Building Resilient Cities:
Enabling Local Action

URBAN RESILIENCE UNIT

National Institute of Urban Affairs

In India, the increasing pace of urbanization and associated challenges are aggravating the chronic stresses of cities making them vulnerable to acute shocks.

Cities, being the economic drivers, have the opportunity to provide residents with a better quality of life with access to better service provision and infrastructure. However, cities are currently underprepared for future urbanization prospects and are struggling to manage shocks like urban floods. In 2015, heavy rainfall in Chennai costed the city $2 billion in damages and losses.[1]

The cost of poor planning for Indian cities is estimated between 1.2% and 6.3% of the GDP by 2050.[2] Furthermore, trends like climate change are expected to cost the Indian economy $1.178 trillion by 2050 if emissions continue at their current rates.[3] There is an imminent need to embed resilience at the heart of urban discourse and as cities grow, urban governance and planning systems need to incorporate the principles of resilience to ensure quality of living.

Established in collaboration with 100 Resilient Cities (100 RC) program of the Rockefeller Foundation, the Urban Resilience Unit (URU) at the National Institute of Urban Affairs (NIUA) is supporting the development of resilient cities across India.

URU CAN SUPPORT YOUR CITY THROUGH:

- ✓ Risk assessments and resilience planning
- ✓ Mainstreaming resilience in urban planning and governance frameworks, and infrastructure development processes
- ✓ Data frameworks and protocols to develop 'data observatories' and decision support systems
- ✓ Tools, techniques and good practices for resilience building
- ✓ Capacity building and training to enable resilience building
- ✓ 'Match-making' for technical assistance and resources
- ✓ Network and cooperation with cities, experts, national and international agencies

[1] Alison, S. 2016. Disaster Risks Grow, As India's Cities Flounder. IndiaSpend, 15 January.
[2] Muthukumara, M., et al. 2018. South Asia's Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards., Washington DC: World Bank: South Asia Development Matters.
[3] Tiwari, M. & Godfrey, N. Better Cities, Better Growth: India's Urban Opportunity. New Climate Economy, World Resources Institute, and Indian Council for Research on International Economic Relations.

What is Urban Resilience?

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 they experience."

Seven Qualities of A Resilient City

Reflective
Using past experience to inform future decisions

Resourceful
Recognising alternative ways to use resources

Inclusive
Prioritise broad consultation to create a sense of shared ownership in decision making

Integrated
Bring together a range of distinct systems and institutions

Robust
Well-conceived, constructed and managed systems

Redundant
Spare capacity purposively created to accommodate disruption

Flexible
Willingness and ability to adopt alternative strategies in response to changing circumstances

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ACUTE SHOCKS

Earthquake

Wildfires

Flooding

Sandstorms

Extreme cold

Hazardous materials accident

Severe storms and extreme rainfall

Terrorism

Disease outbreak

Riot/civil unrest

Infrastructure or building failure

Heat wave

CHRONIC STRESSES

Water scarcity

Lack of affordable housing

Poor air quality

High unemployment

Homelessness

Changing demographics

Lack of social cohesion

Poverty and inequity

Aging infrastructure
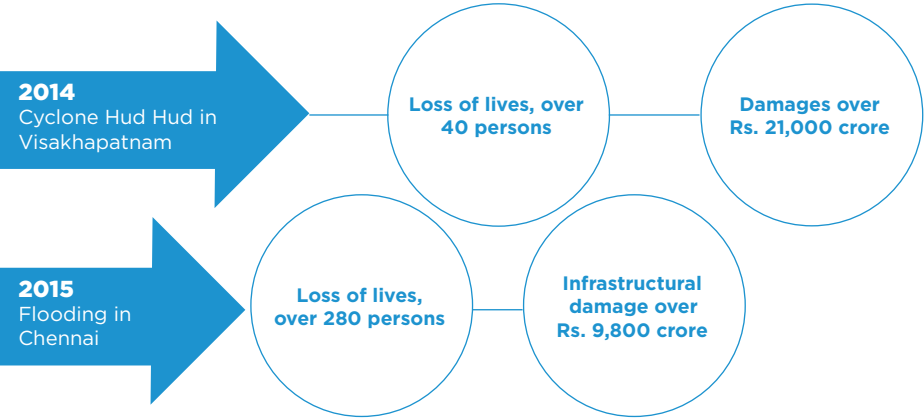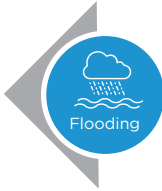
Shifting macroeconomic trends

Crime and violence

Inefficient public transportation system

Scenario in urban India

2014
Cyclone Hud Hud in Visakhapatnam

Loss of lives, over 40 persons

Damages over Rs. 21,000 crore

2015
Flooding in Chennai

Loss of lives, over 280 persons

Infrastructural damage over Rs. 9,800 crore

Earthquake

116 AMRUT Cities and **30 Smart Cities** are prone to high and very high risk of earthquakes

124 AMRUT Cities and **18 Smart Cities** are prone to high risk of flooding

Flooding

Heat wave

Heat waves are estimated to **increase** by **75-fold** in a business-as-usual scenario

21 major cities including Delhi, Bengaluru, Chennai, and Hyderabad are racing towards **zero groundwater** levels by 2020, affecting access for 100 million people.

Water scarcity

Disease outbreak

30 million new dengue cases annually and **390% increase** in **chikungunya cases** over the last 3 years.

Source: Data complied by URU

Maximizing the Resilience Dividend by Leveraging National Urban Missions

There are two main benefits from resilience approaches to urban planning and management. One, it minimizes future costs from shocks and stresses and leads to better designed projects and two, the policies that address multiple challenges, improve services and provide social, economic and environmental co-benefits. This is the resilience dividend.

As a result of the 6 key National Urban Missions launched by MoHUA in 2014, an overall investment of INR 6,85,758 cr has been proposed for urban infrastructure development in 4,041 ULBs across the country (MoHUA, 2018). These include projects on affordable housing, sustainable mobility, solid waste management and sanitation, water supply and sewerage, development of open/ green spaces, heritage conservation, redevelopment and renewal of core areas, and smart governance among others. The Missions together aim towards an improved quality of life for urban dwellers.

Applying resilience lens to these projects can pave the way for a forward-looking, risk aware, inclusive and integrated urban transformation in India.

Urban Resilience Policy to Action:
What can cities do?

1. Mainstream resilience into your city initiatives

The first step is to integrate urban resilience in the City Vision or Development Plan to ensure that all infrastructure and assets, both old and new, are planned, developed and maintained in a resilient manner. Developing or updating building bylaws, urban and infrastructure planning guidelines to make them sensitive to shocks and stresses and equally important is their effective enforcement.

2. Risk assessment and establishing a Plan of Action

A key step for resilience planning is to assess and understand the shocks and stresses experienced by the city. This requires mapping of risks and identification of vulnerable hotspots and communities. Adopting a participatory approach and using local level data will ensure a realistic assessment of social, economic and physical vulnerabilities and the capacities to cope with shocks and stresses. The ULBs can then formulate a long-term vision along with short and medium-term implementation strategies that reduce stresses and support in managing shocks.

3. Adopt a holistic approach to resilience building

Breaking away from siloed practice, ULBs should adopt holistic approach for addressing civic issues. For instance, to become flood resilient, ULBs should follow a comprehensive plan that includes regularly maintaining storm water drains and checking for encroachments, resurfacing roads without raising its elevation, increasing permeable surfaces, promoting rainwater harvesting, restricting construction in low-lying areas, and developing multi-utility water retention spaces to absorb excess water. Such an approach will not only build resilience but will also provide sustainable co-benefits.

4. Data-driven resilience planning

Adopting an approach of informed decision-making will support in building resilience. To aid this, relevant data needs to be collected, digitized, mapped, managed and made accessible across developments at the city level. Data-driven urban governance will support city managers to visualize trends and develop the most efficient strategies to address shocks and stresses.

5. Strengthen institutional capacities

Strengthening institutional capacities of governmental organizations; private sector; academia, and civil society organizations is key for building resilience. It is important to identify specific roles and responsibilities, and platforms to share the knowledge and skills of various stakeholders. Appointing a nodal person to convene stakeholders and coordinate resilience initiatives is key for institutionalizing resilience within the ULB organizational structure.

6. Engage with stakeholders and communities

Engagement with various stakeholders including private sector, academia, civil society organizations, and local communities is significant for ensuring participation and ownership of initiatives. Identifying and strengthening social connect, and community-based resilience building has demonstrated effective action across the globe. Facilitating top-down and bottom-up communication that strengthens the knowledge and awareness of the public is important. Private sector and civil society can also play a key role in ensuring participatory action.

7. Strengthen financial capacities

Financial management is key for ensuring resilient public infrastructure and efficient service delivery. Besides channeling city budgets to embed resilience in urban projects, ULBs can illustrate demand for resilience solutions from the market and contribute to resilience discourse. Innovative options like municipal bonds and green bonds for building resilient infrastructure can be explored.

🏛 MAYORS

- ✓ Save lives, livelihoods and assets from acute shocks and chronic stresses by championing and driving urban resilience in your city.
- ✓ Be the FIRST to pioneer resilience agenda in your political and administrative processes.
- ✓ Provide leadership to convene a broad range of global and local stakeholders to build partnership for resilient actions.
- ✓ Set precedent for sensitizing your people about risks and guiding your councilors in developing resilient actions.

CITY CHAMPION

You can be the first leader in your city to invest in a long-term vision of resilience building and fostering a paradigm shift in visioning the development of your city. Prioritizing urban resilience in your political and administrative narrative will help in saving lives, livelihoods and assets of your city.

The Mayor of Rajkot has championed the city to become an example of global climate leadership since 2016. The city's commitment and actions to reduce GHG emissions has attracted assistance from various bi-lateral and multi-lateral organizations, and several green initiatives are under progress. The Mayor of Rajkot has now become the first Indian Mayor to join the board of Global Covenant of Mayors.

Learning from the experience of heat wave in 2010, the Mayor of Ahmedabad launched a cool-roof initiative under the 'Heat Action Plan' strategy in 2017. Local institutions collaborated with the corporation to identify slums that were most vulnerable to extreme heat. Set out to paint 500 rooftops with white paint, the corporation painted 3000 rooftops with overwhelming support from volunteers and civil society organizations. Cool-roof reduced indoor temperatures by 3-7 degrees centigrade and the tangible outcome of the pilot has led to a citywide planning for similar actions.

RESILIENCE Convener

Being the first citizen of your city, you can provide leadership to convene a broad range of stakeholders and empower them to build partnership for resilient actions.

STRONG LINK between global goal and local action

With the holistic understanding of the city and as the frontrunner of your municipal committee, you can influence ward level budgets by incorporating resilience checks and guide your councilors in developing local resilient actions.

Understanding the need to address air pollution for general well-being, the city of Bengaluru taken up leadership on tackling air pollution. Recently, the Mayor of Bengaluru has collaborated with the Mayor of London to co-chair a global partnership of 20 cities to tackle air pollution in urban areas. The Mayor has planned to install air pollution sensors in all wards and aims to improve the quality of air learning from other city initiatives.

In 2016, the Mayor of Kolkata played a pivotal role in initiating a first-of-its-kind climate change cell within the municipal corporation and a web portal along with mobile application to provide a climate change interactive platform for its citizens. With support from the United Kingdom, the Mayor also launched a 'roadmap' to make Kolkata a low carbon economy and a climate resilient city, the work of which will continue over the next decade.

PULSE of the City

As the elected local leader, you have a deep relation with your city and its people. You can promote public participation for building resilience and play a key role in informing your communities, empowering them and promoting change.

COMMISSIONERS

- ✓ As the chief executive officer at city level, bring about TRANSFORMATIONAL IMPACTS in your city.
- ✓ Mainstream resilience in urban development and governance processes and promote risk-resilient urban investments in your city.
- ✓ Maximize the use of resilient urban solutions in your city through enforcement of policy and regulations.
- ✓ Foster innovation and risk-resilient investments in urban development process.

During 2010-2015, the Municipal Commissioner's Office in Gorakhpur initiated city and ward level resilience action to ensure that all projects are evaluated and monitored through a resilience check. It was found that mismanaged solid waste and inefficient drainage systems are key reasons for recurring urban floods, and resulting water stagnations and outbreak of water borne diseases. This led to implementation of a multi-stakeholder driven solid waste management project in the city focusing on the most vulnerable communities. The latter has also provided co-benefits for improved quality of life in the slum areas of the city.

MINIMIZE loss and damage from disasters

As the Municipal Commissioner, you can ensure that your city has an action plan and prioritized investment strategy for climate change and disaster resilience. And that all the city development and maintenance projects and programs are informed by hazard risk and vulnerability, and resilient to shocks and stresses.

PROMOTE risk-resilient urban investment

You can ensure allocation of dedicated budgets for building climate resilience as part of broader development planning and programs. You can enable increased private sector investment and partnerships to implement the city plan of action.

In the aftermath of cyclone Hud Hud, the Commissioner of Greater Visakhapatnam Municipal Corporation ensured that infrastructure and community resilience projects are included in the smart city proposal for Visakhapatnam. As a result, the city received funding to establish a state of art emergency operations center embedded within the integrated command and control center for monitoring that supports informed decision making during disasters. This has also enabled the city to develop resilient community infrastructure projects such as safe and smart schools.

Pune Municipal Corporation (PMC) appointed a Chief Resilience Officer to coordinate inter-departmental resilience action within PMC and with other line departments. This is helping the city in coming up with robust and risk-resilient infrastructure projects for sustainable mobility, and protecting its water bodies and biodiversity besides reaping co-benefits for efficient infrastructure management and sustainable development.

COORDINATE across institutions

It is within your powers to convene key stakeholders for city development and management. You can therefore, ensure a holistic approach with inter-departmental coordination and city commitment towards resilience building.

FOSTER innovation and training

By implementing awareness campaigns and training programs, you can create awareness on risks and resilience, and build capacity of city managers and engineers for addressing shocks and stresses. Sensitization of private sector and civil society will foster innovative thinking and resilience building solutions across sectors.

In the aftermath of Chennai floods, Greater Chennai Municipal Corporation collaborated with the 100 Resilient Cities initiative of the Rockefeller Foundation. This led to hiring of a Chief Resilience Officer for the city along with formulation of a Resilience Strategy. The partnership also helped Chennai in getting international expertise and exposure supporting the city in developing various initiatives to address its water woes.

🔧 ENGINEERS

- ✓ You can minimize losses and damages from shocks and stresses in your city by developing and implementing resilient urban infrastructure solutions.
- ✓ Map critical assets and services for robust decision-making and efficient infrastructure management.
- ✓ Apply a 'resilience' scan to infrastructure plans, project development and execution processes.

PLAN for disasters

Inadequate and poorly maintained urban infrastructure exacerbates the vulnerability of cities to shocks. As the city engineer, you can ensure that adequate and well-maintained infrastructure is in place and that there is a plan for continuity of critical infrastructure and facilities.

Understanding the key role of resilient infrastructure for minimizing vulnerability to urban floods and water/vector borne diseases, Surat has been formulating and implementing resilience action plans and standard operational procedures for infrastructure assets for almost a decade now. Establishing an End-to-End Early Warning System to monitor and forecast extreme precipitation events and Urban Service Monitoring System has helped the city in mitigating the impacts of urban flood situations.

Guwahati Municipal Corporation introduced a 'resilience' check as part of the building permission process by integrating flood resilience principles in the 2014 revised Building Construction (Regulation) Byelaws. Gorakhpur has prepared city and ward level resilience action plans focusing on monitoring, maintenance and upgrade of critical infrastructure assets and services to minimize risk from urban floods.

PREVENT infrastructure losses and failures

As the city engineer, you can prevent infrastructure losses and failures in your city by developing resilient infrastructure systems. Ensure that risk-informed planning regulations, building codes and standards are developed and regularly updated - both for new infrastructure and for retrofitting existing assets.

MAXIMIZE co-benefits for public infrastructure

Resilience building requires a holistic and cross-sectoral approach. Developing one-stop solution to multiple challenges and addressing the cascading effect of disasters will ensure robust, cost-effective and inclusive resilience action.

Bhubaneswar is currently implementing the 'B-Active' project under the AFD funded CITIIS Program of Smart Cities Mission. The project aims at improving the quality of life of citizens by developing public open spaces. Besides providing spaces for cultural and social activities, these public parks and playgrounds will act as sponges for capturing, storing, and cleaning its water systems and provide opportunities for urban agriculture.

Development of a database management system in 2014 enabled Greater Visakhapatnam Municipal Corporation in conducting a vulnerability assessment and preparing a resilience strategy; it also helped in developing an informed Smart City Proposal quickly and efficiently, and availing further funding for infrastructure development. The system also formed the base for setting up an Emergency Operation Centre and Integrated Command and Control Centre for the city later.

Data INFORMED Decision-making

Create a spatial database of infrastructure assets and services that are critical for your city. This should include temporal, attribute as well as spatial information. Such data will enable informed decisions during emergencies as well as for day-to-day infrastructure management. By conducting regular risk assessments especially for vulnerable hotspots, assets and communities, you can save lives and livelihoods and mitigate risks to infrastructure assets.

About the National Institute of Urban Affairs (NIUA)

NIUA is an autonomous body under the Ministry of Housing and Urban Affairs (MoHUA), Government of India focusing on inter-disciplinary research, capacity building and dissemination of knowledge on issues relevant to cities across India. These include themes such as urbanization, urban policy and planning, municipal finance and governance, land economics, transit oriented development, urban livelihoods, environment and climate change and smart cities.

About the 100 Resilient Cities (100RC)

100 RC - pioneered by the Rockefeller Foundation - is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. 100RC supports the adoption and incorporation of a view of resilience that includes not only shocks such as floods, fires or riots, but also stresses such as growing diversity and ageing infrastructure that could threaten and weaken the fabric of the city on a day-to-day or cyclical basis. 100RC Cities in India include Chennai, Pune and Surat.

About the Urban Resilience Unit (URU)

Established in collaboration with 100 RC, the Urban Resilience Unit (URU) at the National Institute of Urban Affairs (NIUA) is promoting and supporting the development of resilient cities across India.

The Unit is bringing together theoretical frameworks and practical city assessments for developing evidence and policy frameworks that can be used by MoHUA, state and city level development agencies and urban local bodies (ULBs) to build local capacity and mainstream resilience in the urban discourse. This includes developing tools, proof of concepts, and data frameworks and protocols to enable resilience planning efforts in cities. URU is engaging with academic institutes and universities for embedding resilience in urban planning curricula and training programs for urban practitioners, city managers and policymakers to enable evidence-based, informed decision making.

The Unit is also involved in developing a national platform and convening a wide range of stakeholders including urban planning institutes, philanthropies, private sector, multilateral financial institutes, and urban experts with an aim to build strong partnerships for advocating resilience in Indian cities.

Join the Resilient Cities Movement

In a changing world where cities are facing increasingly complex challenges, resilience is critical for cities to not just survive, but adapt and thrive. While robust infrastructure and plans are pre-requisite to this end, we feel it is equally important to involve and engage with diverse stakeholders at every step.

You can contribute towards building resilient cities in India by integrating resilience into your city initiatives. We are eager to hear from you about your experiences and welcome your inputs and expertise in this journey.

Everyone has a part to play!

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