



# Infrastructure and Resilience in Indian Cities

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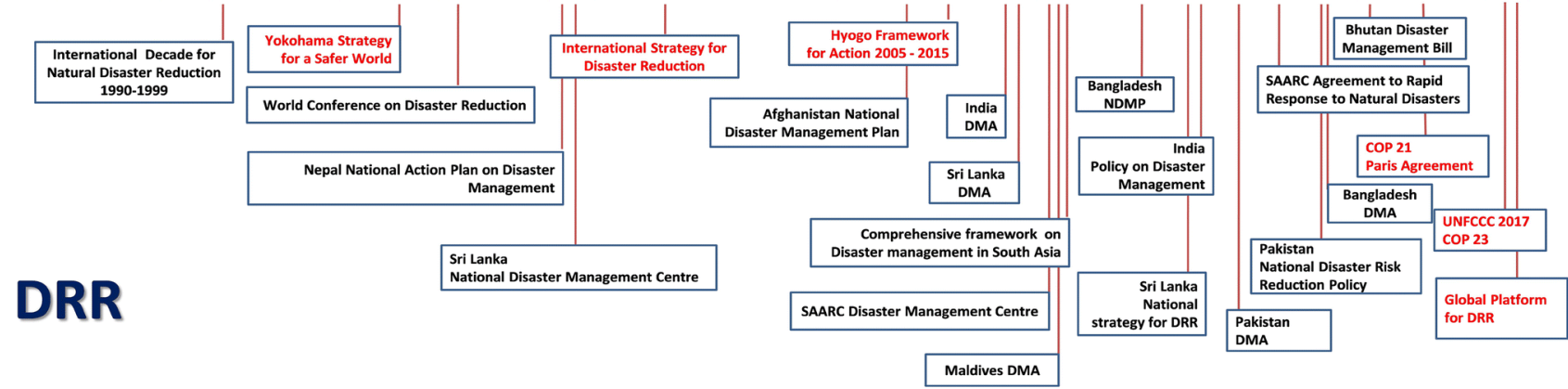
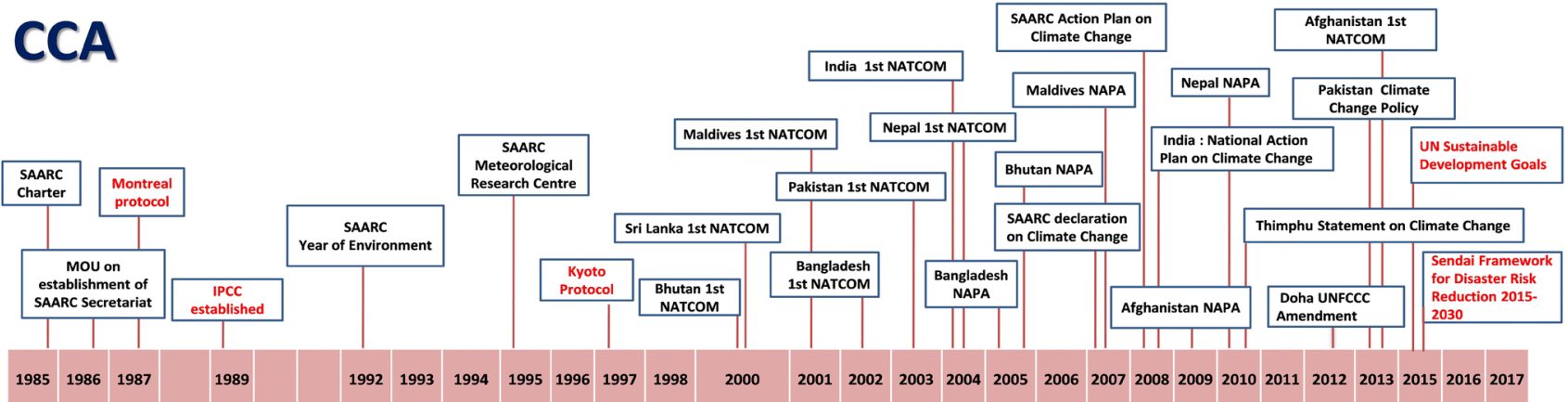
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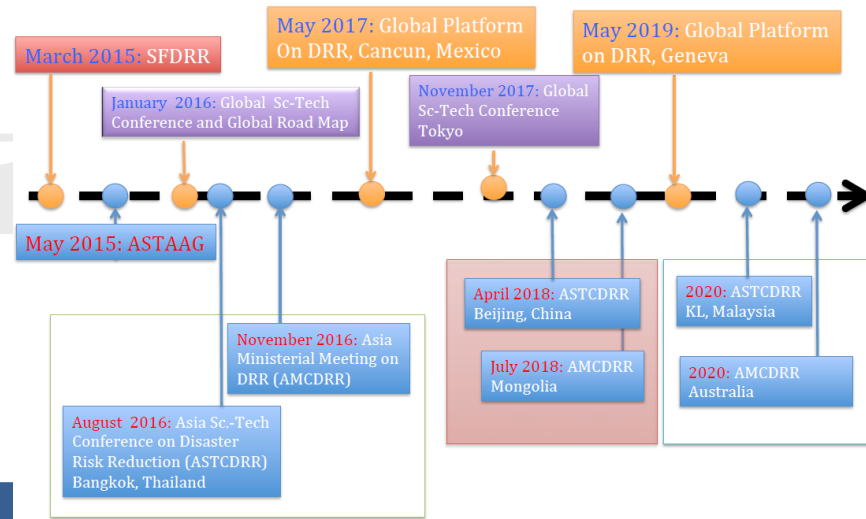
*Workshop on Building Disaster and Climate Resilience in Cities  
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15 - 16 October 2019*



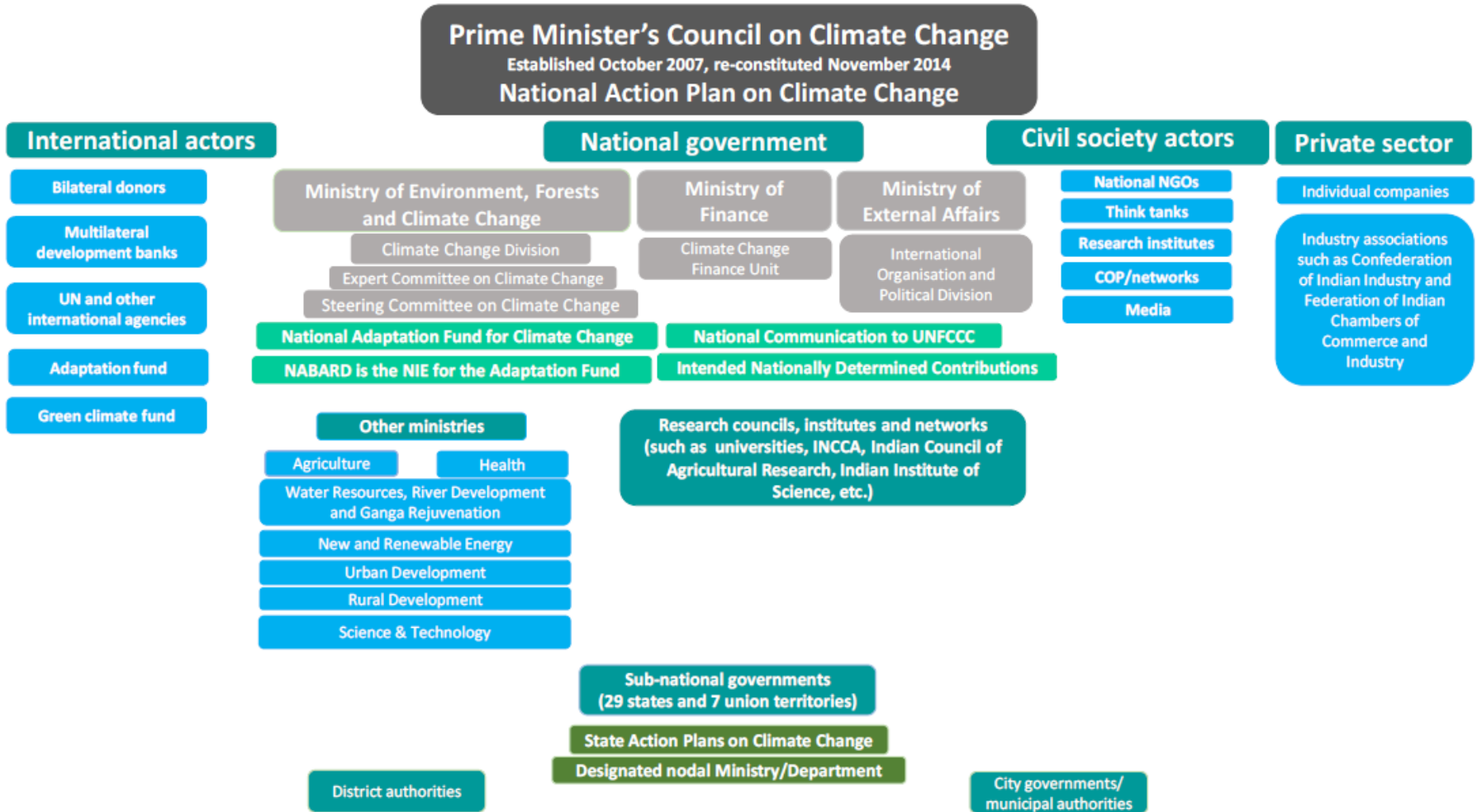


Mall, R.K., Srivastava, R.K., Banerjee, T. et al. Int J Disaster Risk Sci (2019) 10: 14. <https://doi.org/10.1007/s13753-018-0210-9>

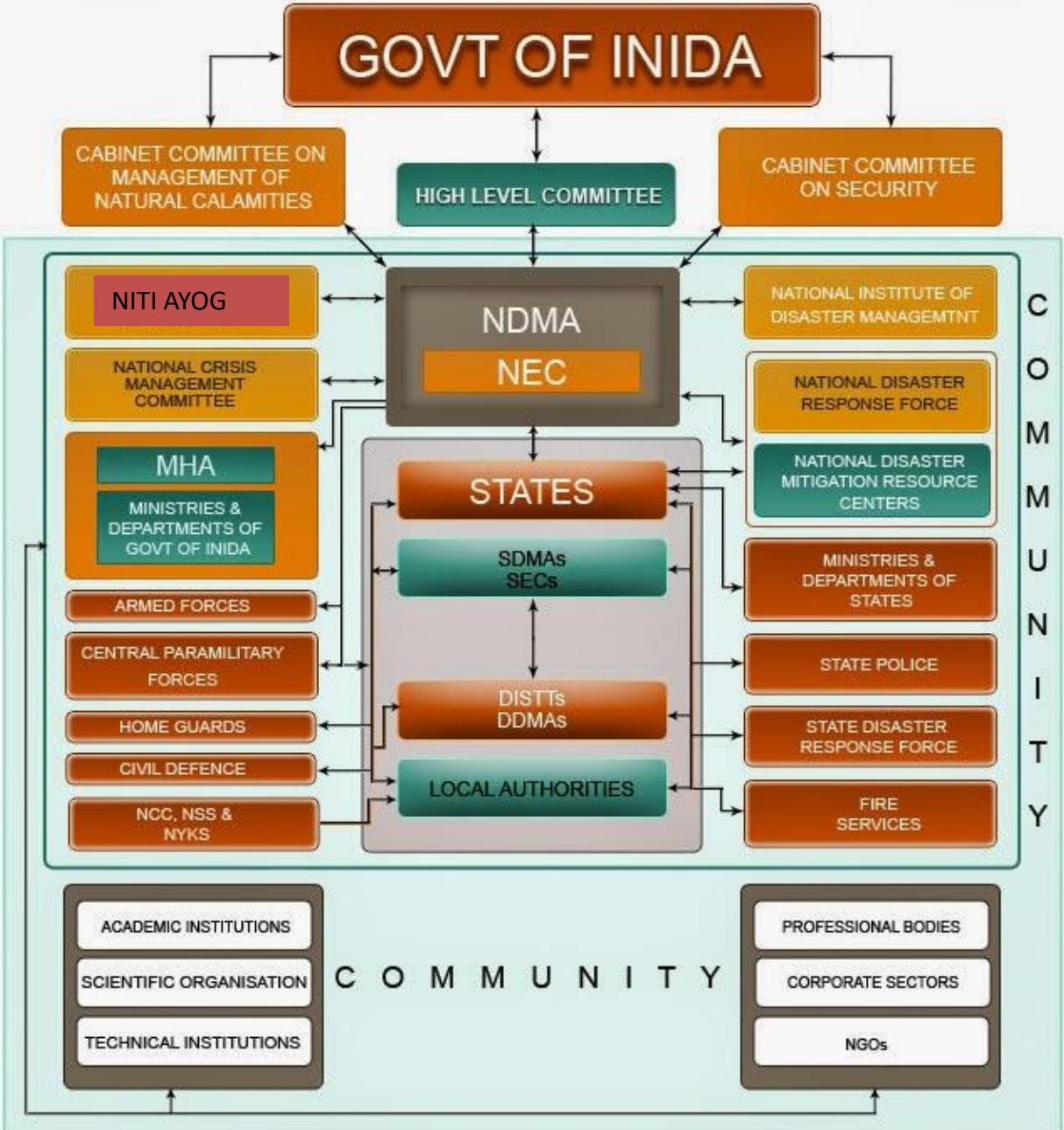
Dr. Rajib Shaw at IIT Roorkee in 2019



# Institutional Setup in India on CC



# NATIONAL DISASTER MANAGEMENT STRUCTURE



# Risks in urban India

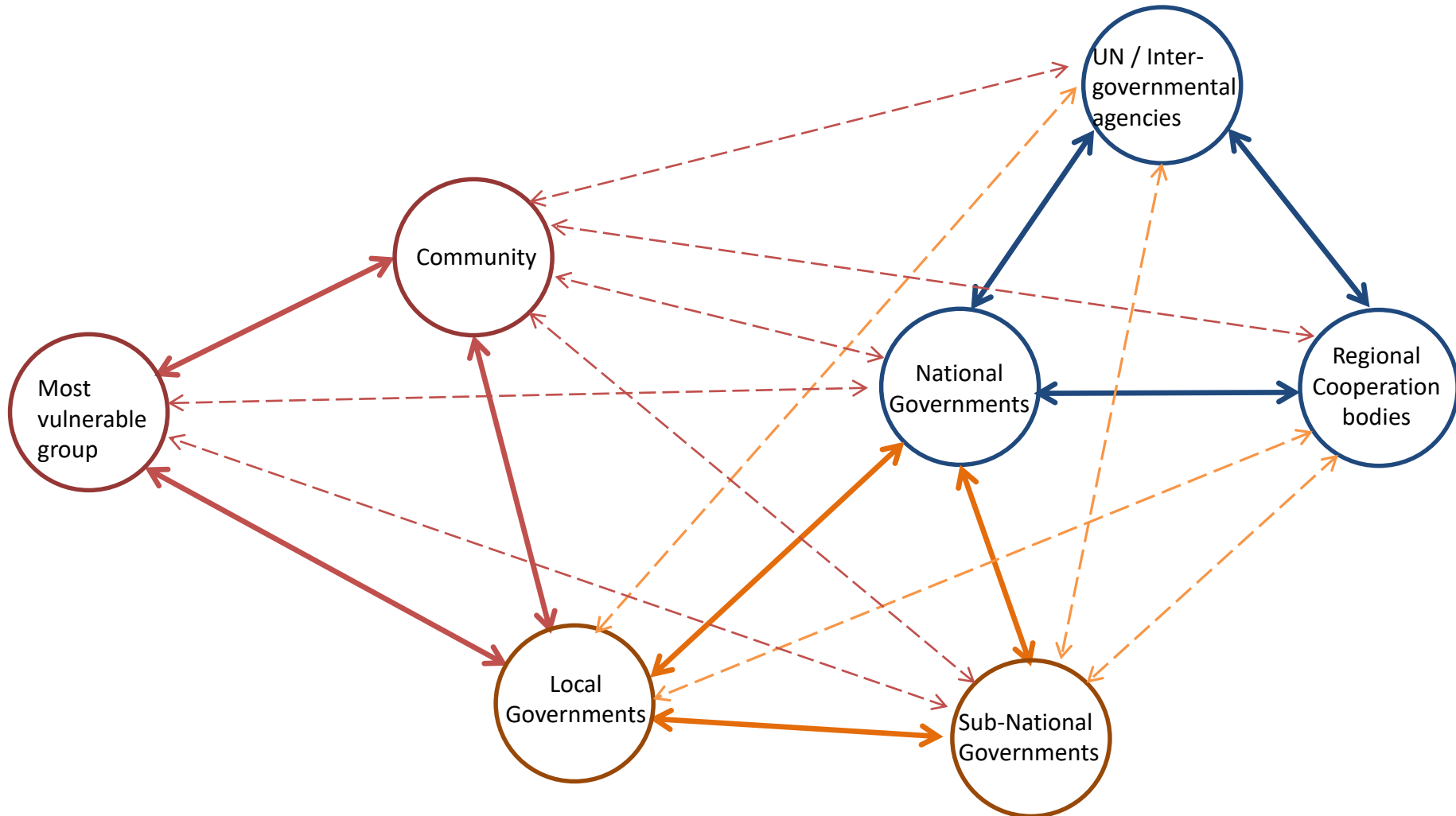
- *Accumulating exposure*
  - *Migration*
  - *Agglomeration*
  - *Inadequate Infrastructure planning*
- *Vulnerabilities of various forms*
  - *Limited capacity to cope*
  - *various natural catastrophe: Earthquake, Flood, Cyclone etc.*
  - *Unemployment; Urban poor;*
  - *Poor Infrastructure –Slums, schools, transportation, sanitation, water supply, solid waste management*
- *Environmental burden*
  - *Stress on ecosystem services and contributing to air pollution and heat island effects.*
- *Coping capacity*
  - *Investment in capacity building*

## Resilience efforts through mission schemes in India

Project/Scheme	SMART CITIES	Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
Year	2015	2015
Objectives	to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.	Providing basic services (e.g. water supply, sewerage, urban transport) to households and build amenities in cities which will improve the quality of life for all, especially the poor and the disadvantaged is a national priority.
Infrastructure Focus	Application of Smart Solutions within the framework of Area Based Development will enable cities to use technology, information and data to improve infrastructure and services.	Ensure basic infrastructure services relating to water supply, sewerage, septage management, storm water drains, transport and development of green spaces and parks with special provision for meeting the needs of children.
Resilience Target	Comprehensive development will improve the quality of life, create employment for all, especially the poor and the disadvantaged, thus leading to inclusive Cities.	Ensuring basic infrastructure services will improve the quality of life, create employment for all, especially the poor and the disadvantaged, thus leading to inclusive Cities.
ULB Capacity	The Action Plans for each Smart City is getting implemented through a Special Purpose Vehicles (SPV) under the supervision of respective ULBs.	Under the scheme the AMRUT will provide project funds to ULBs through the States.
Fund Flow (₹ Cr.)	Against the ₹ 2,05,018 Crore (Total Cost of Projects) ₹ 10,459.2 Crore have been released till 31 March 2018.	₹ 77640.02 Crore and ₹ 35989.70 crore has been approved under SAAPs and Committed Central Assistance respectively.
Observations	<ol style="list-style-type: none"> <li>1. Citizens were involved at initial phase</li> <li>2. Instead of Area Based, Region Based Development strategy to cater the rapid urbanization.</li> </ol>	Along with physical infrastructure development there should be specific focus on land and water resource management.

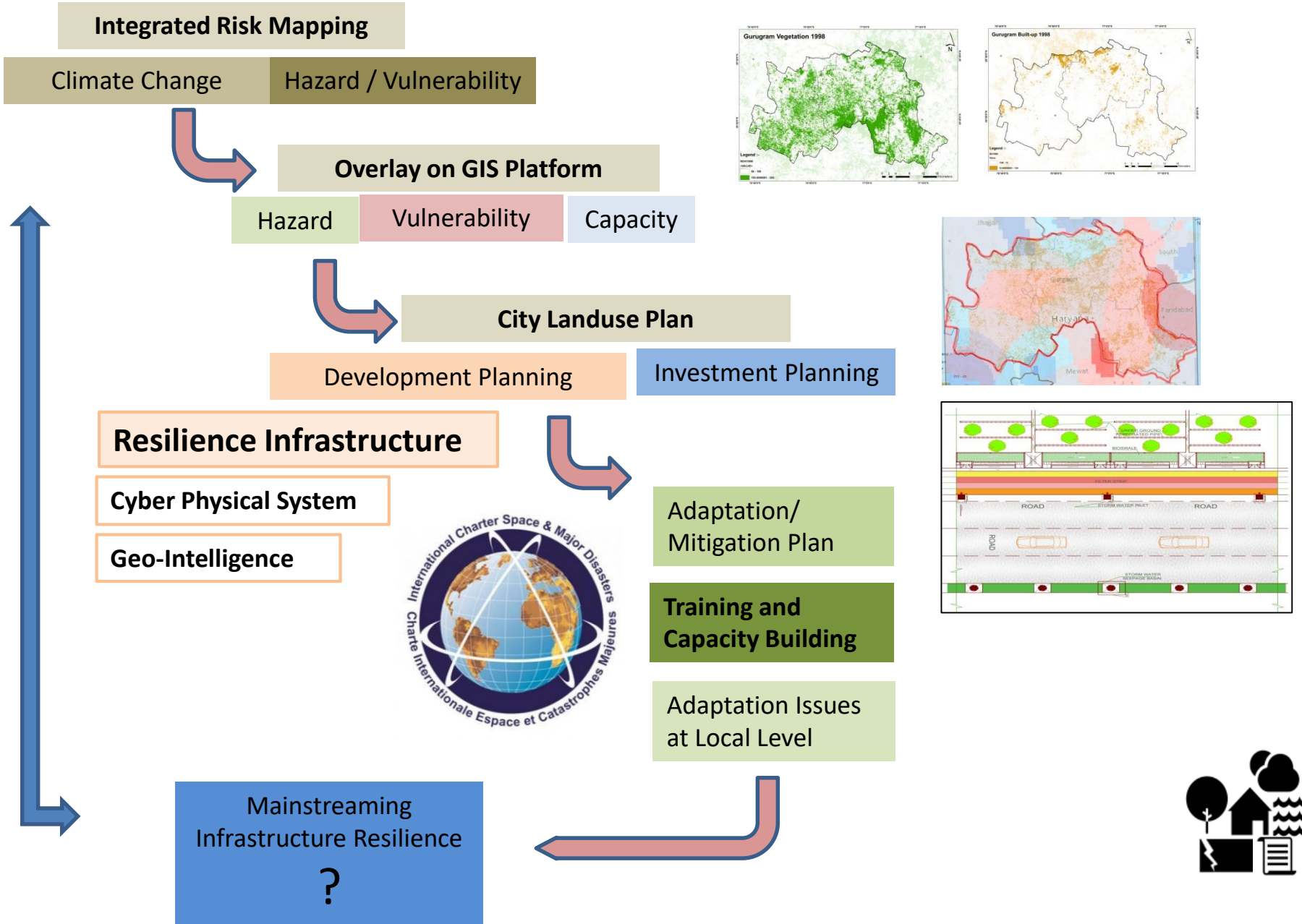
Project/Scheme	Heritage City Development and Augmentation Yojana (HRIDAY)	URBAN INFRASTRUCTURE DEVELOPMENT IN SATELLITE TOWNS (UIDSST) AROUND SEVEN MILLION PLUS CITIES
Year	2015	2012
Objectives	The main objective of HRIDAY is to preserve character of the soul of heritage city and facilitate inclusive heritage linked urban development by exploring various avenues including involving private sector.	The objectives of this scheme are to develop urban infrastructure facilities such as water supply, sewerage, drainage and solid waste management etc. at Satellite towns/ Counter Magnets around Seven mega-cities.
Infrastructure Focus	The scheme has broadly focus on Physical Infrastructure, Institutional Infrastructure, Economic Infrastructure & Social Infrastructure.	Focus is on to develop the infrastructure for the Water supply and sanitation, Sewerage and solid waste management
Resilience Target	Offers paradigm shift in India's approach to city development, bringing together urban planning/economic growth and heritage conservation in an inclusive/integrated manner with special attention on livelihoods, skills, cleanliness, security, accessibility and service.	Comprehensive and integrated regional and urban development will improve the quality of life, create employment for a large population size including the poor and the disadvantaged, thus it will lead to a inclusive growth of the urban region.
ULB Capacity	Identified cities/towns are required to prepare Heritage Management Plan (HMP) for the city/town and develop and execute Detailed Project Reports (DPRs) for identified projects	The ULB or some other agency, designated for the satellite town are subjected to prepare the City Development Plan (CDP) for the implementation of particular projects.
Fund Flow (₹ Cr.)	Total Cost of Approved Projects is ₹ 418.06 Crore	The total released fund is ₹ 325.792 crore against the total approval of ₹ 645.294 crore
Observations	absence of role clarity, and ad-hoc decisions have affected and in part defeated the very concept of HRIDAY scheme	Fund paucity

# Linkage between authorities to most vulnerable group





# S & T Advice for Resilient Urban Infrastructure Planning



# Selection of Urban Area for Resilience planning

## 1. Data collection

RS image of the selected area, demographic, meteorological, physiographic data

## 2. Analysis of Remote Sense images

- 2.1 Historical trend analysis using RS images
- 2.2 Generation of current land surface temperature pattern using thermal imagery

## 3. Database generation for GIS

- 3.1 Base maps creation based on administrative boundaries.
- 3.2 Collection of on-site data to augment the secondary sources of data
- 3.3 Generation of demographic, meteorological and physiographic data maps (ex. Air Quality, LULC etc.) from site and secondary data collected.

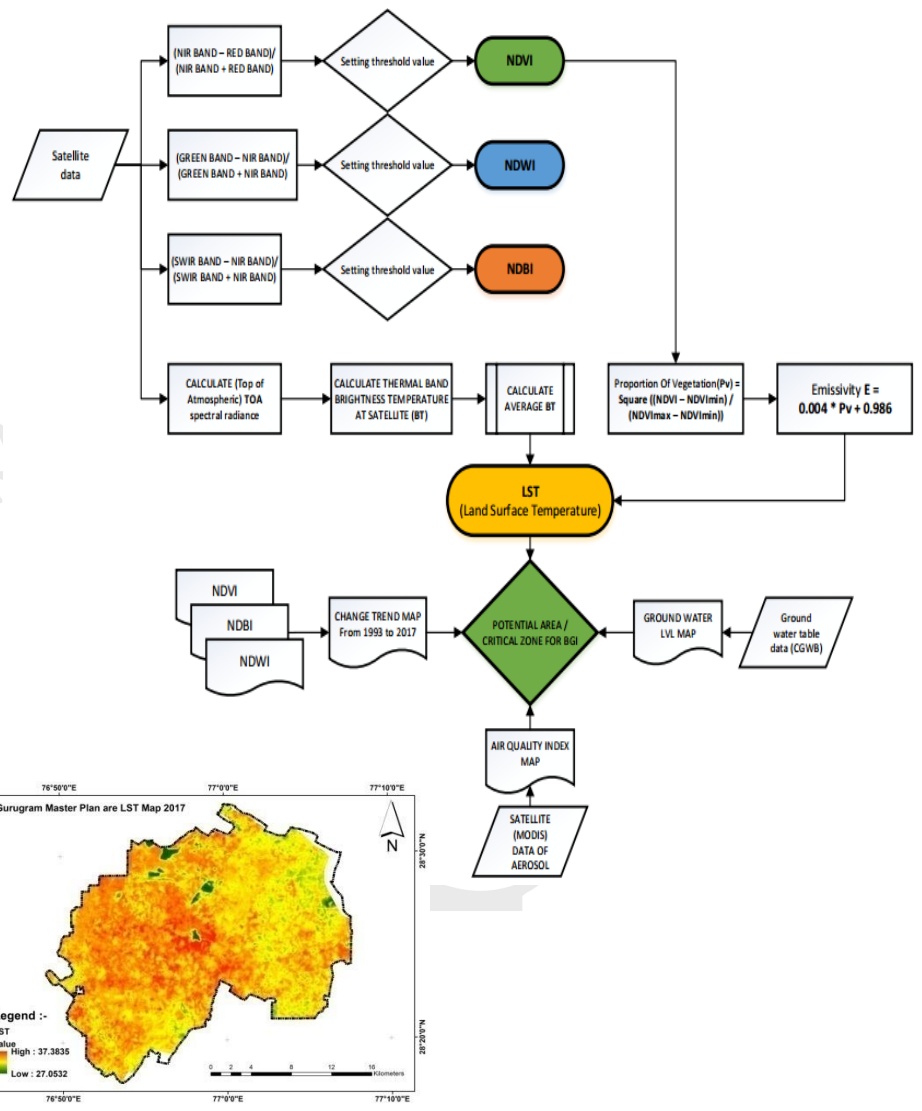
## 4. Overlay generation and hotspot identification

- 4.1 Generating overlay based on processed RS images, LST and data maps from steps 2.1, 2.2 and 3.3
- 4.2 Identifying high potential zones and critical zones from overlays generated
- 4.3 Demarcating Area of Interest (Aoi) within the high potential and critical regions

## 5. Potential solutions and stakeholder consultations

- 5.1 Selection of potential solutions from BGI solution basket.
- 5.2 Creation of networked implementation plan for BGI
- 5.3 Stakeholder consultation to finalize the solutions as generated by the GEOS-NAT process

## 6. Detailing of final participatory action plan with conjunction of stakeholders



# COALITION FOR DISASTER RESILIENT INFRASTRUCTURE-CDRI

## CDRI MISSION

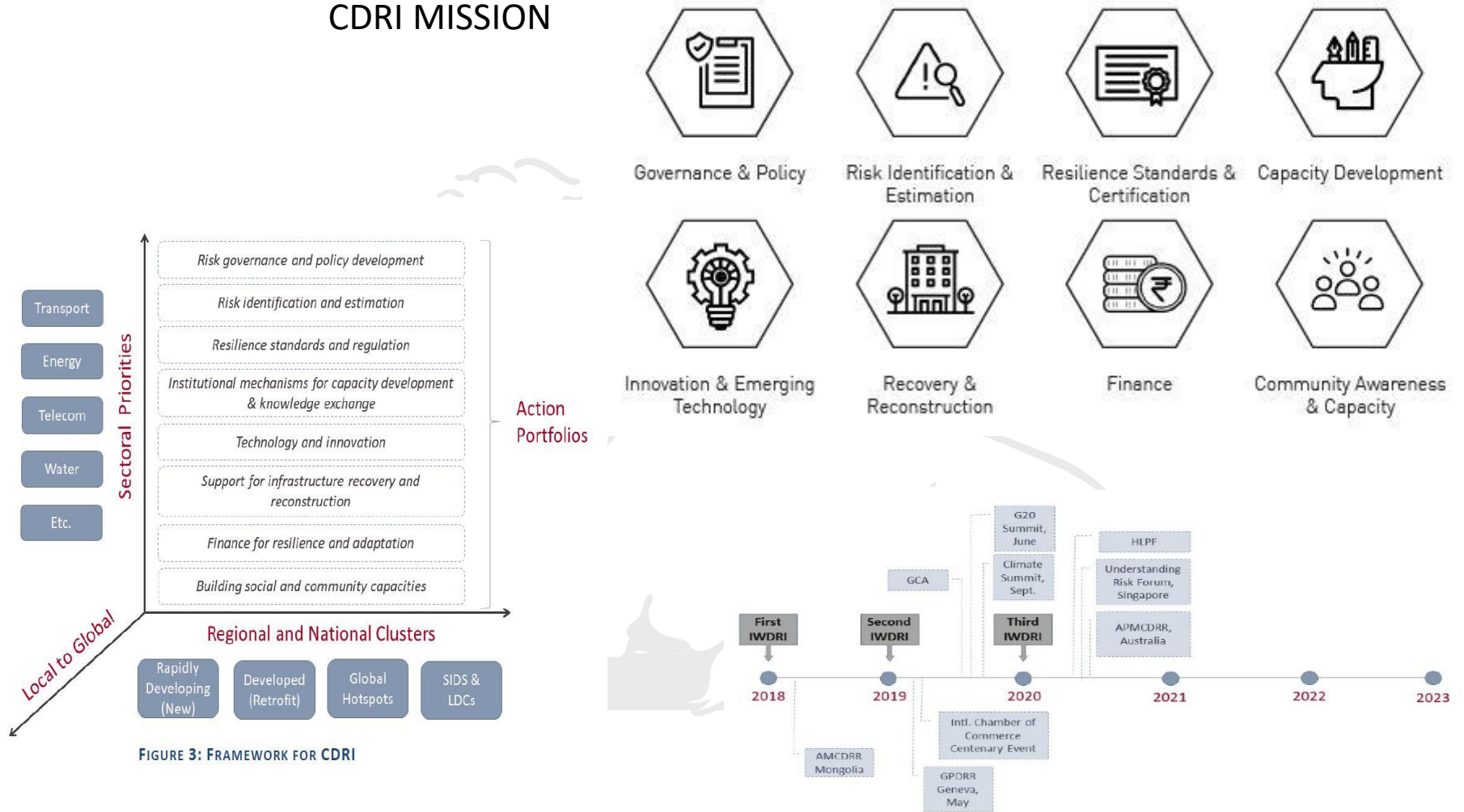


FIGURE 3: FRAMEWORK FOR CDRI

FIGURE 4: TIMELINE OF GLOBAL EVENTS AND CDRI DEVELOPMENT

# COMMUNITY CAPACITY FOR DISASTER RESILIENT INFRASTRUCTURE



Community capacity for disaster resilient infrastructure  
Instead of immediate solutions  
As the risk is dynamic



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