential infrastructure from future climate impacts, governments must develop relevant zoning regulations, building by-laws, and land use restrictions at national and state levels. Given the frequency and severity of danger, densely populated areas must support decentralized administration of additional infrastructure through mechanisms, like:
  - Structural and non-structural risk mitigation measures; and
  - Early warning system.

## 6. CONCLUSIONS

Disasters of various origins are increasing in terms of their frequency and intensity killing more people and causing more economic losses. However, of all, water and climate-related disasters are most ravaging. Changes in the climate induced by anthropogenic and natural factors continually fuel many disasters such as floods, droughts, cyclones, wildfires, heat waves, winter storms, glacial melt, extreme rainfall and hurricanes, etc., and have all increased, globally and, in India too. India's average damages from multi-hazard disasters are roughly US$ 9.8 billion, with floods alone accounting for US$ 7.4 billion[27]. Rapid urbanization, development of industrialization and trade and transportation, high population density, heavy construction, lack of and poor / bad infrastructure, informal settlements, climate change and globalization, lack of physical safety, lack of risk-sensitive land use planning, updating of the disaster management plans as per the current scenario of the region, inappropriate disaster management policies and programs, poor disaster management policies and plans for safeguarding critical infrastructure facilities, and lack of adequate construction and building practices are happening in every city which all contribute to cities poor resilience and slow demise. The emergencies due to natural hazards may led to immense damage to human lives, infrastructural systems, and social well-being, which in turn hampered urban services. In fact, the greatest impact may be felt on critical infrastructure such as airports, communication, power, WASH, transportation, health, education and housing, etc. As cities are facing increasing stresses, there is an essential need to improve resilience, as these stresses can turn into disasters.

Although few programs have been initiated and implemented which concentrate on urban resilience in India, such as Smart City, Resilient City, etc., but these initiatives are still a long way from bringing about the necessary changes to match the magnitude of the task at hand.

Indian cities require initial assistance in developing collaborative platforms - made up of local governments, educational and research institutions,

industry and business, civil society, and citizens - to conduct in-depth assessments of their risks and vulnerabilities, as well as to envision the adaptation strategies they will need in the future to anticipate, adapt to, and withstand the shocks and stresses brought on by adverse environmental, economic, or social conditions. It might be challenging task to transform Indian cities more resilient, but many countries in the world have achieved this by strengthening the infrastructural systems and other means. New and innovative tools, approaches, and concepts that can empower city and citizens while also backed up by government policies are desperately needed. These include multi-hazard analysis, river, seismic and coastal zoning, use of modern technology, risk-sensitive land use planning, capacity building, awareness, early warning system, involvement of local governments and community, effective coordination across sectors in urban development plans and strategies, and inclusion of these necessary aspects in a comprehensive framework that provides for hazard and risk mitigation.

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# Building Climate Resilience in Indian Cities

**Raina Singh and T. Shravani**

**Abstract**

*Most climate change extreme events occurred globally and in India since the last two decades, some of these are considered to be globally irreversible. Urban settlements have been facing the maximum impact of these climate change events. In this paper it is argued that there is an urgent need for cities to formulate and implement ambitious and bold climate actions while mainstreaming resilience in urban planning and governance frameworks. Several critical interventions for building resilience in Indian cities are proposed including formulation of climate action road maps; setting up data systems to conduct assessment based on informed decision making; creating effective institutional and governance mechanisms; mainstreaming urban policy, development plans and infrastructure investments; and promoting advocacy and public engagement.*

## 1. INTRODUCTION

The Global Climate Risk Index 2021 ranks India as the seventh most-affected country from climate-related extreme weather events (storms, floods, heat waves, etc.) based on the recorded data for loss and damage during 2000-2019 in terms of fatalities per 100,000 inhabitants and losses per unit GDP in per cent (David Eckstein, 2021). The report also indicates that in 2019 India recorded its most rainfall since 1994, the most number of cyclones and 'severe cyclones' on record and a severe heat wave in north and central India. Such extreme events and related losses and damages are likely to increase with changing climate as per the inter-governmental panel on climate change (IPCC)'s recent report which has been defined as a 'code red for humanity'. The report presents irrefutable evidence that human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Many of these changes are unprecedented, and are already 'irreversible' for centuries to millennia. Limiting warming below or close to 1.5 °C could reduce challenging impacts on ecosystems, human health and wellbeing but would require to decrease net emissions by around 45 per cent by 2030 and reach *net zero* by 2050 (IPCC, 2021).

As hubs of population, infrastructure and economic activities, cities have been at the forefront in facing the brunt of these extreme events. The 2019 heat wave had several Indian cities amongst the world's hottest 15 places (Dorado, 2019).

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Year 2020 witnessed a heat wave again in Delhi and other cities in northern India; impacts of cyclone Amphan and extreme rains in cities on the eastern coast, urban flooding instances in several cities across the country in addition to the impact of COVID-19 outbreak leading to pandemic plus risk scenarios. With 60 per cent-70 per cent of India's infrastructure for 2030-2050 yet to be built (Friedman, 2014) and 17 out of 20 fastest-growing cities in the world projected to be in India by 2035 (Economics, 2018), climate risks could pose a serious threat to our development goals and infrastructure investments. Cities are also the key contributors to climate change. While India's per capita GHG emissions are much lower - less than half - as compared to the global average, more than 70 per cent of our emissions are coming from urban areas (Sethi, 2015). There is, therefore, an urgent need for cities to formulate and implement ambitious and bold climate actions while mainstreaming resilience in urban planning and governance frameworks.

## 2. URBAN CLIMATE RESILIENCE IN INDIA

In the last two decades, several Indian cities have initiated climate action; primarily in response to contextual climate related extreme events like urban floods and extreme heat, and related water scarcity and disease outbreak faced by them (Table- 1). For

**Table 1: Loss and Damage From Climate Risks In Few Indian Cities (2000-2020)**

| Event | Year | City, State | Loss and Damage |
|---|---|---|---|
|  Floods | 2005, 2009, 2013, 2016 | Bangalore, Karnataka | 2005: 100 homes damaged and 54 collapsed, 10 persons died.<br>During the 2016 urban flood, basic services in the city became non-functional. The flood inundated all arterial roads. |
| | 2004, 2015 | Chennai, Tamil Nadu | Basic transit services disrupted during the mega flood of 2015. It claimed 280+ lives in Chennai but more than 1,27,580 people were rescued. |
| | 2005, 2007, 2015 | Mumbai, Maharashtra | 2005 urban floods: 1094 lives lost, all basic services including major transit operations were suspended.<br>Rs. 550 crore loss was estimated in two days. |
| | 2014 | Sri Nagar, Jammu & Kashmir | 2014 flood-affected all Kashmir valley, all service (transport, telecommunication, city administration, hospitals) of the city came to halt.<br>The estimated damage was Rs. 5000-6000 crore. |
| | 2001, 2002, 2006, 2008 | Hyderabad, Telangana | 2000 urban floods damaged 35,693 homes and affected 2 lakh people.<br>2008 floods affected 1.5 lakh people. |
| | 2010, 2013, 2016 | Delhi | 2016 – heavy rainfall created havoc conditions in the city. |
| | 2005, 2013, 2019 | Vadodara, Gujarat | Major transport operations were suspended for two days, but 10000+ people were evacuated, natural habitats affected. |

| Event | Year | City, State | Loss and Damage |
|---|---|---|---|
| | 2018, 2019 | Kochi, Kerala | 2018 - Airport shut down for 2 weeks with over Rs. 220 crore of loss and damages.<br>Floods were followed by drought, water scarcity and public health issues. |
| | 2005, 2009, 2013, 2016 | Bangalore, Karnataka | 2005: 100 homes damaged and 54 collapsed, 10 persons died.<br>During the 2016 urban flood, basic services in the city became non-functional. The flood inundated all arterial roads. |
|  Cyclones | Cyclone HudHud (2014) | Visakhapatnam, Andhra Pradesh | Major transit operations were suspended.<br>Damages over US$ 2.8 billions |
| | Cyclone Amphan (2020) | Kolkata, West Bengal | Loss and damages worth US$ 13.6 billion (for state of West Bengal) |
|  Water Scarcity | 2019 | Chennai, Tamil Nadu | In June 2019, the city of Chennai faced an acute water shortage after its 4 main water reservoirs ran completely dry.<br>Three years of failed monsoon in 2016, 2017, and 2018 and a major heat wave in India from May to June 2019 further exacerbated the problem by evaporating water left in reservoirs.<br>This has affected the entire city of Chennai which has a population of 11 million people. |
|  Heat Wave | 2018 | Delhi Churu, Rajasthan Banda and Allahabad Uttar Pradesh | Since 2004, the country has experienced 11 of the 15 warmest years. 2018 was the sixth-warmest since 1901.<br>Since 2010, more than 6000 people have died in heat waves in the country |

*Source: (NIUA, 2016) (Chakrabarti, 2019) (WHO, 2019)*

instance, Indore, Rajkot, Gorakhpur, Guwahati developed city resilience strategies with support from the Asian Cities Climate Change Resilience Network initiative (2009-2015) by the Rockefeller Foundation while Kochi, Coimbatore and Udaipur have developed road maps for climate resilient interventions under the Capacities[1] program (2016-2019) supported by the Swiss Agency for Development and Cooperation. Pune, Surat and Chennai have developed city resilience strategies through support from the 100 Resilient Cities program (2015-2020) and others including Shimla, Visakhapatnam, Kochi, Panaji have conducted city level climate vulnerability assessments. The recent Climate Smart Cities Assessment (CSCAF 2.0) by the Ministry of Housing and Urban Affairs 2020[2] (Figure - 1) indicates that only 10 cities out of 126 cities assessed have end to end preparedness, response and recovery systems in place for tackling disasters while 35 cities have initiated city disaster management plans. In addition,

1 *https://www.capacitiesindia.org/*
2 *https://niua.org/c-cube/*

**Fig. 1: Cities Taking Action (Mohua, 2020) (UNFCC, 2021)**


30 cities including Mumbai, Kolkata, Chennai and Bengaluru have developed GHG emissions inventories, modelling them into 2030/2050 scenarios and are tracking the same on international reporting platforms such as CDP-ICLEI Unified Reporting System[3] towards climate mitigation growth pathways. While cities have conducted these assessments and prepared strategies and road maps supported mainly by non-state actors, most did not translate into tangible streamlined interventions on ground, except a few pilot projects and capacity building activities, due to lack of a city level policy mandate on climate action planning.

Moreover, urban development stresses further aggravate the vulnerability of cities (Rajendra K. Pachauri, 2014). For instance, increased paved surfaces affecting run-off, lack of adequate and efficient storm water drainage, poor solid waste management system leading to choking of the drains, etc., exacerbate the vulnerability to urban floods. As such, a cohesive resilience building approach requires applying a climate lens to urban development plans, projects and municipal budgets. However, lack of relevant local data on climate and development indicators, technical capacities, and enabling regulatory and institutional frameworks to support the required multi-stakeholder, collaborative

3 *https://www.cdp.net/en/cities-discloser*

action remain key challenges for cities (MoHUA, 2020). It is observed that cities with good technical capacity, governance structures, policy mandates, budget allocations and data are successful in implementing the actions on the ground. For instance, Indore, Surat and Visakhapatnam are top performers in the 'urban planning, green cover and biodiversity' theme of CSCAF 2.0 because they not only took concrete steps to plan but also worked and allocated budget and ensured implementation on the ground (MoHUA, 2020).

## 3. POLICY AND PROGRAMMATIC FRAMEWORK FOR ENABLING CLIMATE ACTION

The Paris Climate Agreement for the first time acknowledged cities as key sub-national entities to achieve the goal of mitigating greenhouse gas (GHG) emissions and limiting global temperature rise. India is party to the Paris Climate Agreement and has committed to reducing the emissions intensity of its GDP by 45 per cent and reducing 1 billion tons of carbon emissions from the total projected emissions, over 2005 levels, by 2030 and achieving carbon neutrality by 2070. To this effect, India's Intended Nationally Determined Contribution (INDC) includes commitments towards increasing energy efficiency of the building sector, developing climate resilient cities, emission reduction from the waste sector and developing sustainable transportation systems. The Climate Smart Cities Assessment Framework (CSCAF), introduced by MoHUA in 2019, translates these commitments into an incremental road map through 28 indicators across urban planning, energy and green buildings, transportation, water and waste management sectors. The Framework builds on the National Mission on Sustainable Habitat (NMSH), formulated under the National Action Plan on Climate Change in 2014[4], and aligns to the Sustainable Development Goals and Sendai Framework of action on disaster risk reduction. It is intended to be used as a tool for cities to inform investments, showcase evidence of their climate actions and monitor the impact (MoHUA, 2020) (Box - 1). NMSH and CSCAF also provide the enabling framework for mainstreaming resilience at local level through institutionalizing of nodal agencies and data collection and management systems, and building technical and financial capacities through guidelines and training to undertake assessments and action plans. Though these efforts are still at nascent stage and will take time to show results, their biggest immediate impact has been in terms of creating a discourse on urban resilience across India and providing a policy mandate along with a broad road map to cities to take incremental action.

Besides, other key urban missions of Government of India viz. Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Pradhan Mantri Awas Yojana (PMAY-U), Swachh Bharat Mission (SBM-U), and Jal Jeevan Mission (JJM-U) have allocated more than US$ 30 billion since 2014 (MoHUA, 2019) towards implementing inter-

*4 https://mohua.gov.in/cms/National-Mission-on-Sustainable-Habitat.php (currently under revision by MoHUA)*

**Box 1: Climate Smart Cities Assessment Framework (MoHUA, 2020)**

The Climate Smart Cities Assessment Framework (CSCAF) is a first-of-its-kind national assessment framework on climate-relevant parameters. A flagship initiative by the Ministry of Housing and Urban Affairs under the Smart Cities mission, the Framework covers 96 data points across 28 indicators under 5 themes - Energy and Green Buildings; Urban Planning, Green Cover and Biodiversity; Mobility and Air Quality; Water Management; and Waste Management and has 5 progressive and aspirational levels.

The Framework was launched in 2019 to serve as a tool to cities to assess their present situation and build on their climate initiatives. 96 Smart Cities reported in the pilot assessment in 2019-20. In the 2nd phase of assessment (CSCAF 2.0 in 2020-21), 126 cities including all smart cities, state capitals and other cities with a population of over 5 lakh participated in the assessment exercise. The top 9 cities which have shown progressive climate actions in this assessment are Surat, Indore, Ahmedabad, Pune, Vijayawada, Rajkot, Visakhapatnam, Pimpri-Chinchwad and Vadodara. MoHUA envisions to scale this exercise to 500 cities towards adopting, implementing and disseminating best practices, and benchmarking of urban development from a climate resilience lens.

ventions for promotion of sustainable transport, reducing air pollution, generation of renewable energy, scientific waste management, smart water and waste water management, and provide climate change convergence. More recently, the 15th Finance Commission has allocated US$ 4 billion (Rs. 29,250 crore) to urban local bodies funds and grants for development of basic infrastructure and services, and US$ 295 million (Rs. 2,200 crore) to 15 states for clean air action in million-plus cities. The Commission has also allocated approximately US$ 5.5 billion towards disaster response, recovery and capacity building efforts. Out of this amount, Rs. 500 crore have been allocated for preparation of integrated flood management solutions in 6 metropolitan cities - Mumbai, Chennai, Kolkata, Bengaluru Hyderabad, Ahmedabad and Pune. While this is a welcome measure, the focus remains on community level mitigation and there is an equal need for scaling efforts and investments towards development of resilient infrastructure across urban India.

## 4. BUILDING RESILIENCE: WHAT CAN CITIES DO?

### 4.1 Formulating Climate Action Road Maps

The first step for cities to initiate climate resilience action is developing a science based action plan / strategy or road map addressing both climate mitigation and adaptation aspects, contextualized to local climate risks. Cities may refer to MoHUA's CSCAF that provides an incremental road map for cities to develop climate action plans. Besides, the Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines[5], 2014 provide guidance on sustainability and resilience building measures such as urban greening, meeting environmental compliances, planning for disaster management among others. International frameworks and guidelines such as UN Habitat Guiding Principles[6] and

*5 http://tcpo.gov.in/sites/default/files/TCPO/schemes/URDPFI.pdf*

*6 https://unhabitat.org/the-guiding-principles*

C40 Climate Action Planning Framework[7] also provide global approaches, toolkits and good practices for cities. Once formulated, it is typically recommended to review and revise the action plans every 3-5 years with annual progress tracking.

### 4.2 Instituting Data Systems and Conducting Assessment for Informed Decision Making

A key step for climate action planning (CAP) is to assess and understand the resilience baseline of the city. This requires mapping of risks and identification of vulnerable hot spots and communities to formulate adaptation actions and developing a GHG emissions inventory to set climate mitigation targets. To aid this, relevant data needs to be collected, digitized, mapped, managed and made accessible across relevant departments, utilities and agencies at the city level. Cities may refer to national and international guidelines and frameworks, as discussed above, to collect relevant data for climate action planning. MoHUA's Climate Smart Cities Self-Assessment Tool[8] and Global Protocol for Community (GPC)[9] scale GHG inventories provide rapid assessment tools for city managers to visualize trends and develop the most efficient strategies to address the contextual climate risks and achieve GHG emission reduction targets.

### 4.3 Creating Institutional and Governance Mechanisms

As empowered administrative jurisdictions, cities can play a key role in accelerating climate action. To this effect, it is critical to identify a nodal person / department with convening powers, and define clear roles and functions to enable multi-stakeholder and inclusive resilience action. Few cities such as Mumbai and Surat have institutionalized climate cells within the urban local body organizational structure for cross-department coordination and sharing of data. Aligning climate action plans to national and city level development agenda, policies and legal frameworks can make them binding documents. It is equally important to apply a climate lens to monitoring and evaluation frameworks and business processes including building permissions, tenders / terms of reference for infrastructure projects, etc. Cities may use governance assessment tools to identify institutional and governance gaps, develop immediate to long term actions, and track progress over time.

### 4.4 Mainstreaming in Urban Policy, Development Plans and Infrastructure Investments

Mainstreaming climate action in urban, regional and infrastructure development plans can go a long way to ensure that the city's climate strategy is prioritized, financed and implemented on ground. Developing or updating building bylaws, urban and infrastructure planning guidelines in alignment with the climate strategy and their effective enforcement is equally important. For instance,

7 *https://resourcecentre.c40.org/climate-action-planning-framework-home*
8 *https://niua.org/c-cube/csc-sat/*
9 *https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities*

the Master for Delhi, 2041[10] identifies climate action as part of its goals and objectives and further translates the same into key guiding strategies across the Plan and development codes and norms. Cities like Mumbai are allocating 'climate budgets'[11] to operationalize its Climate Action Plan. The Climate Budget will enable the city in embedding climate considerations into its municipal budget and integrate it into its decision-making process thereby mainstreaming climate actions on mitigation and adaptation leading to measurable actions on the ground.

### 4.5 Advocacy and Engagement

Bringing together different stakeholders to champion and prioritize the urban resilience agenda is crucial as resilience action requires a crosscutting, multi-level and multi-stakeholder engagement, and strong commitments and cooperation not just amongst various city level agencies and utilities, but also businesses and communities. Experience in cities in India and beyond has shown that top-level endorsement can go a long way to strengthen multi-sectoral coordination for climate action planning and implementation. For instance, Mumbai CAP exercise[12] has been championed by the State Minister for Environment in Maharashtra, playing a critical role in close coordination across government departments and including civil society and non-government and private stakeholders.

## 5. CONCLUSIONS

At the most recent COP26, cities emerged as the biggest group of governments committing to keeping global heating to 1.5°C through Race to Zero[13] and Race to Resilience[14] commitments. A total of 1,049 cities and local governments across 76 countries representing 722 million people signed up for the two pledges. It is estimated that their collective action has the potential to reduce global emissions by at least 1.4 giga tons annually by 2030 (C40, 2021). Though Indian cities constitute a small share of these commitments, with some 56 cities joining the race, they will act as living labs providing proofs of concepts and key lessons as India chases its ambitious GHG emission reduction and carbon neutrality targets by 2030 / 2070. Recent policy developments in India have provided an enabling framework to scale these lessons. Strengthening local capacities and sustained leadership can play a key role in amplifying the resilience initiatives towards building forward-looking cities.

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# Local Area Plan for Making Cities Resilient in Madhya Pradesh

**Vishnu Khare**

**Abstract**

*A new element in the hierarchy of master plans or generally speaking development plans have been introduced since the last one and a half decade, is Local Area Plans, which claims to promote innovation and use of smart solutions. Taking the case of Indore, the paper demonstrate that LAP helps brining about outcomes such as establishing a framework for redevelopment of existing areas; enables planned expansion in peri-urban areas; supports value capture techniques to finance infrastructure investments; promotes optimal resource utilisation; brings power to people in local level environment management; and creates a better and planned spatial development.*

## 1. INTRODUCTION

Urban populations are growing exponentially. Improving urban infrastructure is becoming a priority worldwide. One potential modality for making Madhya Pradesh resilient is through Local Area Plans, which take a multi-sector, multi-stakeholder approach to urban planning. The main objective of the Local Area Plan towards resilience is to promote cities that provide core infrastructure, clean and sustainable environment and give a decent quality of life to their citizens through the application of 'smart solutions', like TOD (Transit Oriented Development). TOD policies and principles improves public transport, converting dead spaces into public realm which make cities habitable and livable.

Resilience is recoiling, springing back, resuming its original shape after bending, stretching, compression, readily recovering from shock, depression, etc.

Oxford Dictionary defines "Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change, so as to still remain essentially the same function, structure, identity, and feedbacks."

Urban Resilience is the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kind of chronic stresses and acute shocks they experience.

The ability of an urban system and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales - to maintain or rapidly return to desired functions in the face of a disturbance, to adapt, to change,

***Vishnu Khare*;** *Chief City Planner, Indore Municipal Corporation*

and to quickly transform systems that limit current or future adaptive capacity towards resilience.

Resilient urban planning has the following components:

- Carbon neutrality;
- Redundancy of system;
- Diversity of systems;
- Durability;
- Local self sufficiency; and
- Responsiveness and connectedness

Resilient city planning strategies include:

- Transform circulation;
- Reduce energy requirements of existing fabric;
- Re-localize key functions; and
- Increase density, decreasing height and promoting mixed use.

## 2. LOCAL AREA PLAN

Local Area Plan is a development plan of the city at local level. Local area plan helps in development of the city as per the need of the city with micro components which gives sustainability to the infrastructure as it works like a customized solutions for the city where as City Development Plan doesn't specifically address to ground problems like difficulties in implementing Development Control Regulations which are designed for the Pan city rather than whole state, on broad macro level planning principles. With the future projections that most of the world's population will be living in cities by 2050, cities will be the front lines, to avoid the creation of new risk, reduce existing risk and strengthen resilience, including risks from health emergencies, cities need to work on the grass root level planning by understanding the need and future assessment of the area. The attributes of local area reflects strong bonds of association with location and people.

Local area planning is a tool for redevelopment of existing organically developed area as well as a green field area for which new infrastructure has to be developed. It enhances built environment at a particular location and within identified area by reorienting growth continuously redevelop in response to changing land values and other dynamics of real estate market. In most of the Indian city's development happens in organic, haphazard manner imposing excessive loads on existing infrastructure and creating a chaotic built environment. The main purpose of local area plan is to redevelop existing infrastructure of the city in a systematic and organized manner to achieve more specific objectives. Depending on the context, specific objectives may include improving sustainable

forms of transport, conserving heritage, improving infrastructure and creating synchronized built form.

It is a tool which helps in resolving the local issues of the planning which can't be dealt at Master Plan level. Local area planning focuses on the quality of development in the specified area. It enhances the built in environment by restructuring growth, by improving connectivity, quality development in lieu of existing one.

The difference between the Zonal and Local area plan is that Zonal plan is a type of 2D Plan and Local area plan is a 3D plan as it gives the minute details of the development. Often horizontal development of cities takes place in unplanned manner which create urban slums and urban fringes. LAP creates a framework for enhancing the public spaces and necessary infrastructure by enabling redevelopment of the existing built-up environment. Enabling legal provisions for introduction of Town Planning Schemes (TPS) and Local Area Plans (LAP) are already in place in Madhya Pradesh Nagar Tatha Gram Nivesh Adhiniyam 1973.

## 3. LOCAL AREA PLANNING IN INDIA

In India planning was a centralized process owing to the Soviets inspired approach chosen by the country after achieving independence in 1947. Five year plans were adopted on lines of the Soviet approach of centralized allocation of resources. Urban Planning is a state subject in India. The center's role is therefore, limited to laying down the broad guidelines for urban development. The States are required to enact their own versions of urban and regional planning acts on the basis of Model Regional Planning and Development Law prepared by the Town and Country Planning Organization in 1970s, with the assistance of Institute of Town Planners, India.

In the planning hierarchy of India it is proposed to bring Local area plans at the ward level planning taking off from where Town Planning Scheme (TPS) ends. In new planning paradigm the LAP would produce the micro level planning framework for future growth. The Local Area Plan help in rational and scientific identification of plots for social amenities and integrate them in new urban fabric.

## 4. LOCAL AREA PLANNING IN MADHYA PRADESH

Madhya Pradesh is a vibrant state with an area of 3, 08, 000 sq km and is the second largest state in India after Rajasthan. It is a part of peninsular plateau of India lying in north central part, whose boundary can be classified in the north by the plains of Ganga-Yamuna, in the west by the Aravali, east by the Chhattisgarh plains and in the south by the Tapti valley and the plateau of Maharashtra. With a huge land area and diversified growth pattern where every city of the State

has its own growth pattern as per the type of existing community, nature of the work in city, existing flora and fauna, topographical conditions, etc., which further changes at the regional and local level. Same urban planning and urban design principles and spatial growth principles will not apply for every area, so initiatives like Local Area Plan is tool for making cities resilient and exhaustive.

In a state like Madhya Pradesh where growth pattern of every city is due to some unique feature and every city has its own growth epicenter, demands and geographical conditions, the Local Area Plan will help to analyze and diagnose the need and conditions of that area instead to whole city.

The population of Madhya Pradesh is over 7 crore, out of which more than 75 % of the population resides in villages whose main occupation is agriculture, while the rest of the population lives in towns, thus, we still have a chance to redirect our development strategies in a micro or sub - divided grids by the help of Local Area Plan and if it is adopted with proper modus operandi then surely it will create a smacking impact towards the resilience.

Madhya Pradesh which is in transforming, Local Area Plan will not only help to divert the development and growth in proper and sustainable manner, rather it will help in proper and exhaustive use of state's resources, as local resources are important for local area planning because development activities are mostly based on resources. Use of local resources, minimizes the cost of planning and maximizes the benefits to local people.

From the perspective of tourism Madhya Pradesh has enormous potentials and resources to become a major tourism destination. Numerous monuments of historical, archaeological, architectural and pilgrimage are the important dots in the state. Local Area Plan will help to consider the different requirement by identifying local need and help in proper planning and development which again will help in the resilience.

## 5. LOCAL AREA PLANNING IN INDORE

Indore city's growth is dynamic which changes the development pattern according to land dynamics. Over the years urban sprawl of the city is towards the north eastern side along the major roads. The old Municipal area of Indore was 131 sq km with 69 wards, the new city municipal limits has been extended to 276 sq km with 85 wards and 19 zones after addition of 29 villages to the boundary.

Ministry of Housing and Urban Affairs under AMRUT scheme has initiated pilot for formulation of Local Area Plan (LAP) in 25 cities. Indore is one of the selected cities. The selected area is a core city brown field project of 159 ha. The identified pilot LAP is adjacent to Smart City area, which is proposed to be implemented on replicable model of Smart City model. The area for local area planning lies

between the Kahn River in west and railway line in the east. The northern periphery of the identified area is defined by Hope Mill and southern boundary is Jawahar Marg. The site was selected to decongest the core which is in urgent need of redevelopment due to old infrastructure and overburdened services.

Area has properties of heritage value such as Gandhi Hall, District Court, Chattri, etc. The selected site is the part of the planning unit described in the Indore Development Plan. Since the IDP-2021 was implemented it was not taken into consideration, but with this tool of LAP it was taken up and planning is under progress which will help in making the city Resilient.

**Outcomes of Local Area Planning**

- Establish a framework for redevelopment of existing areas;
- Enable planned expansion in peri-urban areas;
- Support value capture techniques to finance infrastructure investments;
- Optimal resource utilisation;
- Power to People : Local level environment management; and
- Creates a better and planned spatial development.

## 6. CONCLUSIONS

A new element in the hierarchy of master plans or generally speaking development plans have been introduced since the last one and a half decade, Local Area Plans (LAPs) which claims to promote innovation and use of smart solutions. In fact Local Area Plans (LAPs) help brining about outcomes such as establishing a framework for redevelopment of existing areas; enables planned expansion in peri-urban areas; supports value capture techniques to finance infrastructure investments; promotes optimal resource utilisation; brings power to people in local level environment management; and creates a better and planned spatial development.

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# Making Cities Resilient in Madhya Pradesh through Local Area Plans

**Shivkant Mudgal**

**Abstract**

*This paper seeks to explore the role of Local Area Plan for making cities of Madhya Pradesh resilient and proposed a framework for creating the public realm for enabling redevelopment of the existing built environment and preparation of a new layout with enhanced provisioning. In addition the author also pronounces that revamped Central Business District and accessibility enhancing Transit Oriented Zone are the two salient features of the Local Area Plan.*

## 1. INTRODUCTION

Local Area based Plans (LAPs) is an macro level planning tool to create a framework for enhancing the public spaces, and areas under roads by enabling redevelopment of the existing built-up environment in turn to promote resilient cities. It may help in rationalized implementation of the existing city core of development plan by detailed assessment of the social and physical requirements of a certain area for holistic up gradation at the local level. LAP addresses context specific development needs which the master plans and zonal plans do not address. However, currently, the LAP mechanism is more commonly used for redevelopment rather than for planning for the urban expansion of cities.

Urbanization is a multi-dimensional phenomenon, which is growing exponentially in developing countries like India. The main concern for cities is to provide sustainable infrastructure in terms of carbon neutrality, well planned transport system, availability of basic resources, etc., which are already overburdened by the existing population load. As a dynamic, socio-ecological system, the city is undergoing a constant process of change and adaptation. This implies that resilience in urban areas should be considered as an adaptive process which does not necessarily require the system to return to an equilibrium state after having been hit.

The ability of an urban system and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity towards resilience.

***Shivkant Mudgal**; Joint Director, Town and Country Planning, Indore*

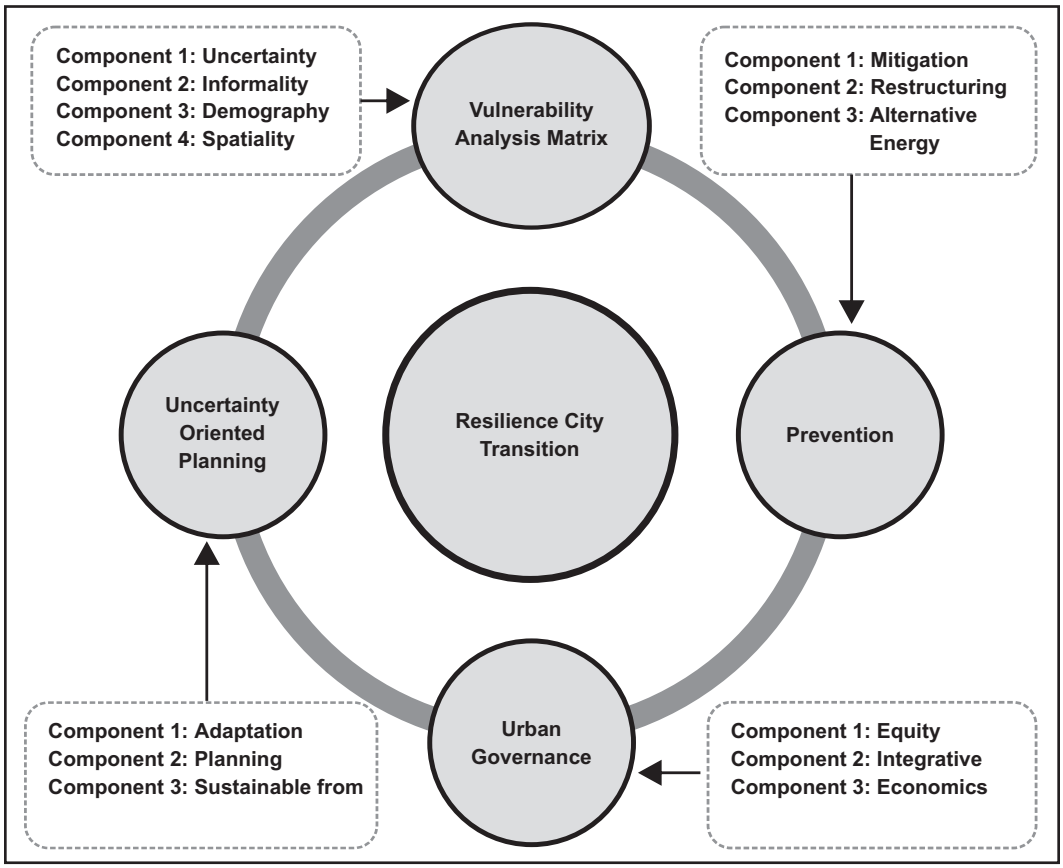
In the context of changing paradigm, the existing planning system lack bottom-up, participatory, dynamic plans, both at the city level and at the local area level. There is also a great deficiency at the linkage of local area planning (having more local or contextual analysis), which can influence and improve plans at city or regional level. The city level plans and the local area plans should feed into each other from time-to-time to create continuous planning activities. Urban areas in India lack such an approach of integrating top-down planning with bottom-up aspirations and efforts.

The development plan is often followed by as an approach termed laissez-faire' where the developers take control and develop tracts of land on the periphery of the city for urban use.

## 2. RESILIENT PLANNING FRAMEWORK

The concept of resilience has traditionally been used in physics and psychology which respectively indicate the ability of an object to return to its original position after receiving a hit and the ability to successfully survive a shock or trauma.

**Fig. 1: Resilient Planning Framework**



Every city is unique, the way resilience manifests itself plays out uniquely in different places. The City Resilience Framework provides a lens through which the complexity of cities and numerous factors that contribute to a city's resilience can be understood. Resilient planning principles include:

- Embrace density, diversity, and mix of uses, users, building types, and public spaces;
- Prioritize walking as the preferred mode of travel, and as a defining component of a healthy quality of life;
- Develop in a way that is transit supportive;
- Focus energy and resources on conserving, enhancing, and creating strong, vibrant places, which are a significant component of the neighborhood structure and of the community's identity;
- Provide the needs of daily living, within walking distance (a 500 m radius);
- Conserve and enhance the health of natural systems (including climate) and areas of environmental significance, and manage the impacts of climate change;
- Enhance the effectiveness, efficiency, and safety of their technical and industrial systems and processes, including their manufacturing, transportation, communications, and construction infrastructure and systems to increase their energy efficiency, and reduce their environmental footprint;
- Will grow and produce the resources they need, in close proximity (200 kilometer radius);
- Will require the active participation of community members, at all scales in the development plans;
- Plan and design for redundancy and durability of their life safety and critical infrastructure systems. Planning and design of these systems will aim for levels of redundancy and durability that are commensurate with the increasing environmental, social, and economic stresses associated with the impacts of climate change; and
- Develop building types and urban forms with reduced servicing costs, and reduced environmental footprints.

## 3. LOCAL AREA PLANS: CONTENTS, FUNCTIONS AND METHODS

Contents of a local area plan should include the following aspects:

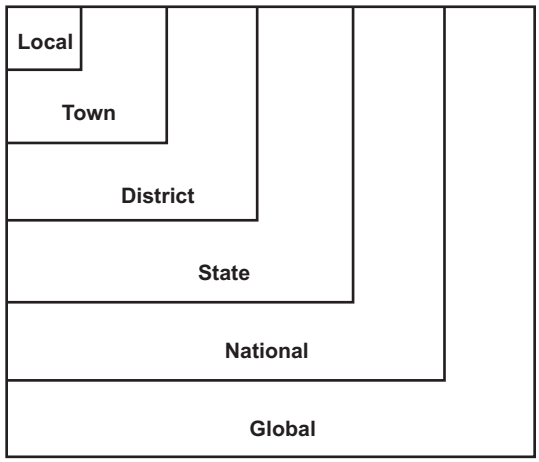
- Land use zoning and density;
- Public open space;
- Provision of infrastructure;
- Conservation of built heritage;
- Conservation of natural environment;

- Provision of traveller accommodation;
- Community facilities;
- Parking Provisions; and
- Design and development standards.

Functions of a local area plan are:

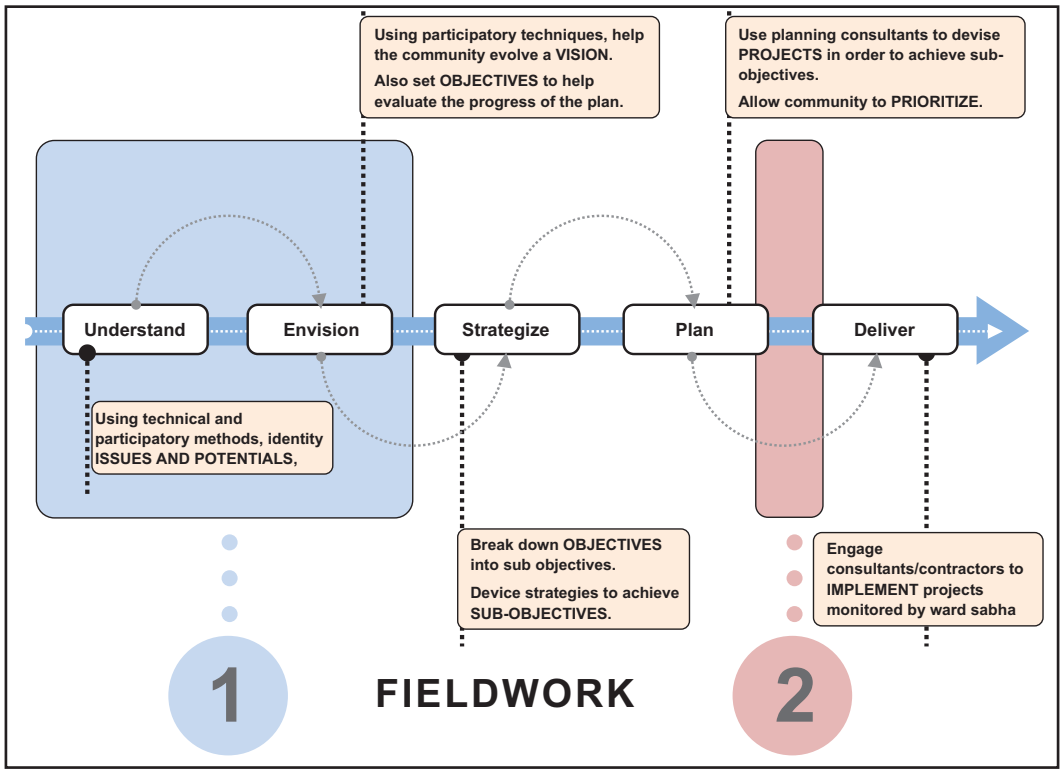
- A local area plan gives plot level details; and
- It also checks whether the proposal is conforming to land use of Master Plan.

**Fig. 2: Various Planning Levels**




Methodology for the preparation of a LAP could be divided into several stages. The proposed LAP methodology consists of five phases. The first phase is understand and involves the planners looking at ward in a way that helps them comprehend the role played by the ward (or the delineated area) in the context of the city. It involves the use of GIS based technical analysis and participatory methods to arrive at the deficits of infrastructure and social amenities. The accessibility maps produced as part of the technical analysis are

**Fig. 3: Methodology for Local Area Plan (LAP)**



used to help the residents identify issues and potentials of the ward. These help the ward residents to frame a vision for their ward. In the second stage Envision' the planner then breaks this vision into a set of achievable and measurable objectives. The third stage strategies involves the planner arriving at strategies - with the help of the community, through participatory meetings - to help realize the objectives. These strategies are then transformed into projects with several options ratified by the community and form part of the plan. The deliver stage involves the implementation of the projects which are monitored by the ward *sabha*. This process repeats itself every three to five years, thereby allowing for periodic evaluation of the achievement of long term vision of the ward by the residents.

## 4. INDORE DEVELOPMENT PLAN

Indore Development Plan, 2021 came into force on 1 January 2008 through the Department of Housing and Environment, Government of Madhya Pradesh via notification number F-3-70-32-2006 under the provisions of Section - 19 of the Madhya Pradesh Nagar Tatha Gram Nivesh Adhiniyam, 1973. Indore Development Plan, 2021 (Figure - 7) envisages developed area under various land uses comprising 34,047 hectares out of the total notified planning area of 50,525 hectares for a projected population of 35,67,000 in 2021.

**Table 1: Existing and Proposed Land Use Distribution**

| S. N. | Category | 1991 Land Allocation | | Existing Land Use 2006 | | Proposed Land Use 2021 | |
|---|---|---|---|---|---|---|---|
| | | Ha | % | Ha | % | Ha | % |
| 1 | Residential | 5060 | 41.66 | 7552 | 55.80 | 15795 | 46.39 |
| 2 | Commercial | 648 | 5.34 | 692.55 | 4.20 | 2610 | 7.66 |
| 3 | Industrial | 1498 | 12.33 | 976 | 7.40 | 2527 | 7.43 |
| 4 | PSP and PUF | 1417 | 11.67 | 1672 | 12.70 | 2693 | 7.91 |
| 5 | Recreational | 1417 | 11.67 | 968 | 7.30 | 4817 | 14.15 |
| 6 | Transportation | 2105 | 17.33 | 1748 | 12.60 | 5605 | 16.46 |
| | **Total** | **12145** | **100** | **13171** | **100** | **34047** | **100** |

**Fig. 4: Existing Land Use 2006**

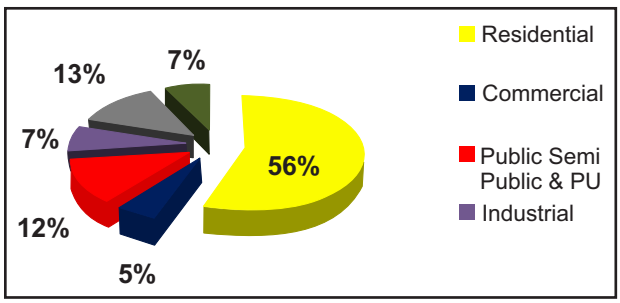
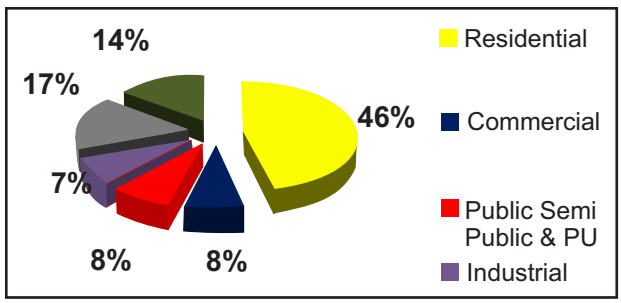



**Fig. 5: Proposed Land Use 2021**



The proposed decentralized commercial area in the city was not successful because the existing commercial growth is concentrated in the CBD area. There has been limited development in transport network due to various missing links still not developed, incomplete Ring Road 1 and non-implementation of Ring Road 2 proposed in the IDP, 2021. In spite of the proposals in the IDP - 1991 for increasing recreational areas, the inadequacy of recreational areas still remains.

Spatially, the city is expanding towards the northern and eastern direction along NH - 3 road. Present thrust of development in the city is taking place towards AB road and NH - 3 Bypass. The transformations along the highways are due to the large scale of agricultural land conversions along NH - 59 for the upcoming residential, commercial, and other institutional properties.

**Fig. 6: The Spatial Growth of Indore City Chronologically**

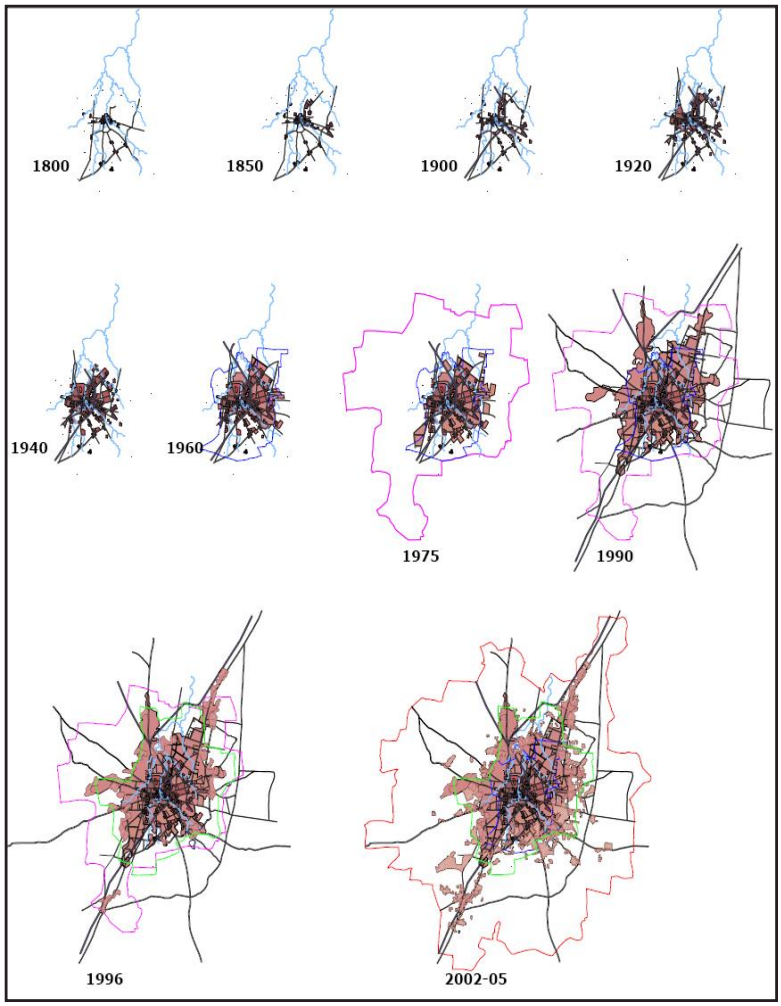


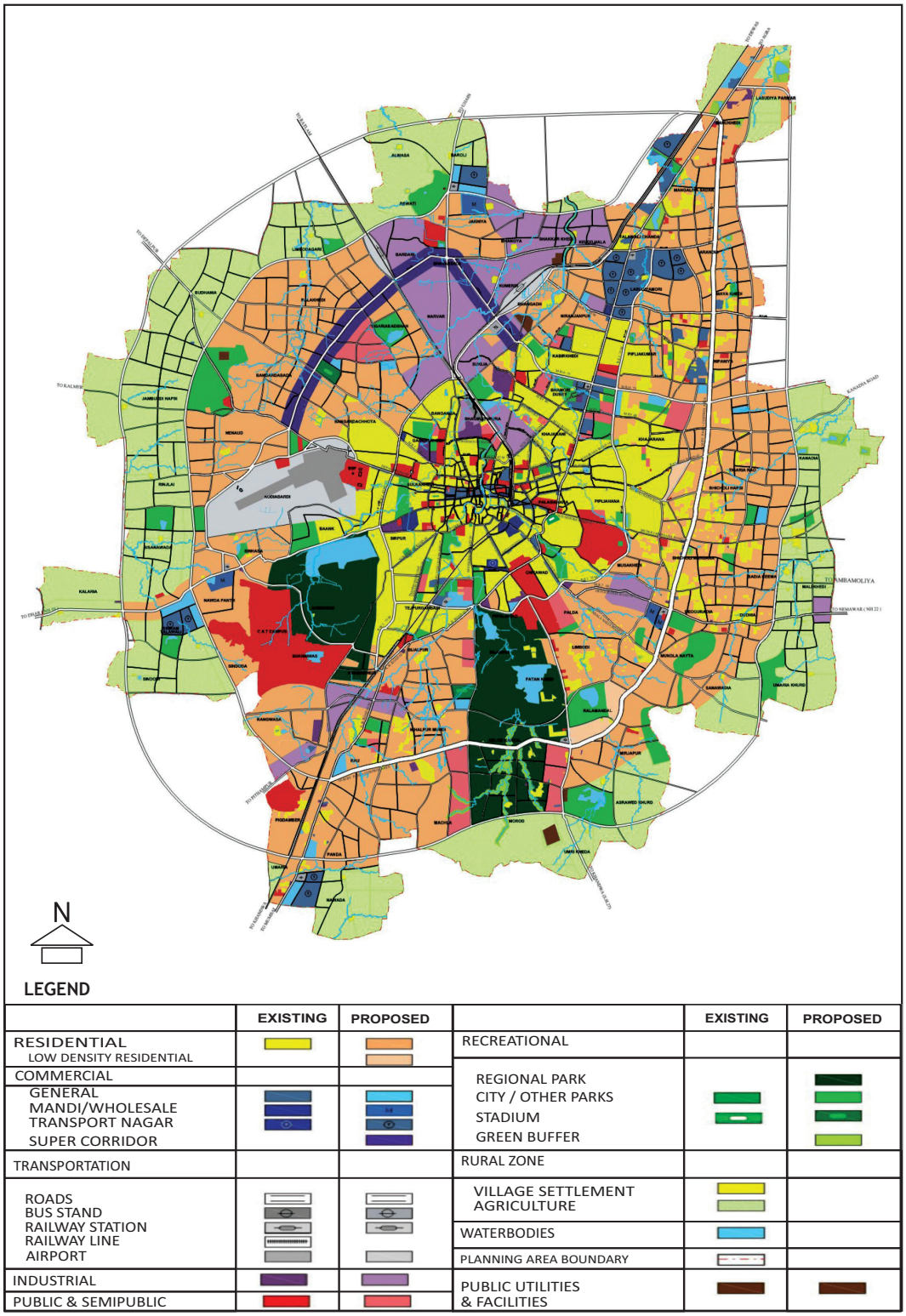

**Table 2: Estimated Population and Area Required, by 2035**

| | Area 2011 (in ha) | 2021 | Estimated Population 2021 | Estimated Population 2035 | Population Rise 2035 | Total additional area required (in ha) |
|---|---|---|---|---|---|---|
| Indore Planning Area | 50525 | 23.63 lakh | 33.68 lakh | 57.31 lakh | 23.63 lakh | 32748 (175 persons per hectare)<br>45848 (125 persons per hectare)<br>57310 (100 persons per hectare) |

**Table 3: Planning Area of Indore Development Plan**

| No. | Villages in Current Planning Area (In Ha) | Current Planning Area (In Ha) | Increased Planning Area | | Total Planning Area | |
|---|---|---|---|---|---|---|
| | | | Additional Villages | Area (In Ha) | Total Villages | Total Area (In Ha) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | 90 | 50525.00 | 79 | 37764.24 | 169 | 88289.24 |

**Fig. 7: Indore Development Plan, 2021**



The estimated population for the Indore Development Plan, 2035 is 57,31,000 for which population projection was carried out using four different methods, and land area requirement is being estimated at the rate of 10 hectares per 1,000 people.

Thus, the area of IDP - 2021 comprising planning area of 50,525 hectares and the increased area of 37,764 hectares totals to 88,289 hectares.

### 4.1 Built Environment - A Case of Aranya Housing, Indore

An internationally prestigious Aga Khan Award winning project designed by eminent architect B.V. Doshi for Indore Development Authority, which was

**Fig. 8: Street scape of a Street at Aranya Housing**

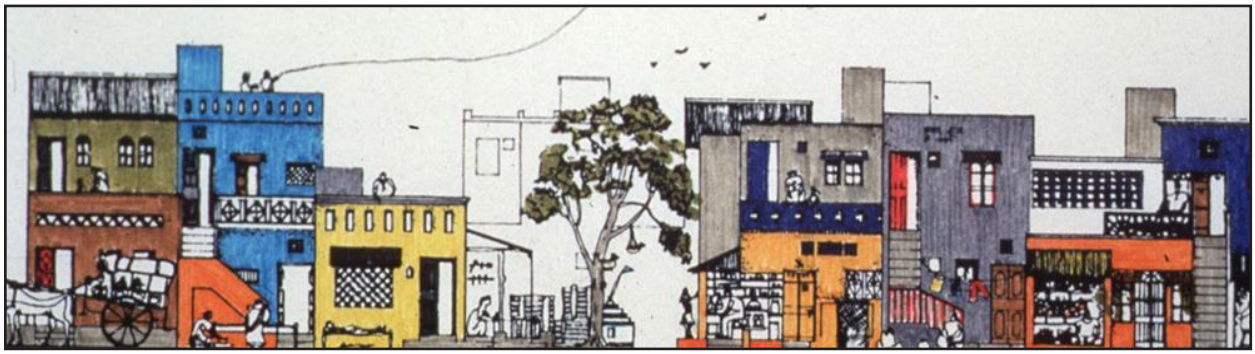
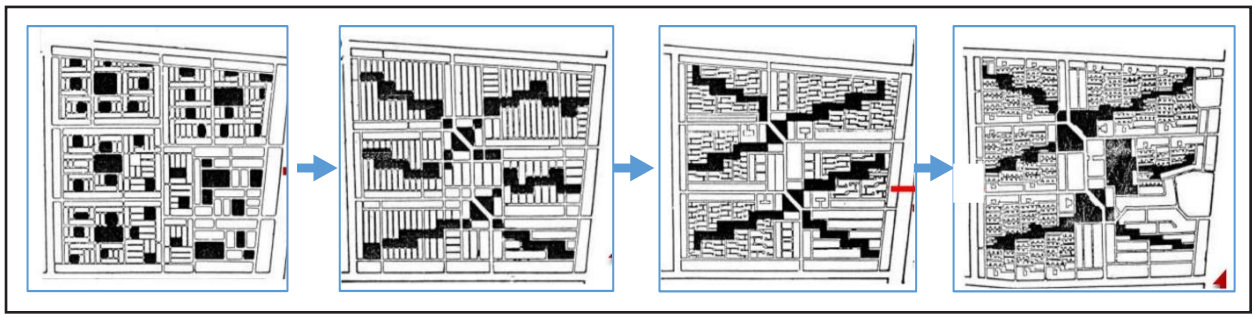


**Fig. 9: Interlinked Open Spaces**

completed in year 1989, is an exemplary design for responding towards the needs of the citizens. It is necessary for a planner for understanding the urban spaces and their effective utilization for resolving the issues being faced due to unplanned organic growth of the city cores.

It is a residential project having area of 86.24 hectares. The key aspect that can be learnt from the Aranya housing is the series of open spaces along the streets. The street design ensured the multidimensional utilization of the street by enhancing them with open spaces (Figure - 8) alongside a form of interlinked open development. The settlement character in Aranya created a harmony between the built environment and the people. The balanced design encouraged social security and cooperation through physical planning process.

**Fig. 10: Evolution of Design of the Open Spaces.**



### 4.2 Re-Engineering the City Core

The haphazard organic development in the city cores can be redeveloped by be strategically identifying the under-utilized areas and converting them into an opportunity for strengthening the physical and social requirement of the site. The city core areas generally fail to preform due to exploitation of the streets as a result of lacking supportive spaces in a highly dense and narrow yet busy streets. The mixed use construction of city cores where *"niche dukaan upar makaan"* without any supportive elements such as parking, necessary amenities, open areas, roadside drains over and above day time illegal encroachment by shops ensures to fail the entire system.

The utmost priority of LAP in this context is to create resilience in the urban core fabric. Though it is not likely possible to completely redevelop existing city core i.e. Brown field in to a Greenfield, but if rationally planned using the form based codes, traffic management policy, ensuring walkability principles and at same time identifying the abandoned buildings, unused back alleys, locked up open parks, other under-utilized chunks can definitely help in providing breathing spaces in turn helping re-engineering the entire core of the city.

Understanding the mixed and accepting the dynamics of land use formation in neighborhoods will be the key to urban core rejuvenation. Once the resilience is developed it will take no time for city to prosper not only in the core areas but also the functioning of entire system will flourish within the city's urban fabric.

Though it is not only necessary to implement the LAP, but it is also necessary to timely introduce the set of new policy level decisions time and again to ensure the smooth functioning. The contiguous areas can also be taken in form of concentric rings as new LAPs by synthesis of learnings from the implemented LAP.

### 4.3 Infrastructure Development Mechanism for the LAP

Locally available recourses are the major component of the local area planning to develop the infrastructure also along with available local resources there should be an appropriate finance mechanism which is required for the smooth development growth. To help cities meet infrastructure demands within their budgetary constraints, they are fostering creative partnerships with the private sector by encouraging increased private sector participation. Value Capture Financing (VCF) is a type of public financing that acts as a tax collection mechanism and aims to recover part or full of the value that public infrastructure generates for private landowners. It owes to act as a funding source for urban investment. The cost for providing urban infrastructure and amenities under such LAPs can be financed through VCF tools such as betterment charges and sale of reserved plots.

## 5. THE CURRENT STATUS OF INDORE LOCAL AREA PLAN

Indore is a city selected by the Ministry of Housing and Urban Affairs among 25 cities under the AMRUT Scheme for formulation of Local Area Plan. An area of 159 hectares was delineated in the core city area (a brown field development) near the Smart City's ABD area for the project. Further city officials participated in capacity building program held at Ahmedabad and based on the learning and guidelines, the LAP base map was prepared. Then Draft plan of the LAP was prepared and sent to Town and Country Planning Organization (TCPO), New Delhi and Directorate, Town and Country Planning (T&CP) Bhopal. After approval of Final Draft by the TCPO, New Delhi, it will be published under TCP Act 1973 and procedure of approval will be followed.

Local area planning is proposed for maintaining densification of the existing zoned areas in the review of Indore Development Plan 2021, which can act as a micro level planning tool. Local Area Plan includes various concepts like:

- Central Business District; and
- Transit Oriented Development

### 5.1 Central Business District

The concept of Central Business District is to create a new zone carved out from the existing commercial zone to create a high-density district with a distinct character and a clearly identifiable urban form to infuse commercial development. The land uses in this central commercial core would include a mix of offices, retail and other business uses along with some residential developments. This zone can provide a distinct character and form to the central area and enhance the skyline.

This zone is to promote and incentivize regeneration and rejuvenation of city's central area and transform it into a vibrant, mixed use, transit oriented, walkable CBD that is attractive for business, entertainment and tourism.

### 5.2 Transit Oriented Zone (TOZ)

BRTS network provides good connectivity across the city. Hence the TOZ can be delineated along the BRTS network and 60 meters on each side of the network can be developed as high-density zone for compact city development. The areas delineated along the transit corridors can be supplemented with higher FSI and can be focused to provide better accessibility across the city including NMT connectivity, basic amenities on streets along with better urban environment.

## 6. CONCLUSIONS

The locally available recourses along with appropriate finance mechanism required for the smooth development growth are the major components of the local area planning to develop the infrastructure. In fact the cost for providing urban infrastructure and amenities under Local Area Plans (LAPs) can be financed through Value Capture Financing (VCF) tools such as betterment charges and sale of reserved plots, etc.

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# Planning Climate Resilient Cities in Madhya Pradesh

**Manmohan Kapshe, Ph.D.**

**Abstract**

*In this paper, the author attempts to put together a brief compilation of various research papers, reports and relevant policy documents in a simple to follow structure for easy understanding of major issues related to developing climate resilient cities with special reference to Madhya Pradesh. This paper does not claim to be an original research paper because most of the text in this paper is based on previous research work done by various research teams in which the author has also contributed. All the respective works are credited to the original authors and appropriate citations have been given as far as possible for due acknowledgement. This paper begins by highlighting the broader issues related to Climate Change and Human Settlements and then defines the scope of Resilience and Climate Adaptation for cities. Possible mitigation and adaptation actions listed by various reports are presented next, followed by two studies from Madhya Pradesh. At the end, important conclusions and actionable points are presented for possible implementation.*

## 1. INTRODUCTION

Climate change is a topic which has received a lot of attention in recent years. It is being discussed on International and National forums; it even finds place in local day-to-day discussions. Cities all over the world are facing increasing environmental hazards, particularly those associated with climate change. Several cities in India have experienced more frequent heat waves - a greater risk of floods and drought. Climate change also increases the likelihood of vector-borne diseases while further reducing urban quality of life. Cities are not just hot spots for climate impacts but also provide opportunities for transformation and adaptation. Governments across the world have increasingly brought in climate related concerns into urban development agenda.

Urban areas hold more than half the world's population and most of the built assets and economic activities are exposed to climate change. In Asia the population growth in urban areas is the highest as compared to the rest of the world and India has been a leading example of fast pace urbanization over last several decades.

## 2. CLIMATE CHANGE AND HUMAN SETTLEMENTS

The cities will be affected by climate change in many ways. The climate change may cause increased flood risk, storm water drainage being overwhelmed,

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increased risk of subsidence, increased risk to health, reduced comfort in buildings, increased risk of infrastructure damage and increased maintenance costs and many other impacts.

There is a high agreement amongst experts of Intergovernmental Panel on Climate Change (IPCC), based on robust evidence that urban climate change-related risks are increasing with widespread negative impacts on people and on local and national economies and ecosystems.

In general, the world over, limited studies are available that present a detailed picture of climate change impacts at urban level. The studies in India are very few and in case of Madhya Pradesh there are no detailed studies available that analyze climate change impacts at settlement level.

In India, responses to climate change at the policy level have been influenced by international reports, policies and agreements especially of the IPCC and the United Nations Framework Convention on Climate Change (UNFCCC). The National Action Plan for Climate Change (NAPCC) establishes eight national missions on climate change, 'Sustainable Habitat' being one of them. In addition to the NAPCC, many State Action Plans on Climate Change (SAPCCs) have been prepared that also focus on addressing local issues. In addition to the NAPCC and SAPCCs, a number of cities have evolved action plans to deal with climate risks such as flash floods and heat waves. All these have proven to be limited in their impact owing to the centrally driven agenda focussed on the international commitments.

United Nations Human Settlement Program report on 'Cities and Climate Change' (UN-Habitat, 2011) clearly stated that with increasing urbanization, understanding the impacts of climate change on the urban environment will become even more important. Evidence is mounting that climate change presents unique challenges for urban areas and their growing populations. These impacts are a result of the following climatic changes:

- Warmer and more frequent hot days and nights over most land areas;
- Fewer cold days and nights in many parts of the world;
- Frequency increases in warm spells / heat waves over most land areas;
- Increased frequency of heavy precipitation events over most areas;
- Increase in areas affected by drought;
- Increases in intense tropical cyclone activity in some parts of the world; and
- Increased incidence of extreme high sea levels in some parts of the world.

Beyond the physical risks posed by the above climatic changes, cities also will face difficulties in providing basic services to their inhabitants. These changes

will affect water supply, physical infrastructure, transport, ecosystem goods and services, energy provision and industrial production. Local economies will be disrupted and populations will be stripped of their assets and livelihoods.

Any discussion on climate change and urban areas is successful if it addresses the following two prime concerns:

- What role the human settlements can play in combating climate change? and;
- At urban level, how do we respond to impacts of climate change?

This paper attempts to assess the available information on addressing the above two issues by developing cities that are capable of facing the stress of climate change in addition the increasing pressures due to fast paced urbanization. This can be accomplished by identifying their vulnerabilities across urban systems enabling them to come up with resilience interventions adaptable for respective cities.

## 3. RESILIENCE AND CLIMATE ADAPTATION

The IPCC defines resilience as 'the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity of self-organization, and the capacity to adapt to stress and change' (IPCC, 2007a).

The concept of building climate-resilience from micro to macro level is increasingly gaining currency as disaster risk reduction has progressively moved away from a 'predict and prevent' paradigm in the evolving context of rapidly transforming complex urban systems and increasing frequency and magnitude of disasters due to climate change (GEAG, 2014).

Well governed cities with universal provision of infrastructure and services have a strong base for building climate resilience if processes of planning, design, and allocation of human capital and material resources are responsive to emerging climate risks (IPCC, 2014a).

When resilience is considered for cities, certain systemic characteristics are highlighted - for instance flexibility, redundancy, responsiveness, capacity to learn, and safe failure as well as taking account of the multiple interdependencies between different sectors (IPCC, 2014a).

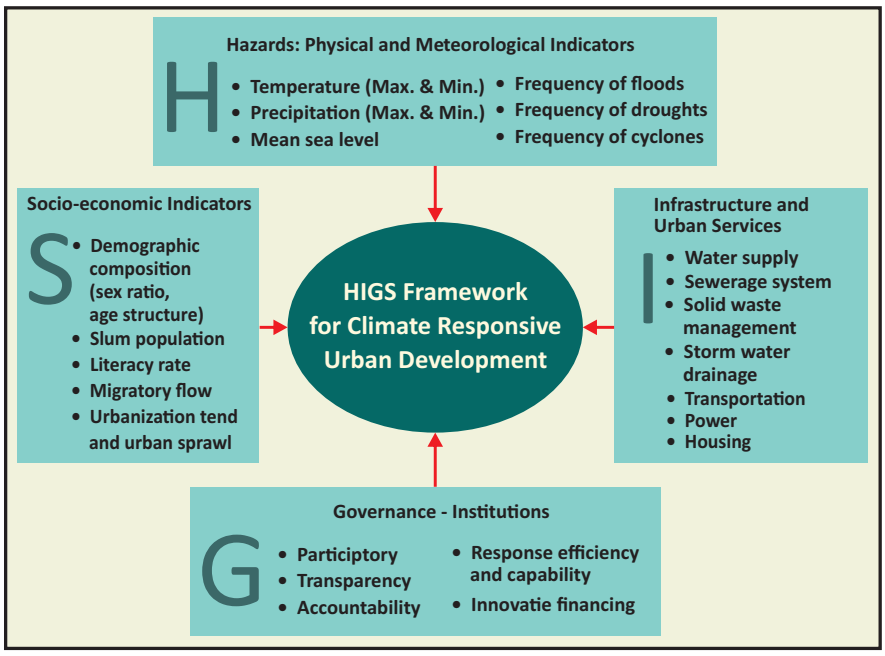
The role of urban planning and urban planners in adaptation to climate change impacts has been emphasized by Tyler and Moench. Adapting through physical infrastructure in urban areas requires complementary adaptation planning, management, governance, and institutional arrangements to be able to deal

with the uncertainty and unprecedented challenges implied by climate change (IPCC, 2014c).

A report prepared by TERI (2011) rightly highlights that:

- Resilience is multi-sectoral: Policies need to be integrated within on-going decision-making and planning processes in critical sectors;
- Resilience is an incremental process: Planning should emphasize mechanisms for on-going learning, evaluation, and adjustment of strategies based on observed impacts of climate changes;
- Resilience includes not only "hard infrastructural investments" but also "soft" actions to strengthen the adaptive capacity of populations and sectors;
- Resilience should be framed in line with local and regional developmental priorities, and focus on the most vulnerable sectors;
- Resilience planning should involve stakeholder groups in a collaborative way. It is a multi-sectoral approach, operating at various levels of institutional set-up;
- Mainstreaming resilience planning needs to be guided by policies and legislative framework or by the rules of law to help integration with development activities at each level; and
- Resilience planning should be based on detailed region-specific vulnerability analysis to capture vulnerability in its varied dimensions (for example biophysical, social, technological, etc.)

**Fig. 1: HIGS Framework for Climate Responsive Urban Development**




*Source: Parikh, 2013*

The resilient cities are better equipped to face the challenges of climate change because these cities have the capability to reduce and manage the negative impacts of climate change having planned and factored these changes in their development goals and planning by:

- Utilizing climate information (of past and future) to identify climate stressors typical to their cities / regions;

- Preparing and implementing strategies to reduce vulnerability of population and city systems. Adapting to change, preparing, and responding to disasters, mitigating GHG emissions; and
- A report on Climate Resilient Urban Development (Parikh, 2013) carried out a comparative study of 20 cities in India and proposed following HIGS framework (Figure - 1) for climate responsive urban development.

The report presents a comparative picture of likely climatic hazards for the 20 cities such as drought, flooding, landslides and cyclones along with Infrastructure capabilities of these cities in terms of water supply, sewerage, draining and municipal solid waste. This report can be a good departure point for all cities to start mapping the vulnerabilities and the capacities to cope with the likely stresses.

## 4. MITIGATION AND ADAPTATION ACTIONS

UN-Habitat (2011) report divides the work clearly in two parts namely mitigation actions and adaptation. It suggests a milestone methodology with following five milestones.

- Milestone 1: establish an inventory and forecast for key sources of GHG emissions in the corporate (municipal) and community areas, and conduct a resilience assessment to determine the vulnerable areas based on expected changes in the climate.
- Milestone 2: set targets for emissions reduction and identify relevant adaptation strategies.
- Milestone 3: develop and adopt a short- to long-term local action plan to reduce emissions and improve community resilience, addressing strategies and actions for both mitigation and adaptation.
- Milestone 4: implement the local action plan with all the measures presented therein.
- Milestone 5: monitor and report on GHG emissions and the implementation of actions and measures.

For coming up with mitigation actions through urban development it proposes actions for different planning situations. Infrastructure development can also contribute towards mitigation actions. Both of these are summarized in the Table - 1 and Table - 2.

On the adaptation side the report proposes asset based actions for building resilience to extreme weather. Further it also provides examples of climate change preparedness goals and actions. A summary of the same is presented in Table - 3.

**Table 1: Climate Change Mitigation through Urban Development**

| Type of Scheme | **Description of Actions** |
|---|---|
| Urban expansion, informal settlements or suburban development: | Application of land-use planning and design policies to limit energy use in the expanding areas of existing cities. |
| New urban development | Application of land-use planning and design policies to limit energy use in new urban areas. |
| Reuse of brown field land | Urban development on old industrial or other derelict areas of the city to encourage densification, mixed-use development and reduce energy use in the city. |
| Neighborhood and small-scale urban renewal | Schemes which seek to renew existing housing stock and redevelop urban layout and design at a neighborhood or street scale in order to reduce energy use in the city. |

**Table 2: Climate Change Mitigation and Urban Infrastructures**

| **Type of Scheme** | **Description of Actions** |
|---|---|
| Alternative energy supply | Development of renewable energy or low-carbon energy supply systems at the city scale. |
| Landfill gas capture | Use of gas produced by landfill sites for energy provision. |
| Alternative water supply | Use of alternative forms of water supply, storage and processing to reduce energy use at city scale. |
| Collection of waste for recycling or reuse | Development of alternative collection systems and ways of using waste to reduce methane produced at landfill sites. |
| Energy and water efficiency / conservation | Enhancing the efficiency of existing infrastructure systems or development of new efficient systems. |
| Demand reduction | Schemes to reduce demand for energy and water use, and for the collection of waste. |

**Table 3: Examples of Specific Adaptation Interventions by Sector**

| **Sector** | **Adaptation option / strategy** | **Underlying policy framework** | **Key constraints to implementation** | **Key opportunities to implementation** |
|---|---|---|---|---|
| Water | Expanded rainwater harvesting; water storage and conservation techniques; water reuse; desalination; water-use and irrigation efficiency. | National water policies and integrated water resources management; water-related hazards management. | Financial and human resources; physical barriers. | Integrated water resources management; synergies with other sectors. |
| Infrastructure and settlements | Relocation; sea walls and storm surge barriers; dune reinforcement; land acquisition and creation of marshlands / wetlands | Standards and regulations that integrate climate change considerations within design; land-use | Financial and technological barriers; availability of relocation space. | Integrated policies and management; synergies with sustainable development goals. |

| Sector | Adaptation option / strategy | Underlying policy framework | Key constraints to implementation | Key opportunities to implementation |
|---|---|---|---|---|
| | as buffer against sea-level rise and flooding; protection of existing natural barriers. | policies; building codes; insurance. | | |
| **Human health** | **Heat-health action plans; emergency medical services improved climate-sensitive disease surveillance and control; safe water and improved sanitation.** | **Public health policies that recognize climate risk; strengthened health services; regional and international cooperation.** | **Limits to human tolerance (vulnerable groups); knowledge limitations; financial capacity.** | **Upgraded health services; improved quality of life.** |
| **Tourism** | **Diversification of tourism attractions and revenues; shifting ski-slopes to higher altitudes and glaciers; artificial snow-making.** | **Integrated planning (e.g. carrying capacity; linkages with other sectors); financial incentives (e.g. subsidies and tax credits).** | **Appeal / marketing of new attractions; financial and logistical challenges; potential adverse impact upon other sectors (e.g. artificial snow-making may increase energy use).** | **Revenues from 'new' attractions; involvement of wider group of stakeholders.** |
| **Transport** | **Realignment / relocation; design standards and planning for roads, rail and other infrastructure to cope with warming and drainage.** | **Integrating climate change considerations within national transport policy; investment in research and development for special situations (e.g. permafrost areas).** | **Financial and technological barriers; availability of less vulnerable routes.** | **Improved technologies and integration with key sectors (e.g. energy).** |
| **Energy** | **Strengthening of overhead transmission and distribution infrastructure; underground cabling for utilities; energy efficiency; use of renewable sources; reduced dependence on single sources of energy; increased efficiency.** | **National energy policies, regulations, and fiscal and financial incentives to encourage use of alternative sources; incorporating climate change within design standards.** | **Access to viable alternatives; financial and technological barriers; acceptance of new technologies.** | **Stimulation of new technologies; use of local resources.** |

## 5. CASE STUDIES FROM MADHYA PRADESH

It is important to know the basics as presented in various reports and research papers discussed above. But it is equally significant to understand the context specific solutions. In this section two research works specifically addressing the

mitigation and adaptation action for cities in Madhya Pradesh have been discussed. The first study deals with developing low carbon cities giving a perspective for Low Carbon Bhopal - 2035 and the other study discusses the likely impacts and capacity to cope with the climate change stress for city of Bhopal and Ujjain.

### 5.1 Low Carbon Society Scenario Bhopal - 2035

This study (Deshpande, 2011) was jointly carried out by Institutions from India and Japan under a research project. Studies for many cities across the world were carried out. In this project reports for two cities from India namely Ahmedabad and Bhopal were prepared. This study presents a case of Bhopal from the point of view of moving on low carbon pathways. Simulations for two possible scenarios namely Business and Usual (BaU) and Low Carbon Society (LCS) for Bhopal for the year 2035 are developed and emission reduction potential of various counter measures are quantified. Actions plan and policy measures are suggested for moving towards LCS Bhopal by the year 2035. The report proposes 7 actions in line with the overall vision of making the city more livable for all the residents.

These recommended actions are based on a detailed analysis of energy and emissions for base year 2005 and alternate scenarios in year 2035 for residential, commercial, Industrial and freight an passenger transport sector.

The simulations show that the GHG emission and energy consumption increase in the both the scenarios. However, with energy efficiency improvements, development of renewable energy, and other policies to promote sustainable development across all sectors as envisaged in the 7 actions (Box - 1), Bhopal has about 40 per cent GHG emission reduction potential over BaU level in the possible LCS Scenario.

**Box 1**

**Seven Actions towards LCS Bhopal - 2035**

**Action - 1: Green Governance - Government's initiatives towards LCS:**

- Introduction of policies and Incentives across sectors incorporating sustainable practices;
- Government schemes including subsidies on use of green technology; and
- Enforcing not only 'prescriptive regulations' but also formulating 'performance guidelines'.

**Action - 2: Holistic Habitat - Energy Efficiency in Buildings:**

- Application of energy efficient technology in buildings;
- Passive and Active methods of Reducing Energy Consumption;
- Use of Multiple Housing Typologies according to Life Style and context;
- Adopting time tested house forms in rural - urban transition areas (climate responsive vernacular ho using); and
- Use of locally available materials and technology.

**Action - 3 : Sustainable Style - Low carbon lifestyle:**

- Introduction to environmental concerns from primary level of education;
- Reduce, reuse, recycle;
- Use of energy efficient appliances; and
- Walking as a way of life.

**Action - 4: Cellular City - Multi Nuclei Land Use Planning:**

- Developing and enhancing the existing city form of self contained settlements with mixed land use;
- Compact, discreet work-home zones requiring minimal inter-zone travel; and
- Defining the city cells based on their natural settings, socio-economic homogeneity, location in the context of city structure.

**Action - 5: Form and Flow - Integrating Transport with City Structure:**

- Two level integration
  - Connecting the Cells:
    - Route optimization considering the topography, water bodies and other natural barriers; and
    - Reducing travel demand and time between zones.
  - Walkable cells:
    - Transportation within compact closely knit work-home mixed land use zones; and
    - Promoting non-automated means of transport-Inclusion of bike tracks, pedestrian walkways, subways and cross overs.
- Migration to Sustainable Technology:
  - Emission norms;
  - Alternative fuels use;
  - Traffic management (passenger and freight); and
  - Parking policy.

**Action - 6: Nurturing Nature - Leveraging on the Natural and Historic Assets:**

- Lake conservation and water management;
- Rain water harvesting at city level using natural collector zones, at community level and household level;
- Social forestry and urban forestry;
- Using indigenous plant species for urban landscaping;
- Conserving the city's heritage; and
- Promoting eco-tourism and heritage tourism.

**Action - 7: Rural Riches - Promoting a Better Lifestyle in the Rural Areas:**

- Developing rural fringes as city's food reserve by increasing agricultural activities;
- Prevent conversion of rural land to peripheral urban housing sprawl through land use control and incentives; and
- Government incentives for developing rural housing typologies, with energy efficient technology interventions.

The scenario assessment shows that, of the total emission reduction potential, 50 per cent would be due to fuel switch which is prominent in residential, commercial and industrial sectors, about 40 per cent would be due to energy efficiency improvements mostly from residential, commercial, and transport sectors, and remaining close to 10 per cent would come from reduction in energy service demand in residential and transport sectors.

This study is of especial significance because the pathways to achieve the LCS are open for the developing countries and a framework for a LCS from the perspective of developing countries is evolving. It could be said that fast growing Indian cities have an opportunity to contribute to the climate change mitigation by developing on a low carbon pathway.

### 5.2 Impacts of Climate Change on Urban Sector in Madhya Pradesh

This study was carried out with the financial support from Department for International Development (DFID) under the project Strengthening Performance

Management in Government (SPMG) in Madhya Pradesh. It attempts to assess the available information on the climate change impacts with special focus on Madhya Pradesh and caries out the ground work for city level case studies for Bhopal and Ujjain. First, at state level the district with higher infrastructure vulnerability were mapped. Infrastructure vulnerability of the urban areas in Madhya Pradesh was assessed on the basis of the data for urban areas for various districts from census of India. Eleven indicators were considered for assessing the infrastructure vulnerability.

For scoring, average of each indicator across all districts was calculated and then compared across the districts. Within each indicator districts are categorized as having values less than average and more than average. Districts with lower than average values are considered as more vulnerable and are counted to calculate the score of each district. Thus, higher score represented more vulnerability.

The analysis indicates that piped water supply is most vulnerable among all indicators taken into consideration. As per the census data electricity connection comes out to be a good indicator. However, it does not consider the availability of electricity supply.

**Fig. 2: Madhya Pradesh Urban Infrastructure Vulnerability**

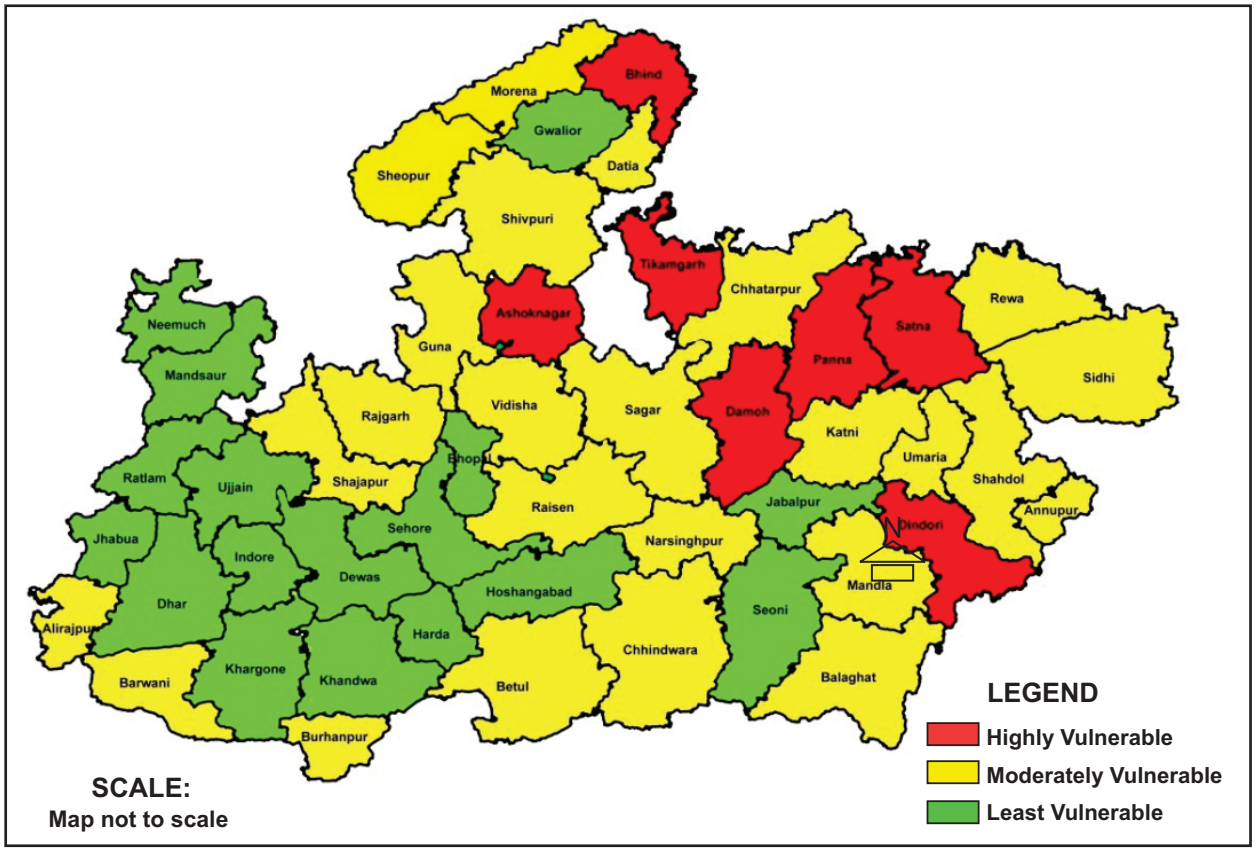


Figure - 2 shows the infrastructure vulnerability of the various districts based on the calculated score. It can be seen that Bhind, Ashoknagar, Damoh, Panna and Tikamgarh appear to be most vulnerable in Madhya Pradesh due to infrastructure stress whereas districts with larger urban centres namely Indore, Gwalior, Bhopal and Jabalpur appear to be resilient with better infrastructure provision.

Infrastructure vulnerability at ward level in Bhopal and in Ujjain was also assessed on the basis of the data from Census of India. Eleven indicators were considered for assessing the infrastructure vulnerability. The study shows that in case of Bhopal only about 40.5 per cent (SD=21.7) households were connected to piped sewer system making it most stressed infrastructure whereas 97.3 per cent (SD = 5.0) households connected to electricity supply lines is least stressed infrastructure. Indicator based on households connected to piped sewer system has maximum standard deviation indicating maximum variations whereas households connected to electric supply lines has least standard deviation showing consistency among 70 wards of Bhopal Municipal corporation.

It is realized that the sewage disposal system is one of the most vulnerable among other services. The storm water disposal system also emerges as one of the most vulnerable. Presence of open drains that also work as storm water drains during rains in most of the areas is a cause of concern. With only 30 per cent provision of piped sewerage system, urban floods due to climate change will make the city living unhygienic and administratively unmanageable in the longer run.

In case of Ujjain also only about 13.8 per cent (SD=11.7) households are connected to piped sewer system making it most vulnerable infrastructure whereas 98.3 per cent (SD = 2.15) households connected to electricity supply lines is the least vulnerable infrastructure indicator. Households connected to piped sewer system has greater standard deviation indicating huge variations whereas households connected to electric supply lines has least standard deviation showing consistency among 54 wards of Ujjain Municipal Corporation. Sanitary system is not available in all the wards and most of the city is dependent on open drains. Problems are faced during seasonal variations such as overflow of open drains, non-working of pumps due to flooding of pump house, etc., making the situation worse and unhygienic. Storm water mixing with sewage during rains exerts pressure on septic tanks. Thus in Ujjain too sewage disposal and storm water drains emerged as the most vulnerable services.

## 6. CONCLUSIONS

India is fast becoming urban. At the present rate it is expected that more than two-thirds of the population of India will be living is urban areas by the year 2050. Thus, a majority of population will be affected by any climate change impacts for urban areas. Madhya Pradesh urbanization scene is no different than national

trend and by 2050 in Madhya Pradesh majority of population shall be living in the urban areas. Negative impacts of climate change to infrastructure pose risks of higher economic damages in developed urban areas and higher human damages in less-developed rural areas or the areas inhabited by urban poor. At the same time development of good quality of infrastructure with consideration for the impacts of climate change can work as a suitable adaptation strategy.

It has been concluded in many reports, including the IPCC reports, that in case of infrastructure, impacts are more directly associated with climatic extremes rather than averages. While planning for infrastructure, there are codes and standards that ensure that the infrastructure is able to bear the normal variability of climate. However, there is no provision for anticipating the abrupt climate changes and extreme events and their impacts. More so, in case of large urban centres in Madhya Pradesh, a lot of new residential and commercial areas are coming up where huge amount of money is being committed for development. However, none of these developments have been analyzed for the likely impacts of climate change.

In many studies it has been observed that long life assets, having low autonomous adaptive capacity, are vulnerable to climate change. In Madhya Pradesh too, therefore, there is a need to include risk assessment and vulnerability studies in infrastructure planning. Development of adaptation options such as ensuring high design standards for new infrastructure so as to protect against extreme events needs to be taken on priority.

In longer run it can be seen that the projected climate change is likely to increase weather related mortality and morbidity due to heat strokes, floods and storms. The urban areas are more likely to suffer because of increasing temperature due to the already existing heat island effect.

**Table 4: Recommended Strategies and Actions for Climate Change Adaptation in Cities**

| Sl. No. | Recommendations | Time frame | Classification |
|---|---|---|---|
| 1. | Identification of process to include climate change scenarios into urban development plans is needed for integration of mitigation and adaptation strategies into policies. | Short term (1-5 years) and Medium term (6-15 years). | Research and Policy mainstream-ing. |
| 2. | Low-income households living in slums and squatters are more vulnerable to climate change impacts. Risk prone sites should be identified in cities and strict development guidelines need to be worked out for such sites. | Short term (1-5 years) and Medium term (6-15 years). | Research and Policy mainstream-ing. |

| Sl. No. | Recommendations | Time frame | Classification |
|---|---|---|---|
| 3. | Long life assets (infrastructure), having low autonomous adaptive capacity, are vulnerable to climate change. Therefore, any new infrastructure project in urban areas should be analyzed in detail for risk due to climate change. | Short term (1-5 years) and Medium term (6-15 years). | Policy mainstreaming for risk and vulnerability analysis in Development Projects. |
| 4. | Many infrastructure projects are also part of adaptation strategies and any damaging impact on these could be adverse to adaptation itself. There fore, it is necessary to ensure high design standards for new infrastructure to protect against extreme events. | Short term (1-5 years) and Medium term (6-15 years). | Policy mainstreaming. |
| 5. | As water supply, sanitation and drainage were the most deficient aspects, therefore, there is a need to have infrastructure projects, with a priority for small and medium urban settlements. | Short term (1-5 years) and Medium term (6-15 years). | Development Projects with CC inputs. |
| 6. | Adaptation of existing infrastructure needs to begin early as retrofitting requires considerable time and cost. | Short term (1-5 years) and Medium term (6-15 years). | Development Projects with CC input. |
| 7. | More resources need to be committed for flood prevention and protection. Comprehensive analysis of the storm water drainage pattern of all urban settlements may be needed to minimise future damages due to urban floods. | Short term (1-5 yr) and Medium term (6-15) and Long term (16-30). | Research and development (GIS based), Development Projects. |
| 8. | It is identified on the basis of the case studies that the officials in local government though are aware about climate change but lack any formal training. Thus, in addition to technology strategies, economic instruments and development strategies; capacity building of the officials in local government is vital for minimizing climate change impacts and promoting adaptation. | Short term (1-5 yr) and Medium term (6-15). | Training Programs, Literature distribution, Capacity Building. |
| 9. | A scientific evidence base with trained manpower in each urban centre is essential for effective implementation of adaptation actions. This includes local risk and vulnerability assessments and information and data with which to consider current and future risk and adaptation and development options. | Short term (1-5 yr) and Medium term (6-15) and Long term (16-30). | Research, Policy mainstreaming and Projects, Capacity Building. |

Though each individual urban settlement has its uniqueness however, some broad generalized strategies can be recommended for the urban areas in Madhya Pradesh. Each individual settlement can develop specific adaptation strategies within the broad categories suggested Table - 4.

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# Building Urban Planning Capacity in India: Role of the ITPI

**D. S. Meshram, Ph.D.**

**Abstract**

*The report of the Advisory Committee of NITI Aayog on 'Reforms in Urban Planning Capacity in India' defines the role and skill sets of town and country planners, and also highlights that urban planning is an independent discipline that from architecture, engineering, urban design, etc. Besides narrates the statutory, non-statuary and advisory functions of State Town and Country Departments, and also gives wide ranging recommendations, which include amending Recruitment Rules for ensuring that the posts of town planners are filled up by qualified town and country planners and also to fill up vacant posts of town planners in State Town and Country Planning Departments. In addition creation of 'National Council of Town and Country Planners' (NCTCP) have also been recommended. In this paper efforts are made to study the provisions and recommendations of the Advisory Committee in detail and also to assess its impact on the role and functions of the ITPI. The paper concludes that the creation of 'National Council of Town and Country Planners' will not jeopardize the role and functions of the ITPI. It is further clarified that similar situations was prevalent when Council of Architecture (CoA) was created by the Architects Act 1972. At that time also Indian Institute of Architects (IIA) existed since 1917, and still both the bodies CoA and IIA are working in tandem. Accordingly, the ITPI and NCTCP can also function without jeopardizing each other's roles and functions.*

## 1. INTRODUCTION

Due to increasing urbanization, there is immense stress on the infrastructure of many cities and towns in India and if this situation, left unplanned and sub-optionally managed, it may be detrimental to the society, economy and environment of the country. While Master Plans are critical for managing urbanization, being statutory instruments to guide and also regulate the present and future urbanization in addition the land required for expansion however, about half of our statuary towns and two-third of Census towns do not have Master Plans and are expanding without any Master Plan to guide their growth and infrastructural investments. Accordingly, to bring about reforms, NITI Aayog constituted a high level inter-ministerial Advisory Committee on 'Reforms in Urban Planning Capacity in India', under the Chairmanship of Dr. Rajiv Kumar, Vice Chairperson, NITI Aayog.

## 2. SALIENT FEATURE OF NITI AAYOG REPORT ON REFORMS IN URBAN PLANNING CAPACITY IN INDIA

In the report of NITI Aayog it is clarified that 'Urban and Regional Planning' is a professional practice and academic study, which is focused on processes that

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promote planned, economic, scientific and artistic development of all sizes of settlements. While urban planning relates to cities, 'Regional Planning' includes planning for rural as well as urban areas within a region on a different scale and level of detailing. The levels of planning include – city level, regional level, and state level, and national.

However, as per 'World Cities Report' of UN-Habitat, India has a grim ration of 0.23 accredited planners per one lakh population, in contrast to figures of U.K. While as per ITPI, there are only 7,000 qualified town and country planners, thus one planner for 75, 000 urban population, where as there are 7,935 towns and cities, besides 640 districts and over 6 lakh villages, (Meshram, 2020). Thus, the supply as well as involvement of urban and regional planners in urban planning and development are critical links therefore, it is necessary to look into the present work force of urban / town planners and their supply system in the country.

### 2.1 Role and Skill Sets of Town and Country Planner

An urban planner across different sectors and scales of interventions, may be engaged in public, private or education sectors. However, the various roles of Town and Country Planners include town planning, technical expert, project manager, advisor, consultant, faculty, etc., some of the key functions of urban planners (including but not limited to) are:

- Technical and Analytical:
  - Preparation of Regional Plans; Master Plans / Development Plans; Zonal Plans; Site Plans; and local Area Plans;
  - Conducting feasibility studies, undertaking surveys, research, analysis, and documentation, detailed project reports, financial modeling, implementation, and monitoring;
  - Analysis, drafting, preparation, implementation, and monitoring of spatial plans;
  - Conducting research and developing strategies, supporting policies, programs and key projects of the government at various levels;
  - Contributing to the field through research and innovations;
  - Developing innovative approaches to solve complex urban and regional challenges pertaining to housing, basic services, and transportation;
  - Incorporating considerations pertaining to gender, child, universal access, climate change, safety and sustainability;
  - Executing techno-legal roles, including building permissions and plan enforcement functions;
  - Developing strategies for regional development;

- Developing policy frameworks for environment-sensitive development; and
- Implementing development projects and closely monitoring the impacts for mid-course corrections, if any.

- Building and Moderation
  - Engaging actively with different stakeholders;
  - Enabling the balance amongst all relevant interests and competing land uses so as to solve conflicting demands on space and development; and
  - Engaging with citizens and ensuring effective public participation at various levels of planning processes.
- Skill Sets of Town and Country Planners

  As the implications of urban planning travels beyond cities to rural, tourism, industrial, transport and logistics, regional, environmental, etc., therefore, the skill sets of town planners need to encompass various aspects of multiple disciplines such as architecture, economics, environmental science, geography, sociology, finance, data analytics, etc. Master Plans essentially involves land allocation for various uses, therefore, planners have to arrive at solutions for competing land uses, economic versus environmental considerations, and many other paradoxical situations, which needs to be moderated through evidence-based decisions or trade-offs and incorporated in a spatial strategy that is most beneficial to the city, its surroundings, and masses. Therefore, the complexity of the task of city planning is remarkably high; and needs specialist skills as well as awareness. An urban planner, is specially trained to possess skills for solving complex multi-sectoral challenges, moderating the competing pressures on land posed by market forces, environmental considerations, and social needs, and take a balanced view in a citizen-centric approach, and also to work across disciplinary boundaries.

### 2.2 Recognizing Urban Planning as an Independent Discipline

It is well known fact that over the years, the urban planning discipline (and its allied nomenclatures) have gained a lot of importance globally, in terms of perception and employability, however, this field and its expertise remains ironically under rated and under-utilized in both public as well as private sectors in India, majorly due to overlapping of the roles / skill sets of a planner, architect, urban designer and a civil engineer. At times, it has also been observed that the planner's role is being performed by the professionals from a field which are not even related to any of the aforementioned domains of expertise. This lack of clarity amongst the potential users of the planning skill sets as well as the public at large, is also hampering the overall quality of work outputs and their intended outcomes.

It is essential to recognize that planning, urban design, architecture, and civil engineering are distinct professions with dedicated degree programs and qualifications, albeit with some overlapping skill sets. Typically, a civil engineer has an expertise in construction technologies of buildings, bridges, roads, ports, etc.; an architect is well-versed in building design; an urban designer has an ability to comprehend the local level plans in detail; and a planner is trained to prepare large-scale plans, including city master plans, comprehensive mobility plans, city sanitation plans, district plans, metropolitan region plans, industrial area plans, policy frameworks, special economic zone plans and so on. The scale of physical intervention of planner varies, at each scale of intervention, and the skill sets and the domain expertise required to achieve the desired outputs also vary. At national and state level policy making planning skills are pertinent for policy formulation, vision preparation, program design, strategic positioning of projects, etc. At regional level the regional plans address the multi sectoral aspects and give direction and priorities for investments and development. Preparation, implementation, and review of regional plans is a cyclic process. Planning skills are predominantly applicable here for devising a bigger picture and a strategy while encompassing considerations about multiple sectors like transportation, tourism, agriculture, land, industries, forests, environment and so on. And at city level, the master plans or development plans are required to be prepared which are statutory in nature. They define land uses and a set of norms to which all the constructions in the city must comply with. Their preparation, implementation and review entail a cyclic process which needs planning skills (both technical as well as managerial) for moderation, consensus building, and decision making with a team of multi-disciplinary experts (which may include architects, civil engineers, data scientists, transportation planners, environmental planners and so on). Other city scale plans that need specialist expertise of planners include city sanitation plans, comprehensive mobility plans and so on. For preparation of local Area Plans this scale of intervention also needs urban design, architecture and engineering skills. Depending on the nature of the area being planned, such as transit oriented zone planning, may also need specialist skills such as transport planning, environmental planning and so on. At the building level the role of planner is mainly in terms of permits and compliances. Therefore, in order to interventions in urban planning capacity of the country, it would be pertinent to derive into the aspect of recognition ‘Urban Planning’ as an independent discipline. This may help in nurturing quality of the present and future urban planning capacity of the nation.

### 2.3 Capacity of Urban Planning in India

The capacity of urban planning in India is built upon three pillars (a) Public Sector, (b) Private Sector, and (c) Education and Research. Under Public Sector

demand – supply aspect of planners needs to be seen in overall context because there are number of ministries, departments, organizations and bodies at central, state, and local level that utilize skill-sets of planners. Private sector companies organize planners in teams and develop and maintain their expertise and provide planning and implementation capacities, while education and research sector play a role to generate knowledge, train urban planning and design professionals to work in private and public sectors, undertake relevant research and ensure a continuous education of professionals.

### 2.3.1 Public Sector Capacity (Urban and Rural)

There are several institutions at the state and UTs and local levels that play a role in urban planning, management and development, like State Town and Country Planning Department, Metropolitan / District Planning Committees, Urban Local Bodies, Parastatal Agencies / Bodies, Improvement Trusts, etc; however only the role and functions of State Town and Country Department are given below:

**State Town and Country Planning Departments:**

The Town and Country Planning Departments play a vital role in the development of the state as they look after the subject of planning of urban and rural areas. The functions of these departments vary from state to state, however, broadly they are listed as follows:

- **Technical Planning Functions (statutory and non-statutory):**
  - Preparation of master / development plans; land use plans; zonal plans; town planning schemes; collection, maintenance and publication of statistics; and layouts for rural areas;
  - **Approvals and Clearances:** Technical approval of layouts, building plans as per rules and regulations, commercial complexes, road development plans, installations (industries);
  - **Providing Technical Suggestions:** Technical suggestions to the Government on matters of change in land-use proposals;
  - **Implementation:** Implementing urban development schemes;
  - **Coordinating with Various Departments:** State Town Planning Departments are involved in area development; and
  - **Staffing and Training:** Training of town planners and other related officers.
- **Advisory Functions:**
  - Advising and assisting the state government departments (e.g. housing board, industrial infrastructure development corporations, pollution control boards, housing corporations), local authorities and parastatal

(e.g. municipal governments, urban development authorities, municipal councils) on matters related to planning, development and use of rural and urban lands in the State;

- Suggest Various Urban Development Schemes like road widening, environmental improvement schemes and so on to the State Government.

### 2.3.2 Need Assessment of Human Resources for Town and Country Planning:

About 52 per cent of Statutory towns and 76 per cent of Census towns do not have any Master Plan to guide their spatial growth and infrastructural investments (TCPO – 2021). And only 3945 sanctioned positions of town planners exist including being occupied by Architects / Engineers) in States and UTs out of which 42 per cent (1657) are vacant. Accordingly, need assessment of Town Planning Departments, have been worked out which amounts to 12,213 by 2021; that is to say additional 8,268 posts needs to be sanctioned in all States and UTs. Thus, total pots accounts for (8268 + 1657) = 9925, which are required to be filled by qualified town planners to meet the immediate requirement for building urban planning capacity.

The Recruitment Rules framed by the respective Public Service Commissions of States and UTs, however, are critical in this regard. These Recruitment Rules do not ensure a degree of domain of town or urban planning as mandatory eligibility condition, which acts as a major bottleneck in ensuring a qualified work force for urban planning. In fact many States do not even consider Bachelor's Degree in Planning as eligible qualification. Accordingly, Ministry of Housing and Poverty Alleviation has issued advisories to various States and UTs for adoption of standard Recruitment Rules prescribed vide Gazette of India, Extra ordinary, Part – II section – 3, sub-section (i) No. 665 dated 27th December, 2012.

### 2.3.3 Planning of Rural Areas

With reference to planning of rural areas, the Committee noted that Ministry of Rural Development (MoRD), and Ministry of *Panchayati Raj* (MoPR) initiated the rural areas spatial planning process 2016 – 17, and enforcement mechanism for Rural Clusters. While Ministry of *Panchayati Raj* (MoPR) has constituted a Committee for drafting the Rural Area Development Plan Formulation and Implementation (RADPFI) Guidelines; MoRD embarked upon the implementation of cluster area notification and spatial planning for the Rurban Clusters. SPMRM is an improved version of Integrated Rural Development Plan (IRDP), which provide for urban amenities to rural areas and is premised on a rural cluster approach for viability and scale of economy, and envisages to develop 300 clusters spread across 28 States and 6 UTs. The total requirement for regional / spatial planning specialists is 301, and urban planning specialists is 34 and so far 30 urban planning professionals have been recruited.

### 2.3.4 Education Sector Capacity

**All India Council for Technical Education:** AICTE was established in 1945 as advisory body, was given statutory status by an Act of Parliament in 1987, is responsible for ensuring uniform development and qualitative growth of technical education system and preparation of syllabus to maintain uniform standards. As per Act technical education means programs of education, research and training in engineering and technology, architecture, town planning, management, pharmacy, and applied arts and crafts. As per Approval Process Hand Book 2021-22, AICTE recognizes one name for the undergraduate degree in planning and 25 nomenclatures for postgraduate degree in planning.

**University Grant Commission:** UGC is a statutory body set-up by government of India under UGC Act 1956, is charged with coordination, determination and maintenance of standards of higher education; and advises Central and State Governments on measures necessary for improvement of university education.

**The Institute of Town Planners India (ITPI):** ITPI came into existence in 1951-52, as a non-statutory professional body. After its establishment, ITPI made efforts to establish School of Planning and Architecture, Delhi and the Town and Country Planning Organization at the Centre as well as Town and Country Planning Departments in the States. It initiated an Associateship Examination in the year 1952-53 for knowledge upgradation of mid-career professionals who could not attend regular classes as they are employed. This was recognized by the Ministry of Scientific Research and Culture Affairs, Government of India, in 1963. So far, 368 candidates have successfully completed this examination. The institute also provides Corporate Associate / Fellow memberships to interested qualified town planners. Currently, there are about 6500-7000 urban planners registered as corporate Associate and Fellow members of ITPI. The Headquarter of the institute is in Delhi and functions through 24 Regional Chapters located in State capitals and 5 regional centers in major cities.

**Centers of Education:** Urban planning education started with the initiation of a master-level program in School of Planning and Architecture, Delhi followed by another such program at IIT Kharagpur. Later, other institutions started offering courses with multiple specializations, such as environmental planning, housing, regional planning, transportation planning, infrastructure, etc.

During early 1980s, ITPI realized the need for starting undergraduate programs in planning and accordingly took up the matter with the then Ministry of Education, and designed a model curricula. SPA Delhi initiated a four-year undergraduate program in planning (B. Plan.) in the academic year 1989–90. Soon afterwards, many other private and public sector institutions started offering this course. Currently, urban planning education in India is offered by 49 institutions; out

of which 49 educational institutions provide degree programs in Urban Planning and allied specializations, and the total annual sanctioned intake capacity of postgraduate degree programs is 1300, that of undergraduate degree programs is about 550, to supply approximately 1875 planners (generalists as well as specialists) every year.

**Model Curricula:** Model Curricula for Undergraduate and Postgraduate programs are prepared periodically by AICTE. For the first time, this exercise was undertaken in 2009 with ITPI. A number of experts in the field of planning participated in this endeavor. Thereafter, minor revisions were made in 2012.

However, the Advisory Committee observed that the nomenclature of undergraduate degrees prescribed by AICTE is Bachelor of Planning or Bachelor of Technology (Planning), that of postgraduate degrees vary across the country. For example, 'city planning', 'urban and regional planning', 'town and country planning', 'housing', 'environmental planning', 'transport planning', etc. While the Schools of Planning and Architecture offer postgraduate degrees under the title 'Master of Planning'. However, such multiplicity in degree nomenclatures and titles causes hindrance in the employment of graduates with similar skills but with different names of degrees / courses. Recently this problem was noticed in the recruitment of town planners in Jharkhand, and Bihar, due to different nomenclatures.

Currently, a ranking framework for assessing institutes offering urban and regional planning education in the country is not available. Such a framework may help promote healthy competition amongst the institutions.

A serious challenge of faculty shortage was observed which is 25-30 per cent approximately. Also, there are few quality improvement programs for faculty in the urban planning domain. The faculties also have limited motivation and incentive to heighten their research and expertise. These can be major limitations in the adoption or adaptation of the model curricula.

### 2.4 Demand Supply Aspect

#### 2.4.1 Supply Estimation

The Planning capacity is grossly inadequate in much of the developing world as per UN-Habitat -2016. In the UK, there are 38 planners per 100,000 population, while in Nigeria and India the figure is 1.44 and 0.23 respectively. This comparison indicates a grim ratio of planners in India and puts forth a need to deeply examine the demand and supply aspects of planners in the country.

The institutions offering the courses with the keyword 'planning' only were referred to for supply estimation. The courses on urban design, development

management and practice were not included due to variation in the title and content. Six scenarios were built for estimating the total workforce of urban planning professionals that may be available in the market. However, Scenario No. 6 was selected being a close representative of the estimated workforce of qualified urban planners available in the market, i.e. approximately 17,000 urban planners may be available in market, in India.

### 2.4.2 Demand Aspect

At present, there is no mandatory system for keeping an absolute count of urban planners that graduate every year in the country or are engaged in jobs. Sometimes the number of planners required in urban India is projected by comparing such numbers prevailing in developed countries. For a valid projection of planners in the country, it is necessary that they have an equally matching demand. There are several possible factors for this mismatch that need to be addressed, like tendency in employers to consider architecture, civil engineering, and urban planning as equivalent domains.

Thus, the critical issues observed among others across the value chain of urban planning capacity in India have several bottlenecks and system issues like:

- About 52 per cent of the Statutory towns and 76 per cent of the Census towns do not have any Master Plans to guide their spatial growth and infrastructural investments, this clearly implies that three-fourth of the urban centers in the country do not have any spatial strategy for the next 20 years. Such severe lack of preparedness to manage the level of urbanization that the Indian cities are bound to witness in the coming decades is a huge risk. Clearly, the 'business-as-usual' approach will not be sustainable. This gap needs to be plugged through concerted efforts.
- Specific proposals with clear assignment of responsibilities of the concerned agencies and a financial implementation plan, need to be devised within the master plans. In addition relevant legislations need to be thoroughly reviewed and amended to create an enabling environment for advancement in the urban planning capacity of the country.
- Multiplicity of agencies dealing with planning of land and sectors like water, sewerage, solid waste, etc.; has led to both silos of working and overlapping of functions. Therefore, there is a need to clearly define mandates and powers for plan preparation and implementation, constitution and functioning of Metropolitan and District Planning Committees, and provide for human resource to suffice for techno-managerial roles of planning, implementation mechanisms, etc.
- As per a study conducted by TCPO and NIUA, over 12000 posts for town planners are required by 2021 in the country, while there are fewer than 4000

sanctioned positions of 'Town planners' in State Town Planning Departments. When this figure is compared with the number of statutory towns, it is alarming to find that there is not even one planner per urban center in India.

- The educational eligibility criteria for the entry level positions of Town Planners in Recruitment Rules of States and UTs is not consistent across the country. In some States, the undergraduate degree in 'Urban Planning' is ironically not even considered eligible to apply for a post of Town Planner job. This is a regulatory bottleneck that needs to be resolved.

## 3. INSTITUTE OF TOWN PLANNERS, INDIA (ITPI)

### 3.1 Origin and Objectives of ITPI

Institute of Town Planners, India (ITPI) established in 1951-52 by the 13 dedicated planners (studied abroad) as a charitable Institute under Section – 26 of Indian Companies Act 1913, is totally committed to foster town and country planning profession and to advance town and country planning education in the Country. The ITPI vision is 'To promote dynamic, inclusive and integrated town and country planning practice, education, research and institutional mechanism for vibrant, sustainable and resilient spatio-economic development of towns, cities and regions' as per Memorandum of Articles of Association and Bye-Laws, the objective of ITPI among others include:

- To advance the study of spatial planning including regional, urban, transport, housing, infrastructure and environment planning as well as allied subjects as an overreaching planning institute to effectively contribute to planning ecosystem and facilitate high quality planning services to States and country at large;
- To promote planned, integrated, dynamic inclusive and resilient development of urban and rural areas;
- To promote and safeguard professional interests of those engaged in town and country planning practice and education;
- To promote spatial planning education, research, and increased capacity building related to urban and regional planning and development through financial aids, awards and rewards;
- To devise and impose the means for testing the qualifications of candidates for admission to the corporate membership of the ITPI by:
  - examination in theory and in practice or by any other tests or to arrange with any educational institution for the imposition of any such tests;
  - recognize the Schools / Institutions imparting town planning education to make eligible their students to become corporate Associate / Fellow of ITPI and also to maintain quality of town planning education;

- To consider various issues affecting or likely to affect the spatial planning practice / legislation / institutional structure and to initiate measures to address them;
- To hold conferences, meetings, exhibitions on town and country planning, which may be organized jointly with any other body or institution, and to award medals, certificates / prizes in connection therewith;
- To act as a resource center and acquire and disseminate analogue or digital information, maps, models, drawings, designs or other material and to maintain, extend and improve the same; and
- To ascertain and notify the law and practice relating to town and country planning, and to compile, collect, collate, revise, print and publish statistics, professional records, periodicals relating to any of the objects of the Institute.

### 3.2 Role of the ITPI

As there was neither a single School of Planning in the Country, nor well established Town and Country Planning Departments in the States, in post-independence period, obviously the first priority of the ITPI during 1951 – 52 was to initiate the action for establishing Schools of Planning and also to make efforts to establish Town and Country Planning Departments at centre and in various States. Accordingly, a model Town and Country Planning Legislation was drafted, which was discussed and deliberated in the second Town and Country Planners Conference of ITPI, held on 2nd – 4th September, 1953, at Hyderabad, which was subsequently adopted by various States with slight modifications to suit to their local conditions (Qaiyum, 2010). Similarly constant efforts were made by the founding members of ITPI to establish School of Planning and due to their untiring efforts the first School of Planning was established in the country in the year 1955 at Delhi by the Ministry of Education, Government of India. Besides Town Planning Organization was also established at centre in the year 1955. With merger of Architecture Department of Delhi Polytechnic, the present School of Planning and Architecture, came into existence in the year 1959.

The All India Council of Technical Education (AICTE) also entered in the Memorandum of Understanding (MoU) with ITPI on June, 1996, to utilize the expertise of ITPI to review the courses, curricula, norms and standards and approval of new courses and institutions, programs, accreditation, recognition and de-recognition and periodic review and also to establish 'All India Board of Town and Country Planning' at AICTE.

Taking into consideration the expertise and experience of ITPI the Ministry of Urban Affairs and Employment, Government of India, assigned the work of preparation of 'Urban Development Plans Formulation and Implementation (UDPFI) Guidelines' to Institute of Town Planners, India Accordingly ITPI prepared

the UDPFI Guideline in 1996, which are being referred widely by the State Governments and other agencies.

### 3.3 Functioning of the ITPI

The professional activities of ITPI are carried out by Professional Standing Committee (PSC) constituted for the purpose. While ITPI functions through 24 Regional Chapters mostly located in State capitals, and 5 Regional Centers; majority of them are equipped with the library and hostel facilities, and under takes professional, educational and research activities, inconformity with the objectives of ITPI.

The educational activities of ITPI are carried out through Educational Standing Committee (ESC), while for conducting Associateship Examination of ITPI, the Town Planning Examination Board has been created, since the inception of ITPI. The Associateship Examination is being conducted for the candidates who are interested in enhancing / upgrading their knowledge and skills but are not in position to attend the regular classes they being employed. For such students the orientation classes are organized by ITPI from the expert faculty. The Associateship Examination of ITPI is very rigorous and has been considered by the Board of Assessment for Technical and Professional Qualifications, set up by Government of India (1963) for the purpose of recruitment to superior posts and services under the Central Government, in the field of town planning. Many candidates, who have done Associateship Examination conducted by ITPI have even achieved the level of Director of Town Planning in various States.

ITPI registers qualified town and country planners (having Bachelor's Degree or Master's Degree in town planning from recognized schools by ITPI) as their Corporate Associate / Fellow members. At present there are over 7500 qualified town and country planners registered with ITPI. The profile of their members is regularly maintained by ITPI.

In the year 1985, ITPI energized its Centre for Research, Development, and Training (CRDT) to promote meaningful research, efficient documentation and relevant training.

ITPI made efforts to start undergraduate program in planning, as the same was imparted at postgraduate level. Accordingly, School of Planning and Architecture, Delhi was the first to start the undergraduate program in the year 1988. ITPI also prepared the Detailed Project Report (DPR) and made presentation to the erstwhile Planning Commission to start four Schools of Planning (May 2006) but Government of India started two Schools of Planning and Architecture – one at Bhopal and second at Vijayawada.

Institute of Town Planners, India is actively participating in the international activities / events, and is an active member of Commonwealth Association of Planners, President ITPI being Vice-President of Commonwealth Association of Planner. ITPI also created 'Women Planners Forum' and 'Young Planners Forum' under the umbrella of Commonwealth Association of Planners.

For making the students eligible as Corporate Associate and Fellow, the ITPI recognizes the courses of Schools of Planning, IITs, NITs, imparting town and country planning education in the country, these institutes approach voluntarily for recognition of their courses by ITPI since 1951-52. The courses of such institutions are recognized on the recommendation of the Expert Team of Educational Standing Committee of ITPI. At present there are 61 Institutes (includes institutes to which provisional recognition have been granted) whose Masters / Undergraduate courses have been recognized by ITPI.

ITPI publishes four quarterly refereed Journals and Newsletters, which gives information on latest technologies and techniques of plan preparation, implementation and enforcement, besides the important national and international events taking place related to urban and regional planning and development, which keeps the Corporate Associate and Fellow members of ITPI updated with latest information. Besides, organizes National and International Conferences on the themes of topical interest, attended by the Corporate Associate and Fellow members of ITPI. There are also certain incentives provided to the corporate Associate and Fellow of ITPI as mentioned in Section – 4 of this paper, which are not being provided even by the certain national level institutes.

Thus, it is quite clear that ITPI, since its inception in 1951-52 have been trying hard to establish town and country planning profession on a strong footing and for increasing number of town and country planners and registering them as Corporate Associate and Fellow members and to maintain quality in planning education recognizes Schools imparting town and country planning education to make their students eligible to become Corporate Associate / Fellow members which ultimately results in building urban planning capacity in the country.

## 4. IMPACT OF RECOMMENDATIONS OF ADVISORY COMMITTEE OF NITI AAYOG ON ACTIVITIES OF THE ITPI

The Advisory Committee of NITI Aayog on "Reforms in Urban Planning Capacity in India" gave 14 wide ranging recommendations, accordingly in this section of the paper; efforts have been made to assess their impact on the role and the activities of ITPI.

### 4.1 Planning of Healthy Cities

The Committee noted that Master Plans are statutory requirement and essential for socio-economic development, better livability, inclusion, citizen engagement,

environmental sustainability, and prevention of climate change risks. It is alarming that about 52 % of Statutory towns in India lack any kind of Master Plan. Covid – 19 has revealed the dire need for planning and management of our cities with thrust on health aspect; accordingly, a central sector scheme of '500 Healthy Cities Program' have been recommended by the committee. However, the committee also observed that for planning of Healthy Cities, by 2030; there is a need of convergence of multi-sectoral efforts at the intersections of spatial planning, public health, and socio-economic development.

This being the central sector scheme to be initiated by the Government of India, IPTI can assist in preparation of Guidelines of the scheme, and also participate in the implementation and monitoring of the scheme.

### 4.2 Advancement in Development Control Regulations (DCRs)

In many cities Development Control Regulations (DCRs) were formulated several decades ago and are often updated arbitrarily and therefore, it is recommended by the committee to initiate a sub-scheme of 'Preparation / Revision of Development Control Regulations' for all the cities / towns proposed under the 'Healthy Cities Program'.

As ITPI is very well versed with ground / field realities can prepare draft revised Development Control Regulations (DCRs) which are user friendly. However, to achieve the desired results it is necessary that this aspect is included in the agenda of reforms of Schemes / Missions of Government, and central assistance be released only when DCRs are revised by the State Governments / UTs.

### 4.3 Ramping up of Human Resources in Public Sector

Currently not even one planner is available per city or town in the States Town and Country Planning Departments, and accordingly the committee recommended States / UTs to expedite the filling up of vacant positions of town planners; and additionally, sanction 8268 posts of town planners to meet present requirement of town planners in States / UTs Town and Country Planning Departments.

This recommendation is a leap forward for strengthening the State Town and Country Planning Departments, however in addition to create additional posts of 8268 of town planners it is also necessary to fill up the existing 1657 vacant posts of town planners. But all these posts are required to be filled up by 'qualified town planners' only, otherwise there is every possibility that these posts may get filled up by the candidates who are not qualified town and country planner, there by affecting the quality of planning and development of our towns and cities, and qualified planners will be deprived of their legitimate posts. It may also be mentioned that issuing the advisory to the State Governments for filling up the vacant posts may not be enough because earlier also Ministry of Housing

and Urban Affairs issued the advisory (on 17th May, 2019; and 12th February, 2018), however, majority of vacant posts have not yet been filled up. It would therefore, be pertinent to tie up this aspect also with agenda of reforms, under the Schemes / Missions of Government of India and the central assistance be released only when the vacant posts of town and country planners are filled up with qualified town and country planners by the State Governments and UTs.

### 4.4 Ensuring 'Qualified' Urban Planners in Services

State Town and Country Planning Department face an acute shortage of town planners. This is compounded by the fact that in several States, ironically the qualification in town planning is not even an essential criterion for planner's job. Moreover, there is a tendency to consider architecture, civil engineering, urban design and urban planning as equivalent domain which is not correct, because all these are separate disciplines and professions (as mentioned in Section 2.2 of this paper). Besides hiring a professional from other disciplines, for the post of urban planning can lead to inefficiencies or in a worst-case scenario. It is therefore, recommended by the committee that states to undertake requisite amendments in their Recruitment Rules to ensure that essential qualification at the entry level positions of town planners at the State Town Planning Departments, Development Authorities, Improvement Trust and other departments is updated to accommodate Postgraduate Degree (M. Plan or M. Tech. Planning) or Bachelor Degree (B. Tech. or B. Plan) in Planning.

This aspect also needs to be tied up with reforms agenda, under the schemes / Missions of Government of India and release the central assistance only when the Recruitment Rules are modified by the State Government to ensure the entry of qualified town and country planners possessing M. Tech. / M. Planning or B. Tech. / B. Planning degree for the posts of town and country planners. ITPI should assist in drafting Model Requirement Rules, as ITPI is very much conversant with ground realities.

### 4.5 Mainstreaming Capacity Building

Most of Town and Country Planning Department do not have a dedicated capacity building cell, in spite of the fact that there is a need to regularly train town planning officials at various levels so that they can stay familiar with the latest technological advancements and their applications in urban planning, management and policy development. They should also get exposure to the 'good' practices and learning in the national and international context. Accordingly, Advisory Committee desired State Governments to make concerted efforts to ensure regular capacity building of their own planning staff and suggested that a suitable percentage of funds under AMRUT or other relevant missions be earmarked for this activity.

ITPI should also take lead in organizing short term capsule training programs through their Centre for Research, Development, and Training (CRDT) by involving expert and experienced faculty, to support the governments in this endeavor.

### 4.6 Rejuvenation of Capacity Building Institutions

The Committee recommended to strengthen existing centres of Excellence, established by MoHUA to act as light house in order to regularly build the skills and expertise of the urban functionaries.

ITPI may also be considered as one of the agency for training town planning staff as ITPI has been organizing training programs and orientation classes for Associateship Examination, besides CRDT is very well versed with the ground realities, accordingly ITPI should make efforts, and approach the concerned authorities.

### 4.7 Re-engineering Urban Planning Governance

The Advisory Committee recommends the constitution of a High-Powered Committee to re-engineer the present urban-planning governance structure, address clear division of roles and responsibilities among various authorities, appropriate revision of rules and regulations, etc.; creation of a more dynamic organizational structure, standardization of the job descriptions of town planners and other experts; and extensive adoption of technology for enabling public participation and inter-agency coordination.

ITPI needs to participate in the program of re-engineering the present urban planning governance structure, and provide the technical support to this program.

### 4.8 Revision of Town and Country Planning Acts

Most States have enacted Town and Country Planning Acts, which enables them to prepare, and notify Master Plans for implementation, which provides a fundamental basis to transform cities and regions. However, many of these Acts need to be reviewed and upgraded to the latest advancements in technology, urban and regional planning approaches and policies. Therefore, the formation of an Apex Committee at the State level is recommended to undertake a regular review of planning legislations.

In fact the first model Town and Country Planning Legislation was prepared by ITPI, which was discussed in the second Town and Country Planners Conference held on 2nd – 4th September, 1953 at Hyderabad. Besides, certain changes were suggested by ITPI in 'Model Urban and Regional Planning and Development Law' while preparing Urban Development Plans Formulation and Implementation (UDPFI) Guidelines (Volume 2A) for the Ministry of Urban Affairs and Employment, Government of India (1996), thus, ITPI should provide their inputs in promoting techno-legal regime in the country.

### 4.9 De-mystifying Planning and Involving Citizens

Planning process being highly technocratic in nature, the public participation in it is limited. While it is important to maintain the master plans' technical rigor, it is equally important to de-mystify them for enabling citizen participation at relevant stages. Therefore, the Advisory Committee strongly recommends a 'Citizen Outreach Campaign' program for 'de-mystifying planning and involving citizens' so as to make urban planning process more accessible.

ITPI is committed to have the public participation not only at the time of preparation of Master Plans / Development Plans but also during its implementation and enforcement, besides to make the Development Plans users friendly and easy to understand by all stake holders. Therefore, ITPI should participate in 'Citizen Outreach Campaign' program', actively.

### 4.10 Building Local Urban leadership

It is important to convey to the city leadership about the significance of urban planning as a tool to achieve orderly development, mobilize finances, ensure affordable housing, and make cities more economically productive, livable as well as inclusive. Therefore, the Advisory Committee recommends a Short-Term Training Program for city-level elected officials to make them aware about the economic and social benefits of urban planning' and also demonstrate that the spatial planning as a important catalyst for 'ease of doing business' and 'ease of living' and is useful strategy.

ITPI should associate and give their inputs in this short training program by their Centre for Research, Development and Training through their expert and experienced faculty / professionals as the training program focus on relevance of urban planning in improving life of citizens and productivity of the cities; spatial planning as a tool to create public open spaces, and benefits of integrated multi-sectoral planning at local, city and regional levels.

### 4.11 Enhancing Role of Private Sector

The Advisory Committee recommends that concerted measures must be taken at multiple levels to strengthen the role of the private sector to improve the overall planning capacity in the country, which may create gainful employment opportunities in the field and also suggested to take measures like adoption of fair process for procuring technical consultancy services, quality and cost based selection for procurements of consultancy and other services, strengthening project structuring and management skills in public sectors, and empanelment of private sector consultancies. The Committee also, recommends training and capacity building of all Town and Country Planning Department officials, including their administrative heads as well as lateral entrants, on project management skills, communication, project structuring, etc.

As enhancing the role of private sector in planning and development would encourage the involvement of qualified town and country planners, ITPI should make efforts to invite private sector to participate in planning activities and also shortlist the competent private sector consulting companies in the domain of urban planning in consultation with Chief Town Planners of States and UTs.

### 4.12 Strengthening Urban Planning Education System

Central universities and technical institutions in all the States / UTs of the Indian Himalayan Region may be encouraged to establish a 'Department of Planning and Public Policy' and offer postgraduate degree programs in planning with specializations in 'Hill Area Planning', 'Environmental Planning', 'Regional Planning', and 'Rural Area Planning'. All such institutions may synergize with the Ministry of Rural Development, Ministry of *Panchayati Raj* and respective State Rural Development Departments, Directorates and develop demand-driven short-term programs on rural area planning. It is also suggested to include planning as a discipline under the National Institute Ranking Framework (NIRF) of MoE to encourage healthy competition among the institutes. Beside, AICTE may retain the names of specializations based on industry requirements, while limiting them to an appropriate number, as 25 nomenclatures seem too high for market acknowledgment and absorption. Nonetheless, the names of the degrees should be limited to only two nomenclatures i.e. Bachelor of Technology in Planning, and Master of Technology in Planning, with their specialization in brackets. The institutions in the domain of planning education may identify prominent international and national institutes, and connect with them and sign MoUs for mentoring. Faculty shortage in educational institutions for conducting degree and Ph.D. programs in planning needs to be resolved in a time bound manner. In this regard, the Faculty Recruitment Rules, particularly of the centrally funded technical institutions, need to be reviewed and strengthened with suitable provisions. Besides, the faculties need to be encouraged to write and publish technical papers, which should be linked with their promotion so that quality improvement can be incentivized. The Committee also recommended that a deeper focus on the subject matter of economics may be brought in by the educational institutes while educating future planners.

ITPI, should take up these issues with all the 60 (recognized and provisionally recognized) Schools / Institutions / Universities and encourage and assist them to take up the action on the recommendations of the Advisory Committee. However, it needs to be noted that M. Planning and B. Planning are mostly adopted nomenclatures by majority of schools. Therefore, having the common nomenclature, would settle the confusion prevalent in the industry as recently it was observed that candidates possessing degrees with certain nomenclatures which were / are not prevalent were not even called for interviews. The

recommendations to initiate programs in planning with specializations in Hill Area Planning, etc., is welcome but there is a need to create posts / position in concern department so that such planner get employment, other wise such candidates may be placed at disadvantageous position, if they are not provided with employment avenues / opportunities.

### 4.13 Creation of National Digital Platform of Town and Country Planners (NDPTCP)

The creation of 'National Digital Platform of Town and Country Planners' (NDPTCP) within the National Urban Innovation Stack of MoHUA has been recommended by the committee so that it may function as marketplace for industry and work force.

ITPI maintains the record of their Corporate Associate and Fellow members (numbering over 7500) as a routing matter and has also created their profile. The same is been upgraded and updated time to time. These efforts are being made by the ITPI to maintain the record of their members specifically with respect to their qualifications, experience and specializations. Therefore, ITPI should collaborate with NDPTCP, in this endeavor of the government.

### 4.14 Constitution of a 'National Council of Town and Country Planners' (NCTCP)

The Advisory Committee observed that the planning profession is still largely mis-interpreted as an extension of other fields, which leads to inconsistent qualification criteria for jobs in public and private sector therefore, concerted action is required to bring in structure, professionalism and identity to the profession of Town and Country Planning and therefore, recommended a 'National Council of Town and Country Planners' (NCTCP) to be constituted as a statutory body of the Government of India. The NCTCP inter alia has following purpose, as per recommendations of the Advisory Committee:

- Ensure only qualified candidates enter services / posts / jobs of planning;
- Provide career counselling to young planners;
- Conduct skill-mapping of planners vis-à-vis the market demand biennially and make suggestions to institutions offering degree programs in urban planning and other related specializations; and
- Suggest to the All-India Board of Town and Country Planning Education about the requisite revisions in the curricula.

Out of the above 14 recommendations narrated above the Advisory Committee have some reservations only on the last two recommendations i.e. on the creation of 'National Digital Platform of Town and Country Planners' (NDPTCP) and

'National Council of Town and Country Planners' (NCTCP). In this reference as mentioned in section – 3 of this paper, ITPI undertakes professional; educational; research, documentation, and training activities; while a 'National Council of Town and Country Planners' a statutory body of Government as proposed to be created by Advisory Committee of NITI Aayog would mainly has the purpose mentioned above and therefore, there would not be any conflict of interest, as ITPI registers the qualified town and country planners as Corporate Associate / Fellow members of ITPI. The Corporate Associate / Fellow Members of ITPI are eligible to get certain incentives like; all the Corporate Associate and Fellow life members of ITPI are entitled to get benefit of Benevolent Fund created by ITPI under which the member gets the amount ten times of the fees they have paid, in case of any mishap or in case of acute ailment or after the demise of the member; they can participate in International, and National Conferences organized by ITPI, beside in the Annual National Town and Country Planners Conference held in different parts of the country every year; are also entitled to get a set of Technical Papers of National Conferences free of cost; for disseminating knowledge and skills and in order to inculcate the habit of writing research papers by members working as professionals / academicians and researchers, ITPI publishes four quarterly Journals since 1951-52 (without break) and four quarterly Newsletters giving the latest information on the events taking place in the profession and education which are circulated free of cost to all the Corporate Associate and Fellow members of ITPI; can participate in the activities of Commonwealth Association of Planners (CAP), without paying any extra fee, as their annual fee of CAP is paid by ITPI; Women planners can participate in "Women Planners Forum" and Young Planners can participate in "Young Planners Forum" created under the umbrella of Commonwealth Association of Planners (CAPs) by ITPI, without paying extra fee; can avail the facilities available (including Library and Hostel) at HQ., and at Regional Chapter Buildings located mostly in State capitals; ITPI organizes national seminars, conferences, workshops brain storming sessions and webinars, and expert talks of eminent persons, to disseminate the information and knowledge on the latest technologies of plan formulation, implementation and enforcement for the benefit of the Corporate Associate / Fellow members of ITPI in which ITPI members can participate; ITPI, also organizes Zonal Conferences in different Zones of the country, and the members from different Regional Chapters, located in a particular Zone can attend these Zonal Conferences, organized on the theme of topical interests. Such incentive are generally not provided by Institutes of national level, to their members.

In fact ITPI registers the qualified town and country planners as Corporate Associate / Fellow members and maintains their data (as is being done by other Institutes as well) for using it in house to make them members of various

Committees of ITPI like - Educational Standing Committee, Professional Standing Committee, Town Planning Examination Board, Research Committee; as a faculty for taking Orientation Classes of Associateship Examination after taking into consideration their qualifications, expertise, and experience. They can also be involved in the Research, Documentation and Training as and when required. Thus, the registration of qualified planners as Corporate Associate / Fellow of ITPI has totally different purpose than a 'National Council of Town and Country Planners'' (NDPTCP) and also different from "National Digital Platform of Town and Country Planners' (NDPTCP).

ITPI also recognizes the schools and institutions for making their students eligible to become Corporate Associate and Fellow of ITPI. Students from such recognized Schools by ITPI can have incentives and access to the activities and infrastructure of ITPI like: Students and teachers can participate in 'Annual National Town and Country Planners Conference' held every year since, 1951-52 (without any break) organized on the themes of national / international and regional importance; teachers from all the recognized institutions by ITPI can participate in the Networking Meetings organized every year by ITPI with all the Heads of Planning Department of Schools and also with the industry i.e. Town Planning Departments of States, to understand the emerging challenges of education and industry so that planning education can be reoriented accordingly; Students and teachers can write the research papers for National Town and Country Planners, Conference held every year, which are published as Technical Papers and circulated to all the members free of cost; Students from recognized schools / institutions can participate in the NOSPlan, student's events for which IPTI gives generous grants to NOSPlan - student's organization; Teachers and students of recognized schools / institutes by ITPI can avail the facilities and infrastructure (including Library and Hostel) of ITPI HQ and Regional Chapter Buildings of ITPI, located mostly in State capitals; Students from such institutes will be eligible for competing in National Best Thesis Award for Postgraduate students (Rs. 30,000/, Rs. 20,000/- and 10,000/- for 1st, 2nd and 3rd prize respectively and to and fro 2nd AC fair by Railway and free accommodation at National Town and Country Planners Conference and a certificate) and another National Best Thesis Award for Undergraduate students (Rs. 30,000/- and 20,000/- for 1st and 2nd prize and can avail other benefits available to postgraduate students); from current year "National Best Teachers Award of Planning" has also been instituted by ITPI for the teachers from recognized schools / institutes recognized by ITPI; Faculty from recognized schools, can participate in the "Women Planners Forum" created under the umbrella of Commonwealth Association of Planners; and Students from recognized institution by ITPI can participate in 'Young Planners Forum' of Commonwealth Association of Planners (CAP) activities.

Besides, the Associateship Examination is being conducted by ITPI for the candidates, who are interested in upgrading their knowledge and skills but are not in position to attend regular classes (which is approved, in 1963 by the Board of Assessment of Technical and Professional Qualification, setup by Government of India) for superior posts in central government.

Thus, it can be observed that above functions of ITPI will not jeopardize the functions of National Council of Town and Country Planners (NCTCP) and will also not clash with the creation of 'National Digital Platform of Town and Country Planners' (NDPTCP).

## 5. CONCLUSIONS

Observing the grim condition of planning profession and education during 1951-52, as the profession of planning was not well-established and Town and Country Planning Departments in majority of States did not exist, neither there was a single School of Planning for training Town and Country Planners in the country, 13 Town Planners who studied abroad formed the Institute of Town Planners, India. Accordingly, to improve the prevalent condition at that time, the ITPI prepared Model Town and Country Planning Law, which was adopted by a majority of States with slight modifications to suit their local conditions. In addition, these planners made good efforts to establish the Schools of Planning. As a result School of Planning, Delhi was established in 1955, which after merger of Architecture Department of Delhi Polytechnic became the present School of Planning and Architecture in 1959. Due to hard work and untiring efforts of founder members of the ITPI, today we have over 7,500 qualified town and country planners and over 60 planning schools recognized by ITPI, imparting town and country planning education in the country. Thus, it needs no emphasis to mention that for improving grim condition prevailing during 1951-52, and initially building urban planning capacity in India, the credit goes to Institute of Town Planners, India.

However, there is not denying the fact that recommendation of Advisory Committee of NITI Aayog will go a long way in enhancing urban planning capacity in India, provided the recommendations of the Committee are implemented in the spirit in which they are conceived and all the stakeholders are taken on the board, specifically, the creation of additional posts of 8,268, town and country planners and filling up of the existing vacant posts of 1,657, town and country planner in the State Town and Country Planning Departments by the qualified town and country planners; and changing the Recruitment Rules for making provision for absorbing qualified town and country planners in the State Town Planning Departments. Issuing advisories to state governments so far has not yet brought the desired results. Therefore, it would be appropriate to include these aspects in the Reforms

Agenda of the present missions and schemes of the government and financial assistance be released only when the required actions are taken by the state governments local bodies.

Thus, it is clear that the ITPI is responsible for building and elevating urban planning capacity in India both of town planning profession and education since 1951-52. Therefore, the activities being carried out by ITPI (as mentioned in section - 3 of this paper) will not hinder the work of the proposed 'National Council of Town and Country Planners' (NCTCP) and also NDPTCP. In fact, the similar situation was prevalent when 'Council of Architecture' (CoA) was created under Architects Act, 1972 as Indian Institute of Architects (IIA) was existing since 1917. Today, both these bodies are working in tandem without jeopardizing the each other's work since 1972. In a similar manner NCTCP and ITPI can exist without any conflict in their functions as clarified in section 4 of this paper because the ITPI is registering qualified town and country planners as Corporate Associate and Fellow members of the ITPI and also recognizes institutions imparting town and country planning education in the country to make their students eligible for becoming Corporate Associate and Fellow members of ITPI. In addition, the ITPI also undertakes professional, educational and research, documentation and training activities since its inception in 1951-52.

However, it is important to mention that only qualified town and country planners need to be inducted as members in the NCTCP, because if non-qualified town planners are inducted in NCTCP, there will always be a conflict of interest. Beside adequate representation is required to be given to the ITPI in NCTCP to ensure that persons not having town and country planning qualifications do not enter into NCTCP or practice as town and country planners, in the country.

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# Challenges and Opportunities for Re-imagining India's Urban Futures through Smart Cities

**H. S. Kumara, Ph.D.**

**Abstract**

*Re-imagining India's urban futures should not be limited only to population size but must also encompass governance, planning and management. Digital solutions are only one part of the planning tool kit for making a city great. Smart technologies on their own cannot solve all planning problems because city governments have a dual role to play. They have to execute intelligent solutions as well as orchestrate and enable evolution of broader ecosystems. There is a need for major urban infrastructure initiatives to encourage more compact, efficient urban forms, in part by removing biases against compact forms. Given the scale of India's anticipated urban growth, there are immense challenges but also tremendous opportunities to get India's urban process right, robust, resilient and inclusive. On the other hand the digital revolution is offering an unprecedented window of opportunity to improve lives of millions of urban residents. However, there is no guarantee that the rapid diffusion of new technologies will automatically benefit citizens across the board.*

## 1. INTRODUCTION

Global urbanization rate are alarming very rapidly. The proportion of people living in the urban areas is increasing continuously. Across the globe, cities account for most of our carbon emissions and energy use. While cities cover 3 per cent of the earth's land surface, but create more than 70 per cent of all carbon emissions, mainly from buildings, energy and transport. They also consume 78 per cent of the world's primary energy. Currently, 54 per cent of all people live in cities – a percentage that is projected to rise to 68 per cent by 2050 (*UNDESA, 2019*). As the population grows, so does new construction, resulting in even higher energy consumption and carbon emissions. For the world's growing urban populations, the "new normal" must mean better and sustainable places to live and work, and ways to travel, for all – not just a privileged few *(Barbara Norman and Peter Newman, 2021)*[1]. Cities can use the plan to make more "inclusive, resilient, sustainable, and safe" settlements, as SDG - 11 requires (*SDG, 2030*).

The India's urban population reached about 420 million or 33 per cent of its total population in 2015. This is expected to almost double to 800 million by 2050, with close to 400 million more people living in towns and cities by 2050, one in every two Indians. By 2031, 75 per cent of India's national income is expected

1 *https://www.urbanet.info/reimagining-cities/*

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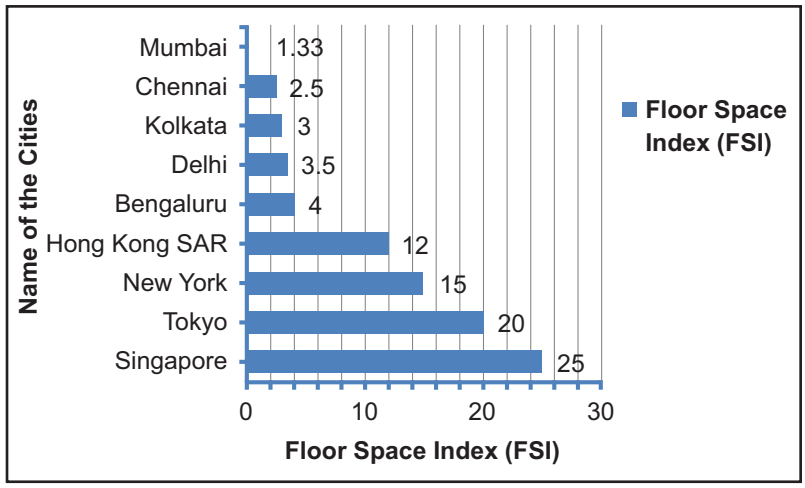
to come from cities and the majority of new jobs will be created in urban areas (Tewari, M., Godfrey. N., et al ). In 2020, the most crucial problems witnessed in India's urban sector were the growing informality - in the form of slums and unorganized economic activities - along with violations of development norms, deterioration of air and water quality, depletion of natural resources, traffic and transportation inadequacies, mismanagement of solid and liquid waste, erratic electricity supply, waterlogging, loss of heritage and culture, lack of rural-urban integration, growing intolerance, and violence and crime (Rumi Aijaz, 2021).

Government of India's call for re-imagining urban planning and development to make cities and towns healthy and livable is laudable. Metropolitan cities are engine of economic growth. But they strived by unplanned or inadequately managed urban spatial expansion, in combination with unsustainable production and consumption patterns and a lack of capacity of public institutions to manage urbanization, can impair sustainability due to urban sprawl, pollution and environmental degradation. One of the challenges for Indian cities is retrofit development; re-zoning and re-densification of old part of the cities with smart technologies.

## 2. PERMISSIBLE FLOOR SPACE INDEX (FSI) IN SELECTED CITIES

Due to rapid urban transmission in Indian mega-cities such as Mumbai, Delhi, Bengaluru, Kolkata, and Chennai, etc., there is a challenge for spatial planners, policy makers and bureaucrats to decide densify and build cities vertically or go horizontal by forcing their residents to move out. This is often accompanied by the building up of the vacant lands as well as densifying the plots within the city. Existing land use regulations and land market institutions play a powerful role in reducing the efficiency of land use in Indian cities. The six major urban agglomerations – Delhi, Mumbai, Kolkata, Bengaluru, Hyderabad and Chennai – had about 74 million inhabitants in 2011. Cities are continuously expanding in terms of geographical spread consuming agricultural lands for urban use. Presently, the major impact of current land regulations, such as overly restrictive Floor Space Indexes (FSI) or Floor Area Ratios (FAR) that promote low density in the amount of built-up floor space per unit of land area, especially in urban cores where there is high demand. The FSI is very low in Indian cities comparing with other global cities (Fig. 1).

**Fig. 1: Floor Space Index in Selected Cities**



## 3. RE-IMAGING URBAN FUTURE IN SMART CITIES IN INDIA

The present urban challenges are climate change, population growth, demographic change, urbanization and resource depletion imply that the World's great cities need to adapt to survive and thrive over the coming decades. There is an increasing interest, therefore, in the role that information and communication technologies could play in transforming existing power-hungry metropolises into low-carbon cities of the future (Box 1). The Government of India have selected 100 cities,

**Box 1: Will Smart Cities Be Equitable Cities?**

For more on migration, integration, and the role of cities, see People on the move: Global migration's impact and opportunity and Europe's new refugees: A road map for better integration outcomes, McKinsey Global Institute, December 2016. A smart city is not automatically an equitable city unless its leaders take care to make it so. Some critics assert that the entire push to make cities smart is mainly about making life more convenient for the affluent. Young and digital-savvy populations are natural users of these technologies, but older and poorer demographic groups on the wrong side of the digital divide may be left out of the benefits - and left, feeling that they have little say in the direction their city is taking. But cities cannot be truly smart without broad adoption. Being inclusive is not only a social goal but also a driver of results, since the benefits of smart systems multiply as more people use them.

Several global agencies efforts are under way to create standards and guidelines for inclusive city design, such as the Smart Cities for All tool kit launched in 2017 by G3ict, an initiative launched by the UN Global Alliance for ICT and Development. The initiative proposes global standards on digital inclusion, a model procurement policy drawing on international accessibility standards, and a database of smart technology initiatives bridging the digital divide.

Source: McKinsey Global Institute (MGI) (2018)

under the Smart Cities Mission which aims to develop cities that provide core infrastructure and apply 'smart' solutions to give its citizens a decent quality of life, and a sustainable environment. The Smart Cities Mission has been allocated Rs. 6,450 crore in 2021-22, which is an annual increase of 42 per cent over the actual expenditure for 2019-20 (Table - 1).

**Table 1: Status of Smart City Projects as on January, 2021 (Rs. in crore)**

| Project status | No. of projects | % of projects | Cost | % of cost |
|---|---|---|---|---|
| Total Proposed | 5,151 | - | 2,05,018 | - |
| Tendered | 788 | 15% | 35,309 | 17% |
| Work orders issued | 2,441 | 47% | 1,06,187 | 52% |
| Completed | 2,187 | 42% | 35,413 | 17% |

*Sources: Unstarred Question No. 1020, Ministry of Housing and Urban Affairs, Rajya Sabha, February 10, 2021; PRS.*

A smart city should enable every citizen to engage with all the services on offer, public as well as private, in a way best suited to his or her needs. The emerging patterns for smart cities are reform linked program with GIS, GPS, GPR planning, cloud computing, big data analytics and virtual studio with computerized data center, etc. Smart cities are envisioned to have sustainable infrastructure to enhance residents' comfort at the same time ensuring environmental safety. Smart city prioritizes transportation and accessibility, enhances social services and sustainability, and allows its residents a voice. The most important goals of a smart city are to enhance coverage efficiency, lessen waste and inconvenience, enhance social and financial quality, and maximize social inclusion. But Smart city is not a tailor-made solution, it needs to capture any regions and its citizen's aspirational goals. It has to access the needs and respond to the diversity of socio-cultural- environmental aspects.

## 4. CHALLENGES AND OPPORTUNITIES FOR RE-IMAGING URBAN FUTURE IN INDIA

4.1 The challenges for re-imaging India's urban future thorough smart cities are described below, in brief:

### 4.1.1 Technology for Urban Development

A digital revolution currently underway and technology permeates, touches every aspect of our society including urban planning and development. Currently, under the Smart Cities Mission (SCM) 100 cities are under implementation stage. The mission aims "to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to smart outcomes. Few biggest technology challenges that are shifting economic landscape in urban areas are - Artificial Intelligence, IOT, Block Chain, Cyber security, Machine learning and Building automation, etc., and these smart applications are playing very important role in re-imaging urban futures in Mega cities in India.

### 4.1.2 Future Mobility

The challenges of future mobility in re-imaging urban India mainly focused with electrical vehicles, public transit, NMT, public bike sharing, rapid rail system, etc. Vehicle plays a vital role in our economic and social prosperity. Urban transport emerges as one of the chief contributors to the high-carbon growth associated with India's urban centres. Road Transport is the largest $CO_2$ emitter in transportation sector. Smart city technologies can stretch transit investment, helping cities get more out of their existing assets or embedding intelligence into expansions and new assets. Adding IoT sensors to existing infrastructure can help crews perform predictive maintenance on equipment, fixing problems before they turn into breakdowns and delays.

The National Urban Transport Policy of India, 2006 clearly lists out the role of NMT as a last mile connector for the urban transport systems and as an independent mode for short distances (NUTP, 2006). Cities are being designed in a way that amenities and most services are within a 15 minute walking or cycling distance, creating a new neighborhood approach. Cities work towards offering digital, clean, intelligent, autonomous and inter-modal mobility, with more walking and cycling spaces, where transport is commonly provided as a service. The Ministry of Housing and Urban Affairs, Government of India has already come up with various initiatives such as 'transport4all', 'cycle4change' and 'streets4people', etc.

#### 4.1.3 Urban Infrastructure

Cities around the world face daunting infrastructure challenges, but smart city technologies change the nature and economics of infrastructure. Technology reduces the physical and transaction costs of gathering information on usage patterns. Smart city applications become more effective when paired with low-tech measures and complementary policy moves. The challenges are Network, 5G, Utilities, Energy - solar power, Smart Lighting, etc., and calls for investment in infrastructure – physical, energy, digital and telecoms – that supports effective transformation.

#### 4.1.4 Community Development

Social inclusion should be a key pillar of urban growth and development for the cities of the future, bearing in mind the three building blocks identified by World Bank: spatial inclusion (providing affordable housing, water and sanitation), social inclusion (expanding equal rights and participation) and economic inclusion (creating jobs and offering citizens opportunities for economic development). Many digital tools now exist to help residents engage with their government, access job training and opportunities, and make personal connections with one another. These areas have great possibilities for creating a sense of belonging in the impersonal environs of a city, but they are relatively underdeveloped. Unemployment is also a loss of productive potential. Recent data suggests that unemployment rose to 6.1 per cent in 2018. The self-sustainability, employability and governance at community level playing very crucial role in re-imaging India's urban future.

#### 4.1.5 Safety and Security

Cities are leveraging artificial intelligence (AI) to ensure safety and security for their citizens while safeguarding the privacy and fundamental human rights. Employment policy, funding and governance - cities strive to promote awareness of the importance of data privacy and preparedness for the impact of cyber-attacks since data will be an important city commodity. The various data flows and exchanges between network components and the IoT should be subject to

effective risk management in assessing and responding to threats within smart cities. There is challenge for big data analytics and management in smart cities are comprised of a significant number of different sensors, interaction devices, network access points, specialized hardware and software.

4.2 The opportunities for re-imaging India's urban future through smart cities are described below,+ in brief:

- Smart city technologies can make daily commutes faster and less exasperating. Cities that deploy smart mobility applications could cut commuting times by 15–20 per cent an average;
- Using technology to transform urban environments in a more meaningful way will require new thinking about governance. Technology is as effective as the entity that puts it to work only;
- To adopt right pattern of urban development for drawing on urbanist principles, such as better land-use, urban design, transport planning, and housing policies and practices, will make the vision of net zero carbon cities much easier to realize – requiring fewer EVs, heat pumps, building retrofits, batteries, and solar panels to achieve the same result;
- The opportunity is to create a net-zero integrated energy system in cities. This system can seamlessly facilitate near-constant interactions between energy infrastructure, buildings and electric vehicles;
- Clean electrification makes the entire systemic efficiency concept ignite, moving the biggest energy-using sectors in cities – buildings and mobility – to the electricity vector, while supporting the development of renewable; and
- The combination of efficiency, clean end-use electrification, active energy management, integrated design and digital technologies can significantly reduce building energy consumption and emissions.

## 6. CONCLUSIONS

The discourse on re-imagining India’s urban future should not be limited only to population size but must also encompass governance, planning and management. Digital solutions are only one part of the full tool kit for making a city great. But they are the most powerful and cost-effective additions to that tool kit in many ways. Smart technologies on their own cannot solve all the planning problems like severe housing shortages, or the absence of fundamental infrastructure and essential services. City government has a dual role to play. It has to execute some intelligent solutions on its own, and it has to orchestrate and enable the evolution of a broader ecosystem. There is a need for major urban infrastructure initiatives to encourage more compact, efficient urban forms, in part by removing biases against compact forms. Given the scale of India’s anticipated urban growth, there are immense challenges but also a tremendous opportunity to get India’s urban process right to enable a more robust, resilient and inclusive

prosperity. On the other hand the digital revolution is offering an unprecedented window of opportunity to improve lives of millions of urban residents today and tomorrow. But there is no guarantee that the rapid diffusion of new technologies will automatically benefit citizens across the board.

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# Integrating Urban Villages in Spatial Planning: An Overview of Transformation of Rural Villages to Urban Villages: A Case Study of Delhi

**Shanu Raina; and Shaila Bantanur, Ph.D.**

**Abstract**

*Rapid pace of urbanization of the capital city Delhi has led to engulfing of various rural villages to urban villages. Once declared "urban" these villages go through spatial, social, economic and environmental transformations. Villagers traditionally have lived on agriculture and agriculture-related activities. The situation has changed with large scale acquisition of their lands by Delhi Development Authority for planned development of Delhi. With loss of their fields and farms and space for agriculture-related activities, the villages lost their traditional ambience. Agricultural labor class is the most affected by these transformations. Population in the urban villages has increased due to in-migration, thereby resulting in residential pockets of high density, poor infrastructure and public amenities. This paper firstly discusses the concept of urban villages in Indian scenario. Secondly, the stages and process of transformations in these rural areas to urban villages are analyzed. In the process of urbanization, the shift of rural to urban results in various transformations such as loss of agricultural land and adoption of different urban occupations. The main aim of the paper is to study the various planning policies as contained in the Master Plans for Delhi and their role from the last 75 years in shaping the current spatial planning of urban villages.*

## 1. INTRODUCTION

With close to 29 million residents, the National Capital Territory (NCT) is set to overtake Tokyo as most populous region in the world. Within the nation, Delhi has the highest population density of 11,320 persons per sq km (Census, 2011). Delhi covers an area of 1,483 sq km, of which 369.35 sq km (Table - 1) is designated as rural and 1,113.65 sq km as urban, which makes it the largest city in terms of area in the country (ESD, 2020). Over the last few decades, rapid population growth and shift in urban-rural land use share within and around NCT's metropolitan region has dramatically impacted the existing village settlements which remain under serviced.

Growth in the urban area during 2001-2011 was observed at 20.44 per cent. This pace of urbanization has reduced the number of villages in Delhi from 300 in 1961 to 165 in 2001 and 112 in 2011. The number of urban villages has increased from 20 in 1961 to 135 in 2011. The number of census towns has increased from 3 in 1971 to 29 in 1991 and 110 in 2011. Thus, more and more villages of Delhi are being declared as census towns in each successive Census, resulting in decreasing rural population and rural areas in Delhi (ESD, 2020).

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**Table 1: Rural and Urban Area of Delhi during 1981-2011**

| S. No. | Classification of area | 1981 | | 1991 | | 2001 | | 2011 | |
|---|---|---|---|---|---|---|---|---|---|
| | | sq km | % | sq km | % | sq km | % | sq km | % |
| 1 | Rural | 891.10 | 60 | 797.66 | 53.79 | 558.32 | 37.65 | 369.35 | 24.90 |
| 2 | Urban | 700.23 | 47 | 685.34 | 46.21 | 924.68 | 62.35 | 1113.65 | 75.1 |
| 3 | Total | 1483 | 100 | 1483 | 100 | 1483 | 100 | 1483 | 100 |

*Source: Census of India 1981,1991, 2001, 2011*

## 2. RURAL VILLAGES OF DELHI

Villages falling in the Rural Use Zone that have not been notified under Section 507 of DMC Act nor any change of land use declared under the DDA Act, 1957 are termed as Rural Villages. Here the traditional revenue records like *Khasra Khatouni* (*Khasra* is the unit number assigned to a specific plot of land and *Khatouni* is record of ownership and other details like area, record of mutations, etc.), *Shijra* (map of the Revenue Estate), *Jamabandi* (record of ownership and of possession under the East Punjab Act), etc. are maintained by the Revenue Department of Government of NCT of Delhi (DDA, 2007). Population size, population density in built-up areas, infrastructure characteristics, administrative boundaries and predominant economic activities are the main variables conventionally used to distinguish rural from urban (Tacoli, 1998). The characteristics of rural villages are similar to other parts of rural India in terms of spatial structure and socio-economic characteristics of households (Ahmad, 2011). As per Census 1951, there were 304 rural villages in Delhi with the population of 3.07 lakh (18 per cent) of the total population of 17.44 lakh. Subsequently in the Census 2001, the number of rural villages decreased to 165 with the population of 9.45 lakh (6.82 per cent) of the total population of 138.51 lakh. Further in the Census 2011, the number of rural villages reduced to 112 with the population of 4.19 lakh (2.50 per cent of the total population of 167.88 lakh). The total area of Delhi is 1,483 sq km, out of which 558.32 sq km was rural area as per Census 2001. Now as per Census 2011, the rural area is 369.35 sq km i.e. 24.91 per cent (Anon., 2020).

## 3. DEFINITION, AND CHARACTERISTICS OF URBAN VILLAGES

Land earmarked for village *abadi* and agricultural land of a village were duly demarcated in the land settlement of 1908-09 and the *abadi* site was circumscribed in the village map in red ink. That is how it came to be commonly known as *Lal Dora*. The land falling within *Lal Dora* is not assessed for land revenue. Those falling outside the village *abadi* (*Lal Dora*) are meant for purposes connected with agriculture and are subject to land revenue (DDA, 2007).

An urban village can be defined as a village which has acquired urban characteristics due to reduction in its agricultural base by the process of acquisition of land holding for public purpose or by its transformation into residential or industrial colonies

(Tyagi, 1982). An urban village is an erstwhile rural village that is enveloped by a city while retaining distinct social and morphological characteristics and is a pervasive feature of cities that urbanize in a densely populated countryside (Leaf, 2011). Rapid urbanization in India and China has led to formation of hundreds of such urban villages each (Leaf, 2002).

Urban villages are not merely remnants of the old village core but indicate a complex assemblage of uses that emerges as villages transform both their built and un-built land (Oostrum, 2020). These urban villages are characterized by high growth rate, high density, over population, unplanned buildings and infrastructure shortage (Kumar, 2018).

## 4. STAGES OF TRANSFORMATION IN URBAN VILLAGES

Stages of transformation of urban villages in Indian scenario (Chattopadhay, 2014) include:

- Stage 1: Villagers face a problem of acquaintance with the new change in occupation and livelihood triggered by acquisition of their agricultural land.
- Stage 2: A process of adaptation in terms of alternate livelihoods, new structures, and change in land use; and
- Stage 3: Renewal and Reconstruction.

Distinctive characteristic of the peri-urban interface is that social groups are heterogeneous and in constant transition. That is to say, the composition and interests of these groups tend to change over time, in a process characterized by the fluctuating incorporation of new stakeholders (Allen, 2003). Lack of suitable checks for encroachments of buildings onto streets. Construction of rental accommodation becomes a driving force for physical changes that take place in the village (Singh, 2018). Transformation process consists of social differentiation and diversification of livelihood strategies among farmer households in the community, and more importantly, though having temporarily attained higher living standards, many farmers still feel their livelihoods are not sustainable because they lack work (Suu, 2009).

With loss of their fields and farms and space for agriculture-related activities, the villages lost their traditional ambience. The villagers, restricted within the confines of *Lal Dora*, lost their age old traditional agricultural-cum-cattle based livelihood. Whatever little they got as one-time lump-sum monetary compensation for their acquired lands, did not last long (DDA, 2007). Once agrarian settlements have now given to the market forces of the surrounding planned development leading to haphazard growth, illegal and unsafe construction activities, absorbent land value, gentrification, lack of open spaces, insufficient infrastructure, degradation of environment and overall, in some cases slum like conditions (Raina, 2018).

## 5. CHALLENGES OCCURRED DUE TO TRANSFORMATION OF RURAL VILLAGES TO URBAN VILLAGES

Jawaharlal Nehru in Ravi Kalia's book "Chandigarh: The making of an Indian City" writes: "The fundamental problem of India is not Delhi or Calcutta or Bombay but the villages of India. We want to urbanize the villages, not take away from the people the villages to the towns. However well we may deal with the towns, the problems of the villages of India will remain for a long, and any social standards that we seek to introduce will be judged ultimately bot by what happens in Delhi but in villages of India". The villages were not looked as an opportunity rather as threat or a problem, in the way of development. The city, or more properly the "urban", has had a fugitive existence in the political, cultural, and sociological imagination of modern India (Nair, 2005).

In the process of urbanization, the shift of rural to urban results in various transformation such as loss of agricultural land and adoption of different urban occupation. Agricultural labour class is the most affected by the transformation. Population in the urban villages increases due to in-migration, there by resulting in the residential pockets of high density, poor infrastructure and public amenities. The Delhi Master Plan (MPD), 2001 permits a density of 450 persons per hectare, but the density in Masoodpur urban village is as high as 1,100 persons per hectare (Begum, 2005). Land values became the sole consideration leading to unauthorized construction and encroachments. Change in land use i.e. residential to industrial and commercial also takes place. Division and sub-division of property leading to more built-up area and lesser open spaces. The architecture character of the buildings is lost and results in gentrification of the buildings. Since building byelaws prevalent in the rest of the city are not equally applicable to urban villages, much of the new construction come up in violation of the existing regulations (Committee, 2007). Urban sprawl and growth of the city impacts many nucleated settlements that were originally dependent on agriculture by an urban way of life as a result, the dependency diverts to urban activities for survival (Chattopadhay, 2014). An urbanizing village reflects the natural process of transformation of a human settlement from one economic order to another and one way of life to another. Thus, socio-economic and morphological changes gradually and naturally (Mehra, 2005).

## 6. PARAMETERS FOR ANALYZING TRANSFORMATIONS IN URBAN VILLAGES

Cities are expanding and in the course of development nearby villages get engulfed within urban boundaries. Certain degree of the transformation takes places in all the village settlements soon after the land acquisition phase. The three biggest expressions of transformations have been studied in detail, and are discussed bellow:

### 6.1 Land Use Change is the Biggest Expression of Development

The changing urban land-use played an important role in bringing about transformation in the economic and social structure of these urban villages

themselves. This is because originally these villages were 'the spatial embodiments of certain social systems with their ceremonies, rituals, festivals, social networks, institutions and family life resulting in the continuity of communities providing security, stability and diversity of human experience' (Jain, 1990).

The high number of uncontrolled settlements in Delhi is a result of the increased gap between the demand for and supply of land, housing and allied infrastructure. On one hand, Delhi's explosive population growth and rapid urbanization have accelerated demand, while on the other, the public monopoly on the supply of urban land has reduced the supply of serviced land (Ahmad, 2011). The mega cities already suffer from the shortage of developed land supply which leads to skyrocketing land costs, skewed real estate market, exorbitant rentals, and lack of access to land for economically weaker sections and migrants. The delivery of developed urban land is not only sluggish but its high cost makes it unaffordable. The inability of urban areas to develop huge amount of land rapidly results in pressure on surrounding rural lands, which meet the lower end market demand. People who cannot afford to live in urban areas move to fringe areas and villages beyond.

### 6.2 Economic Changes

With land acquisition village people lost their traditional agricultural and allied occupations. In this expansion of the city's economy, they did not fit in squarely as they had neither general education nor vocational training. Villages are no more self-contained, self-sufficient entities. The expectation that rural areas would concentrate on primary activity, too, has been belied by events as the occupational profile has tilted in favour of secondary and tertiary sector employment at the expense of the primary sector in Delhi rural areas. A sizeable percentage of people make a living not by farming, dairying or pursuing traditional village crafts but as city labour. Migrant workers are usually from rural areas of the country and they find the village life in these settlements more suitable than the urban life style in surrounding areas (Singh, 2018). Many village products bear little relation to the needs of the villagers but cater to urban needs. Rising land values and economic opportunity has brought affluence to some while widening the economic gulf between the economic strata. Developing premises for urban tenants and godowns for commercial organizations is a major economic activity.

### 6.3 Social Changes

The new trend has also been steadily undermining the homogenous character of the village society. Traditional affinities and relationships do not count for much. The village institutions have eroded and there is a steady disintegration of their well-knit *abadis* and their social fabric was shattered.

The close-knit village community is now playing host to displaced migrants from urban Delhi and elsewhere, displaced squatters, relocated slum dwellers and

**Table 2: Delhi has 352 Villages out of which 214 are Urban Villages and 138 Rural Villages**

| | | |
|---|---|---|
| i | 1908-1909 | • Revenue Settlement was done for the first and last time when the *Lal Dora* areas were defined (Committee, 2007). |
| ii | 1948 | • East Punjab Consolidation and Prevention of Fragmentation Act – to consolidate agricultural holdings. |
| iii | 1951 | • Above Act was extended to Delhi |
| iv | 1951-1954 | • 102 *Lal Dora* villages (DDA, 1962). were there |
| v | 1954 | • Delhi Land Reforms Act enacted, later amended to allow extension of '*abadi*' areas for amenities like health facilities, religious buildings, physical infrastructure, landscaping and open areas. Extended area demarcated by new boundary called '*phirni* (Jain, 1990)'. |
| vi | 1957 | • Agricultural land was acquired from the villagers at the rate of Rs 3000/acre.<br>- Subsequently the rates were revised over the years. In the initial years, the villagers were also given a residential plot of 400 sq m area and one family member was given a government employment.<br>- With time the area of the residential plot was reduced to 250 sq m and the practice of giving employment was discontinued.<br>- The villagers were then assured that the development of 'urbanized villages' would be integrated with the surrounding urban areas but no such planned developments took place though some isolated efforts were made (DDA, 2007).<br>• Delhi municipal Corporation Act kept *Lal Dora* areas out of purview of building byelaws. |
| vii | 1961 | • The Master Plan of Delhi, 1961 used the expression "urban village" in a special sense to designate the cluster of villages chosen on the fringes of urban Delhi to relocate certain small industries with village- like character, e.g. pottery, hand-loom weaving, tanning, rearing milch cattle (DDA, 1962). |
| viii | 1963 | • Delhi Administration Notification stating residents constructing houses within the Lal Dora areas need not avail building permission, subject to certain limitations like only residential use, maximum height two and half stories etc.<br>- This order however, debarred the construction of factories; warehouses slaughter houses, etc., within *Lal Dora*.<br>• 139 villages were notified as urban. |
| ix | 1977 | • Ministry of Urban Development issued order pertaining to regularization of unauthorized colonies.<br>• This order was extended to *Lal Dora* as well. |
| x | 1979 | • A committee was entrusted with the task of formulating Perspective Plan (1980-2004).<br>• A circular stated that as of August 2004 Byelaws be applicable to *Lal Dora* areas and action be taken on those buildings which were constructed after August 23rd, 2004 (DDA Notification). |
| xi | 1983 | • Delhi Development Authority Building Byelaw stated Construction in *Lal Dora* areas are not required to obtain completion certificates or fire safety certificates before occupying buildings. |
| xii | 1994 | • 14 villages were urbanized. |

| | | |
|---|---|---|
| xiii | 2006 | • Municipal Corporation of Delhi reconsidered the same on the basis of Standing committee's resolution dated 27th August 2006 approving an individual's request to not withdraw the 1963 notification. |
| xiv | 2011 | • Notification for building bye laws for urban villages was issued. |
| xv | 2017 | • 89 more villages engulfed in urban limits of Delhi.<br>• Master Plan Delhi 2021 laid down norms for these villages to be governed by special regulations.<br>- For villages notified as urbanized, any construction has to be carried out in conformity with the building by-laws of the local bodies and Master Plan of Delhi, 2021.<br>• Land Pooling Policy covers the greenfield areas in 5 zones — J, K-1, L, N and P-II under the MPD, 2021.<br>• Under the Land Pooling Policy, 60% of pooled land would be returned to owners after infrastructure development,<br>- if the pooled land is 20 ha and above and 48%,<br>- if the land pooled, is between 2-20 ha. of the 60% of returned land,<br>- 53% will be for residential, 5% for commercial use and 2% for public and semi-public use.<br>• Delhi Village Development Board (DVDB), to look after civic works in both rural and urban villages in the National Capital.<br>• The DVDB to look after construction of approach roads, link roads, village roads, development of ponds and water bodies, development of cremation grounds, parks and other facilities (ESD, 2020 - 21). |
| xvi | 2017 - 19 | • The Delhi government has declared the 174 villages as urban areas (MCD, 2019).<br>• The 95 urbanized villages were transferred to DDA in 2017, and in 2019,<br>• The Delhi government urbanized another 79 villages and brought it under DDA (DDA, 2019). |

relocating industrial workers with little roots in the village. The proximity of the metropolis, the all-pervasive effect of the television and other media has planted urban aspirations in the rural mind set leading to an accelerated departure from traditional values.

## 7. CONCLUSIONS

Urban Villages of Delhi were totally missed in the first Master Plan of Delhi, (MPD) - 1981. It was only in 1980s that the unplanned haphazard growth of these urban villages caught attention of authorities. The basic anomaly in the process surfaced in the way the land in villages was taken away which deprived the villagers of their basic source of livelihood and also created a sense of directionlessness in the village economy (Mehra, 2005). Village Development Plans which were to be a part of Master Plan for Delhi (MPD) - 2021 were not completed, which are now excluded from the Master Plan for Delhi, (MPD) - 2041. Planning process for these villages has never been participatory. These urban villages could not be planned and spatially integrated with the existing planned fabric of the city.

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# Resiliency of Indian Cities

**Sudhir Singh Chauhan; and Gurpreet Kaur**

**Abstract**

*This paper highlights that in India there is a lack of planned environment with respect to desired goals and strategies which has been demonstrated amply by COVID-19 pandemic which have significantly distorted urban life. Therefore, the authors pleaded that urban planners and policy makers engaged in spatial planning and management needs to consider how "people-oriented" principles could be incorporated into spatial-planning systems to reduce the negative impacts on both cities and people.*

## 1. INTRODUCTION

Urbanization refers to the population shift from rural to urban areas, the corresponding decrease in the proportion of people living in rural areas, and the way in which societies adapt to this change. Natural increase of population, rural to urban migration is driven by pull factors (that attract people to urban areas) and push factors (that drive people away from the rural areas), employment opportunities, educational institutions and urban lifestyle are the main pull factors and poor living conditions, lack of educational and economic opportunities and poor health care facilities are the main push factors. So, in order to sustain the increasing urbanization there is an urgent need to build sustainable infrastructure in the cities as increasing urbanization leads to acute shocks or stresses such as terrorism, disease outbreak (COVID-19), lack of physical and social infrastructure etc. Therefore, to absorb these shocks and stresses, resilience of the cities plays a vital role. So, spatial planners need to plan the cities accordingly, to overcome such complications and problems.

The world is rapidly urbanizing, with up to 1.4 million people per week moving into urban areas. A significant portion of new urban expansion will occur in South Asia and sub-Saharan Africa. In India alone, the number of urban dwellers is expected to increase by 404 million over the next 35 years, with nearly 50 per cent of the country's population living in cities by 2050. In sub-Saharan Africa, similar growth rates will result in 56 per cent of the region's population living in urban areas by 2050, compared to 40 per cent today (UN DESA 2014). As cities grow and grapple with uncertainties and challenges like climate change, it is becoming increasingly urgent for municipalities and development authorities to address urban resilience (Carmin, 2012). Unprecedented urbanization has transformed the planet

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from 30 per cent urban in 1950 to over 54 per cent urban today, and this will reach an estimated 66 per cent by 2050.

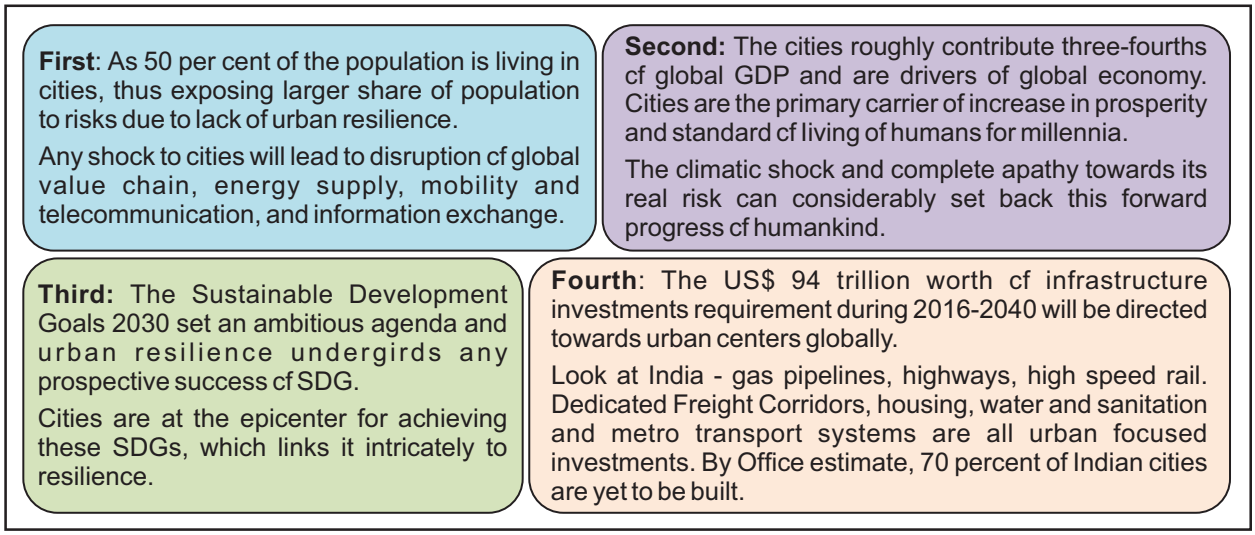
Together, India, China and Nigeria will account for 35 per cent of the projected growth of the world's urban population between 2018 and 2050. By 2050, it is projected that India will have added 416 million urban dwellers. Currently, India's population stood at 1210 million in 2011, with an urbanization level of 31.1 per cent (Census of India 2011).Cities stand at the forefront of the challenges and opportunities of the 21st century. Ever increasing population is causing humongous stress on the available resources and infrastructure, therefore, proper planning techniques needs to be adopted. Resilience is the capacity of a system to absorb disturbance and reorganize while changing to still retain essentially the same function, structure, identity, and feedbacks. It is an inherent and fundamental quality for both human and natural systems.

## 2. NEED FOR MAKING CITIES RESILIENT

In case of India, there is lack of planned environment with respect to resilient desired goals and strategies. Absence of socio-culture facilities tends to fail the concept of resilient city. Safe and livable cities are the prime rising focus these days, thus better and resilient planning approaches needs to be implemented to ensure the safety of all people. Therefore, there is a critical need for a flexible and dynamic approach to building resilience that goes beyond risk mitigation. There are concrete ways to improve the decision-making process and making it more resilient.

Change in the structure of national and local economy, poor infrastructure, rising pollution levels and lack of physical safety leads to decline of cities at a glacial pace. However, climatic events can cause catastrophe to cities that can render them grounded in minutes. The floods of Mumbai and Chennai, Nepal Earthquake, Uttarakhand floods are few such instances where our cities, many hundreds of years old, became paralyzed and inhospitable. Cities are at real risks. By one estimate, every year, around 46 million people in cities are at risk from flooding, from storm surges in the East Asia region alone. Many coastal cities, particularly in Asia, are staring at the risk of submersion due to rising sea levels. More than 1,000 people died, and 45 million people suffered losses in terms of loss of livelihood, homes, and services in 2017 when severe floods hit south-east Asian cities, including Dhaka, Mumbai, and Chennai. There are four major reasons (Figure - 1) for investing in resilience which contributes to long-term sustainability by ensuring current development gains are safeguarded for future generations. The need and desire for urban resilience is firmly established. It is time for actual actions that can save the impending crisis which is already showing early signs. Cities are our bulwark against slipping back in time and urban resilience is a tool to ensure that no discernible harm is done to our cities.

**Fig. 1: Four Major Reasons for Investing in Resilience**



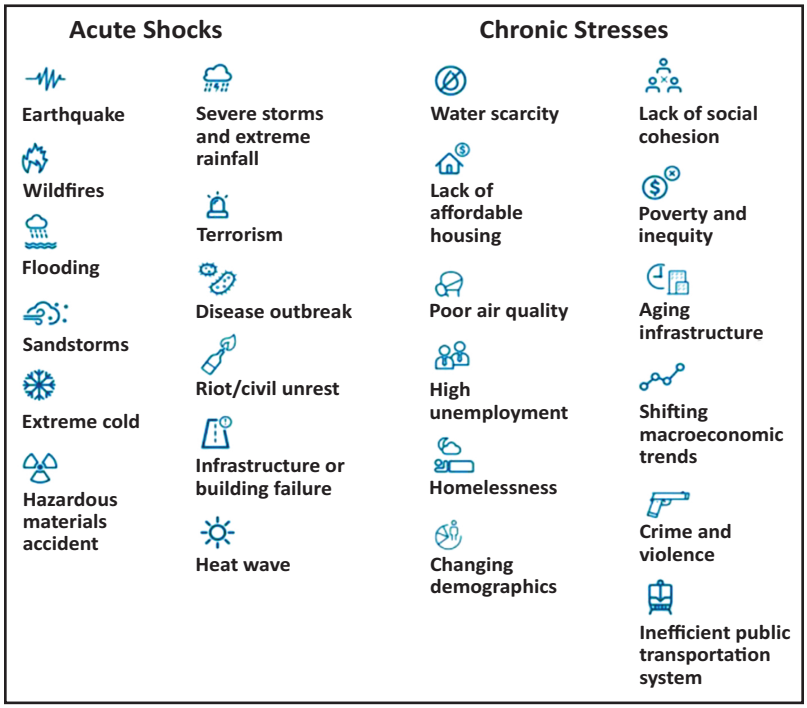

*Source: https://www.orfonline.org/expert-speak/urban-resilience-why-should-we-pay-more-attention-49653/*

## 3. CONCEPT OF RESILIENT CITY

Before understanding the concept of resilient cities, it is important to understand the origin of term resilience in urban planning. The notion of resilience is rapidly gaining ground in the urban sustainability literature. The word "resilience" has been chosen as an umbrella term for the planning and design strategies needed to help our cities develop the necessary capacity to meet the challenges of the future. The term resilience is a normative concept which is not easy to be presented in quantitative terms. However, there is a broad consensus in the research community that city as a dynamic entity is not only an ecological system but also a social one. As a dynamic, socio-ecological system a city is undergoing a constant process of change and adaptation. This implies that resilience in urban areas should be considered as an adaptive process which does necessarily require the system to return to an equilibrium state after having been hit. The time scale is an important dimension of resilience. "Engle, Bremond", describe resilience as a system's ability of short-term coping and long-term adaptation. A community should be able to absorb impacts in the short term and self-organize and increase its capacity for learning in the long run.

A Resilient city is one that has developed capacities to absorb future shocks and stresses (Figure - 2). Urban resilience is "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks (natural, socio-economic or technological) are faced by Indian cities such as earthquakes, wild-fires, floods, sandstorms, extreme cold, terrorism, war, disease outbreak, pan-

**Fig. 2: Shocks and Stresses Faced by Cities**




*Source: 100 Resilient Cities, 2013*

demic or epidemic (COVID-19), infrastructure, building failure, heat wave, water scarcity, labor strike or unrest, poor air quality, high unemployment, lack of affordable housing, lack of social cohesion, poverty and inequality, corruption, crime and violence, civil unrest, changing demographics, inefficient public transportation system, etc.

Urban resilience demands that cities look holistically at their capacities and their risks, including through meaningful engagement with the most vulnerable members of a community. The focus of urban resilience is to understand the prospective stresses in the urban centers and devising strategies to cope, in case these stresses become shocks.

A city can become resilient if it's people are healthy and have access to basic services; if its people are safe, socially cohesive with reliable employment supporting a sustainable economy; if the city's ecosystem, infrastructure, and services are well-balanced catering to the well-being of it's people; and if the city leadership and local communities work together in driving integrated planning. In the resilience literature, these are four dimensions of the City Resilience Framework (CRF), which are given bellow.

- Health and Well-being of everyone living and working in the city - focus on People.
- Economy and Society the systems within the society and economy that enable urban population to live peacefully and act collectively - focus on Organizations.
- Infrastructure and Environment the quality of physical infrastructure and ecosystems that protect, provide, and connect us - focus on Places.
- Leadership and Strategy appropriate leadership and strategy, enabling the city to learn from the past and take timely action focus on Knowledge and Institutions.

- A resilient city is one that has developed capacities to help absorb future shocks and stresses, to maintain the same functions, structures, systems, and identity.

## 4. STRATEGIES FOR RESILIENCE URBAN PLANNING

Cities of future needs to be resilient as the COVID-19 pandemic have already significantly distorted urban life. By 2050, more than two thirds of the world population is projected to live in urban areas, and most of this urban growth will take place in lower and lower-middle income countries. But densely built-up urban spaces tend to come with challenges of their own. Therefore, there is a need to start ensuring today that these urban areas will be inclusive, safe, sustainable, and resilient.

### 4.1 Examples of Urban Resilience Initiatives in India

- **Urban Horticulture (Chennai):** Rooftop horticulture is also linked to waste management through segregation of waste and demand for compost, which benefits the city's waste management agency.
- **Rooftops with Gardens** (Figure - 3) to reduce roof surface temperatures and the city's aims to scale this initiative to address heat stress in the city.

**Fig. 3: Rooftop Horticulture in Chennai**

*Source: https://resilientchennai.com/urban-horticulture/*

- **Integrated Disease Surveillance Project (Indore)**: Intends to reduce human vulnerability by detecting early warning signals of disease outbreaks to ensure appropriate response.
- **End to End Early Warning System for Ukai and Local Floods (Surat):** The objective of this project is to reduce the damage caused by floods (Figure - 4) by reducing their intensity; the project reduces human vulnerability especially of the economically weaker sections by - installing weather systems and data transfer mechanisms from catchment to reservoir to city.

**Fig. 4: Floods in Surat**


*Source: Wikipedia, 2016*

- **Urban community based micro resilience model of ward exposed to climate and hydro meteorological risks (Gorakhpur):** Impacts of climate change were experienced by certain wards where basic services like drinking water, sanitation, solid waste were limited.

### 4.2 Few promising aspects and strategies for resilient urban planning in the Indian cities

- **Focus on Access to Core Services:** The spread of COVID-19 in the world's most connected urban centers has raised questions about healthy density. Density is the pre-condition for effective urban service provision, and far too many people in cities today lack access to basic services such as water, housing and health care that has exacerbated the challenge of responding effectively to COVID-19 in many cities. Poor access makes lock down orders impossible to comply with in some places. Closing this urban services divide must be a priority for cities going forward.
- **Affordable Housing and Public Spaces:** Population density without adequate public spaces or proper affordable housing provision will lead to problems. COVID-19 may prompt changes too, from temporary measures that make it feasible for people to follow social distancing guidelines to more lasting changes that should focus on improving access to affordable housing and public space like upgrading more informal settlements in place. Africa, India, and Southeast Asia face the enormous task of shaping the next generation of cities. More than 2.5 billion urban dwellers will be added to the world by 2050, 90 per cent of them in Africa and Asia. It's estimated that 1.2 billion city dwellers lack access to affordable and secure housing today. As it turns,

a large share of future growth is going to be unplanned, which could raise this number to as high as 1.6 billion people by just 2025. Change is needed and perhaps COVID-19 will be the wake-up call to get us there.

- **Integrated Green and Blue Spaces:** One of the few places that have seen a surge in traffic during COVID-19 lock downs (at least as long as they remain open) is urban parks. A new approach to city planning should bring open spaces, watersheds, forests, and parks into the heart of the city that is how we think about and plan our cities. A more holistic approach to planning that combines gray, green and blue infrastructure supports better health, better water management (flooding contributes to many epidemics and diseases after natural disasters), and climate adaptation and mitigation strategies. Furthermore, larger open spaces within the urban fabric can help cities implement emergency services and evacuation protocols.
- **More City-Level, Granular Data:** Data is mainly now aggregated at the national level, while many decisions on containment of any epidemic or pandemic are made at the local level. To help cities harness the power of big data in response to this crisis but also other long-term sustainability and equity challenges, we need to empower cities with more granular, regularly updated data streams that can provide better evidence for decision-making.
- **Urban Transport Systems need to become more Sustainable:** Sustainable urban transport can include giving priority to bicycles over cars as done for example in Copenhagen (Figure - 5) where a bridge exclusively for bikes has been constructed, by introducing bus rapid transit (BRT) with dedicated bus routes like in Johannesburg, or cable cars as part of urban public transport systems to link hilly and often low-income urban communities to the city like in Medellin or La Paz.
- **Nature-based solutions work for cities, too:** Increasingly nature-based solutions are considered in urban climate change adaptation and disaster risk reduction.

**Fig. 5: Copenhagen Bicycle Bridge**

**Fig. 6: New York City's Greened Rooftops**

**Table 1: Three Interrelated Recommendations**

| |
|---|
| **15 Minutes Neighborhood Model** |
| • This model revolves around simple forms of active mobility and ensures that everyone can easily access essential goods and services.<br>• Such neighborhoods could be built by developing localized strategies to ensure adequate safety and well-being of the residents and growth of local businesses to make them resilient. |
| **Engage the Citizens in Rebuilding Cities** |
| • It's important to engage the citizens in rebuilding cities by incorporating their needs and visions in the local agenda and the city.<br>• Residents, businesses and the local governments / leaders could play an active role.<br>• Hyper-local governance could transform the local economy and enable better crisis response. |
| **Need to Accelerate the Building of Integrated Urban Systems** |
| • There is a need to accelerate the building of integrated urban systems by utilizing innovative digital technology for intelligent management and efficient delivery of urban services.<br>• It would enable the regional and local government, communities, and businesses to seamlessly connect with each other and ensure inter - departmental collaboration both within the city and across territories. |

*Source: Prepared from article 'Building resilient cities' by Chauhan Shivanshu*

An example would be of New York City's greened rooftops (Figure - 6) and streets that can better manage storm water runoff and improve urban climate. China introduced the concept of 'sponge cities', cities with open spaces that can soak up floodwater and prevent disaster in ecologically friendly ways.

There is no set road map for a resilient future, but there are varying perspectives evidently emerging from the global patterns. But if leaders and communities want to build stronger cities, the planning must begin with the fundamental unit in the city - the 'neighborhood'. The top-down ecosystem of city planning, and governance must change. There is already a growing focus towards a localized approach, becoming self-reliant and resilient. Three inter-related recommendations that could forge deeper and stronger social recovery at a local level are given in Table - 1.

## 5. CONCLUSIONS

In India there is a lack of planned environment with respect to desired goals and strategies, which has been amply demonstrated by COVID-19 pandemic which have significantly distorted urban life. Therefore, urban planners and policy makers engaged in spatial planning and management needs to consider how "people-oriented" principles could be incorporated into spatial-planning systems to reduce the negative impacts on both cities and people. The shift to home working has changed peoples' way of life, affected their subjective well-being, and significantly affected spatial planning within cities, placing greater demands on architectural design and community spatial planning. Therefore, additional open public spaces and a more supportive infrastructure are required. It is found that an effective community-based spatial planning system has not been established yet. These aspects needs to be taken into consideration in Master Plans for the future. In terms of policy implications, planning agencies should work with public health and public safety departments to formulate

guidelines and management rules in order to improve spatial planning of cities during periods of extraordinary changes and challenges.

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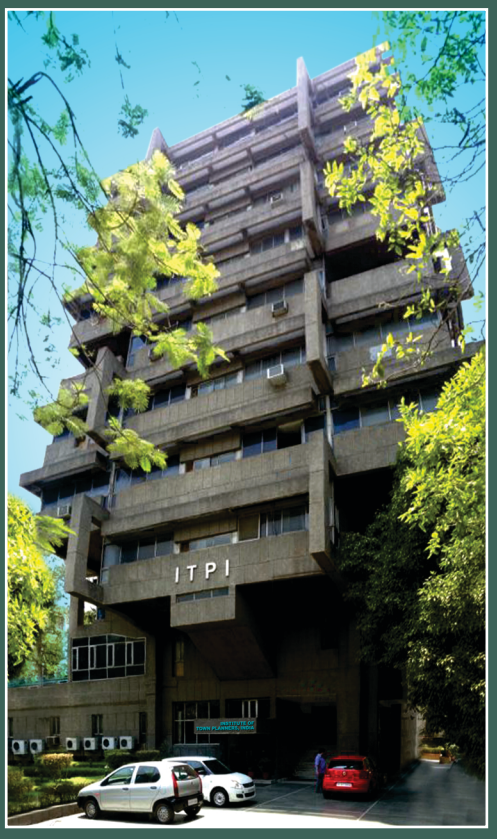


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