

# Options for urban flood resilience within Indian cities

Findings from the high level national stakeholder consultation

Dr. Umamaheshwaran Rajasekar  
Urban Resilience Unit



National Institute of Urban Affairs

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# About Us:

## **NATIONAL INSTITUTE OF URBAN AFFAIRS:**

National Institute of Urban Affairs (NIUA) is a premier institute for research, capacity building and dissemination of knowledge for the urban sector in India. It conducts research on urbanization, urban policy and planning, municipal finance and governance, land economics, transit oriented development, urban livelihoods, environment & climate change and smart cities. The institution functions with a vision to promote integrated solutions for urban India.

## **URBAN RESILIENCE UNIT AT NIUA:**

NIUA in collaboration with 100 Resilience Cities Program have agreed to contribute to the resilience-building efforts in India. The culmination of the partnership is the establishment of the Urban Resilience Unit (URU) that will direct resilience-related activities across urban planning institutes in cities across India. URU will bring together theoretical frameworks & practical city-assessments to build local capacity & embed resilience into the heart of urban discourse.

# Current and Future Development

India requires investment worth **US\$ 777.73 billion in infrastructure by 2022** to have sustainable development in the country.

Currently, cities are underprepared to deal with rapid growth, manage shocks like floods:

- **US\$ 92.22 billion** total investment by the GoI in the infrastructure sector.
- **US\$ 31.81 billion** invested in the smart cities mission.
- **150,000 new affordable houses** were sanctioned under Pradhan Mantri Awas Yojana (PMAY), Urban in 2018.

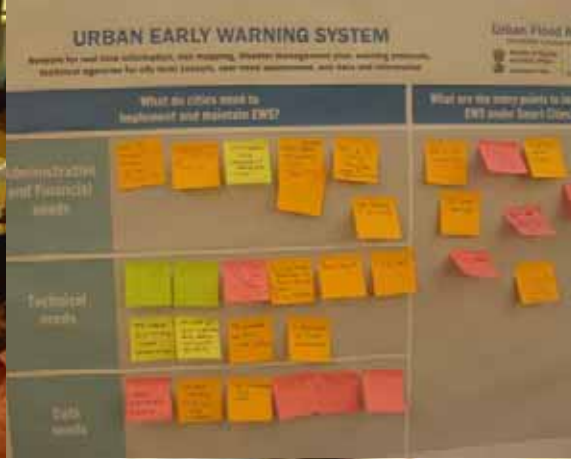


# Indian Scenario: 2000 to 2019

| Disaster type    | Disaster subtype | Events count | Total deaths | Total affected | Total damage ('000 US\$) |
|------------------|------------------|--------------|--------------|----------------|--------------------------|
| Drought          | Drought          | 4            | 20           | 68,00,00,000   | 44,98,722                |
| Ext. Temperature | Cold wave        | 16           | 2,591        | 25             | -                        |
| Ext. Temperature | Heat wave        | 12           | 6,434        | 25             | 4,00,000                 |
| Flood            | Extreme Rainfall | 32           | 2,555        | 3,46,50,612    | 53,99,500                |
| Flood            | Coastal flood    | 1            | 80           | 72,00,000      | 2,75,000                 |
| Flood            | Flash flood      | 25           | 3,036        | 4,11,21,588    | 38,10,480                |
| Flood            | Riverine flood   | 108          | 19,908       | 25,88,64,779   | 3,85,53,347              |
| Storm            | Convective storm | 41           | 1,495        | 7,63,771       | 14,34,000                |
| Storm            | Tropical cyclone | 28           | 1,952        | 2,09,38,724    | 1,05,19,512              |

| Natural Hazards | Very High Disaster Risk Zone |              | High Disaster Risk Zone |              | Moderate Disaster Risk Zone |              | Low Disaster Risk Zone |              |
|-----------------|------------------------------|--------------|-------------------------|--------------|-----------------------------|--------------|------------------------|--------------|
|                 | Smart Cities                 | Amrut Cities | Smart Cities            | Amrut Cities | Smart Cities                | Amrut Cities | Smart Cities           | Amrut Cities |
|                 | Cyclone                      | 13           | 92                      | 36           | 218                         | 43           | 155                    | 6            |
| Floods          |                              |              | 18                      | 124          |                             |              | 80                     | 376          |

With half of India's population set to be living in urban areas by 2050, the **cost of poor planning** for Indian cities will **cost the economy between 1.2% and 6.3% of GDP.**

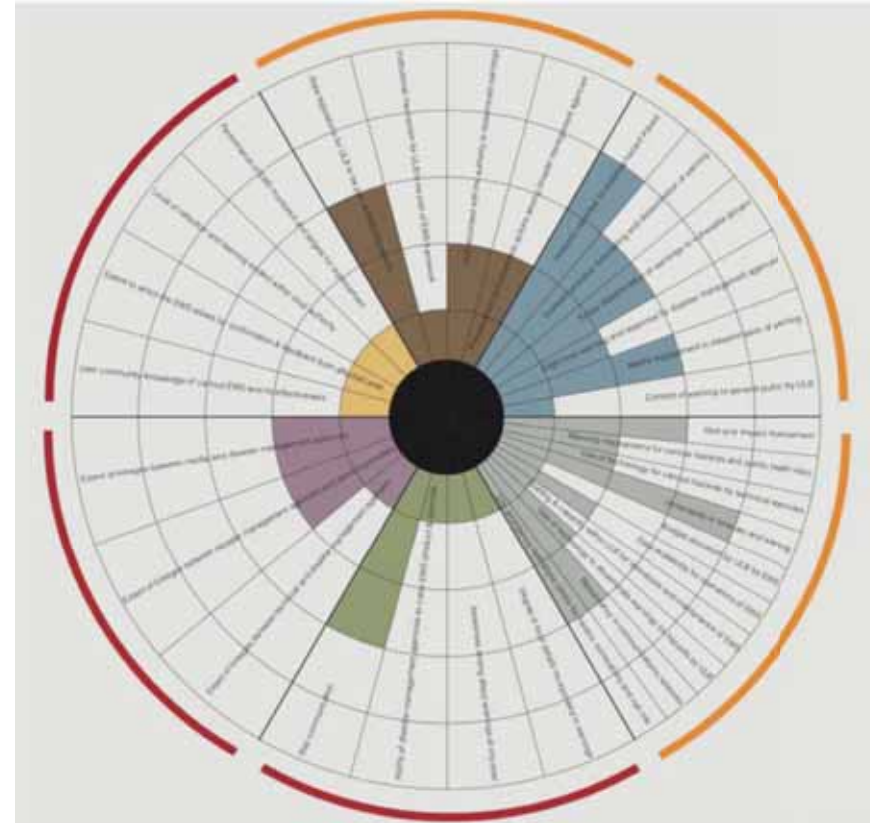


## Mainstreaming urban flood resilience within the SMART and AMRUT programs



# Urban Early Warning System

- Systems thinking for flooding modeling and management
- Comprehensive institutional mapping of agencies working in areas of flood
- Establishment of urban data observatory addressing for both shocks and stress
- Increase in number of automated weather stations within urban areas
- Increase in number of river gauges within urban areas



# Urban Flood Resilience Plan

- Planning and development authorities must include natural drainage basins, watersheds, rivers and other hydrological features in master planning.
- Innovative infrastructure with multi-functionality for building resilience should be used to reduce the impact of flooding.
- Flood action plans must be informed by sub-ward level vulnerability analysis.
- Post flood management plans (including water ambulances) and health care



# Strengthen coordination among stakeholders

- Establishing Integrated Command and Control Centers (currently there are 13 being implemented) for distributed but coordinated response before, during and after the event
- Early warning communication should be contextual and include night time warning including customized advisories and web based information sharing protocols
- Linking during and post event coordination with other departments especially health and other critical services





# Thank You

You can reach me at [Urajasekar@niua.org](mailto:Urajasekar@niua.org)