Resilience Efforts in India

US-India Partnership for Climate Resilience
Workshop on Development & Application of Downscaling Climate Projections
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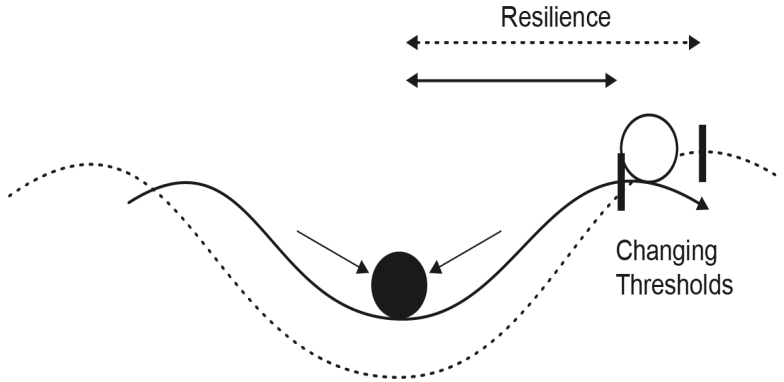
Outline

- Impacts & Consequences
- Resilient Building Measures
- Looking Ahead

Why focus on resilience?

- Risk perceived ***increasing in both frequency and intensity***
- ***Resilience perceived as a process of reconciling humanitarian response to disasters with longer-term development*** efforts.
- Growing ***understanding and recognition of interdependence*** between biophysical and socioeconomic systems.

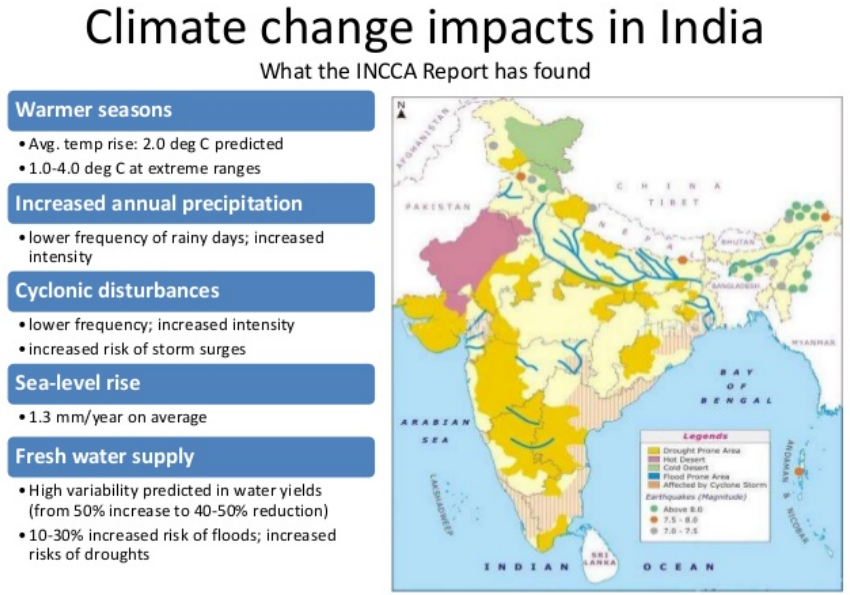


Primary Drivers of Vulnerability

- Climate Change
- Population Growth
- Poverty
- Urbanization
- Globalization
- Conflicts & terrorism

Climate Variations & Change

- More than 60% of population depends on climate sensitive sectors, e.g. agriculture and forestry
- Temperature increases
  - Observed: 0.4°C over past 100 yrs.
  - Projected: ~ 2 °C by 2030.
- Precipitation will be me more variable, e.g. changes in monsoon patterns
- Increase in both intensity & frequency of extreme events: droughts, floods, cyclones



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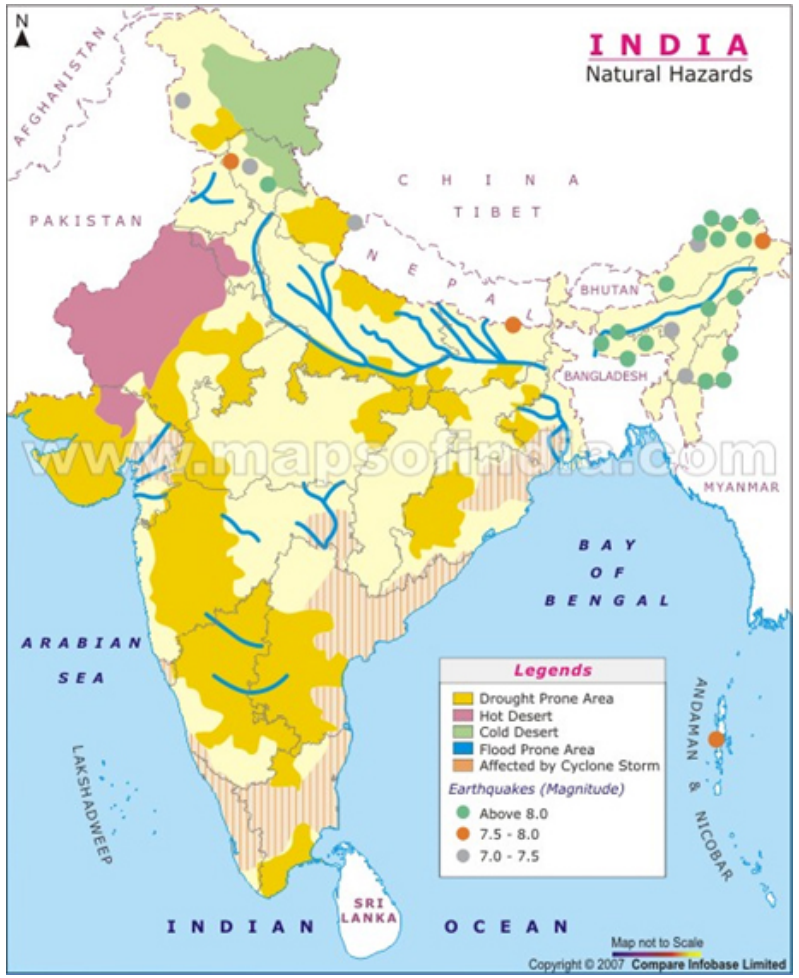
Disasters- Indian Scenario

- India supports **1/6th of world's population** on **2 % of world**'s landmass
- **59%** of land vulnerable to earthquakes
- **28%** of land vulnerable to drought
- 68% of cultivable lands are vulnerable to droughts
- **40 million hectares** (12%) of land vulnerable to floods
- **80%** of coast vulnerable to Cyclones
- **1 million** houses damaged annually leading to human, economic, social and other losses



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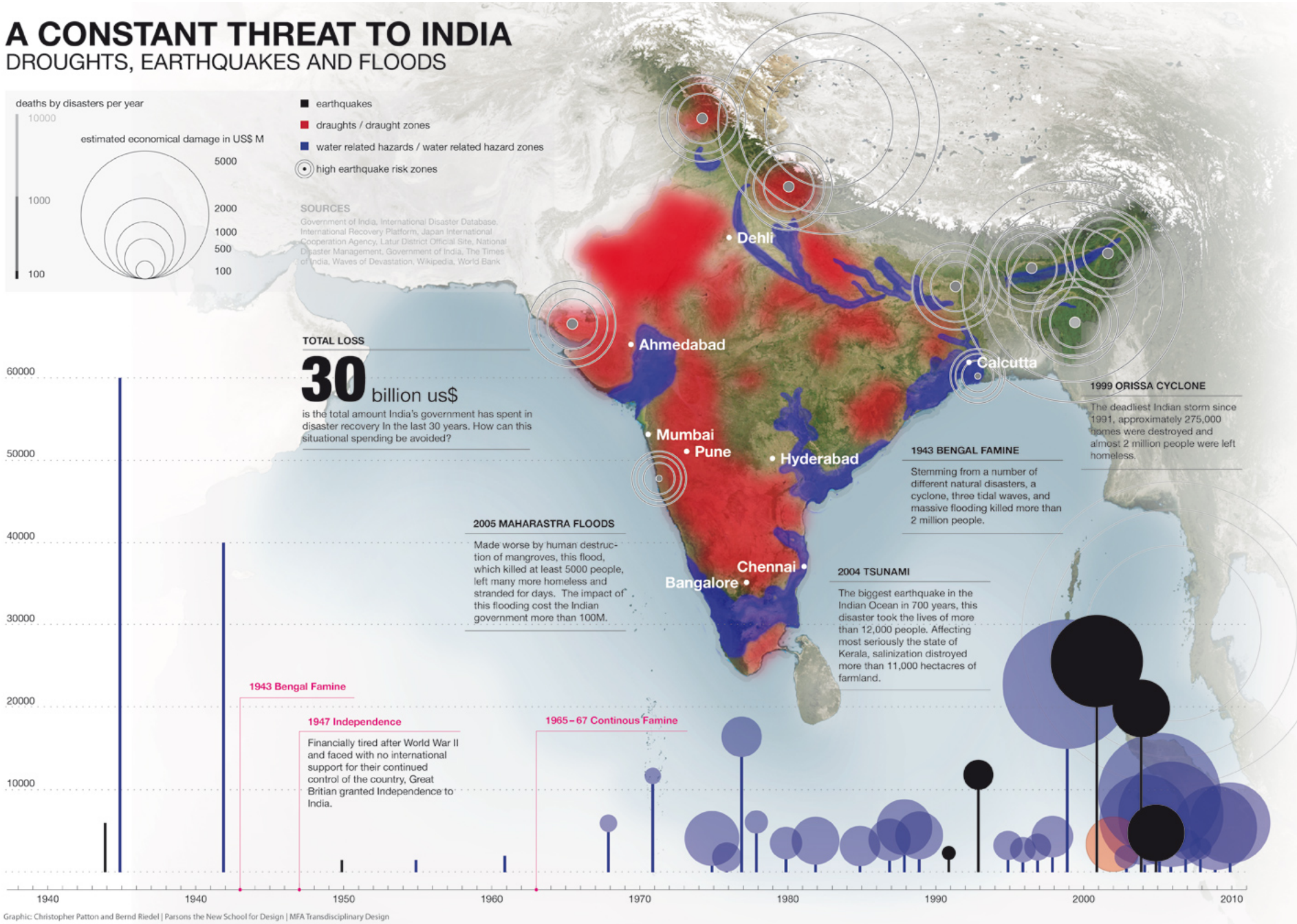
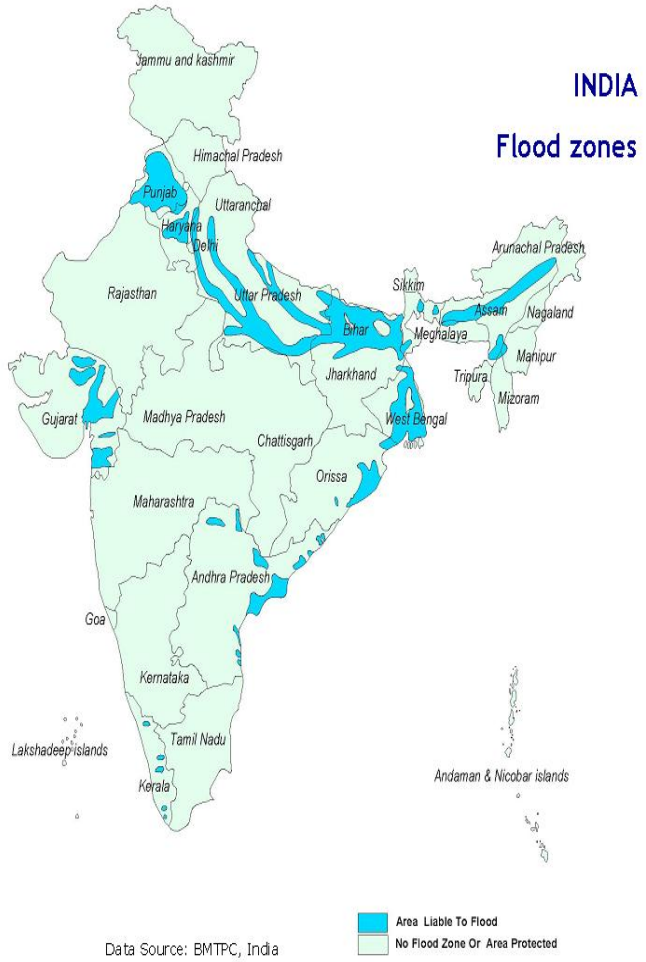


http://indiaenvironmentportal.org.in/media/iep/infographics/2015%20Floods/tracker.html

Floods

- About ***30 million people are affected annually.*** Floods in the Indo–Gangetic–Brahmaputra plains are an annual feature.
- On an average, a few hundred lives are lost, millions are rendered homeless and several hectares of crops are damaged every year.
- Nearly ***75% of the total rainfall occurs over a short monsoon season*** (June – September). 40 million hectares, or 12% of Indian land, is considered prone to floods.
- Floods are a perennial phenomenon in at least 5 states - ***Assam, Bihar, Orissa , Uttar Pradesh and West Bengal.***

Source: NDMA, 2011



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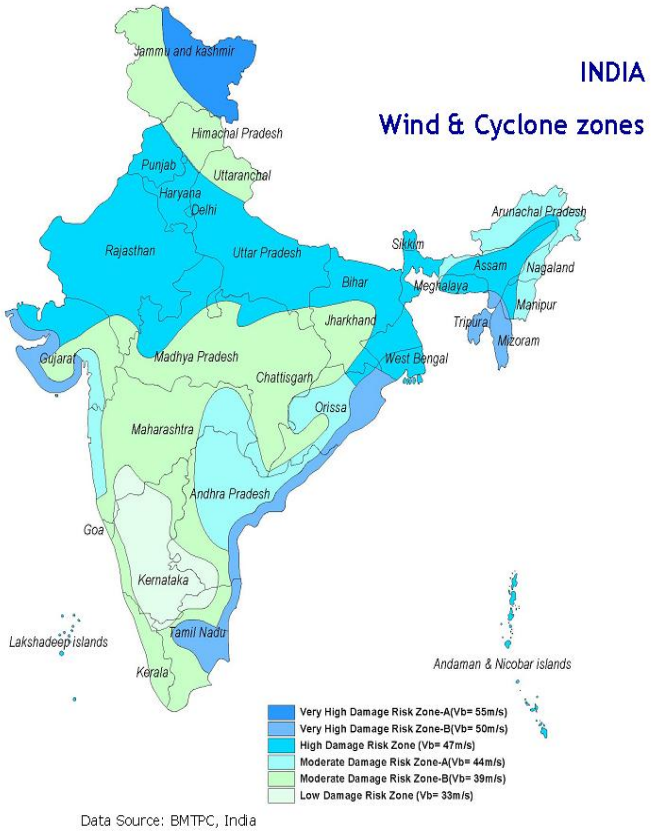
Droughts

- Drought is another ***recurrent phenomenon*** which results in widespread adverse impact on vulnerable people's livelihoods and young children's nutrition status.
- About ***50 million people are affected annually by drought***. Of approximately 90 million hectares of rain-fed areas, about 40 million hectares are affected by scanty or no rain.
- Though droughts are slow onset emergency, and to an extent predictable emergency, they have caused severe suffering in the affected areas ***exacerbating poverty, hunger and unemployment***

Cyclones

- About 8% of the land is vulnerable to cyclones of which ***coastal areas experience two or three tropical cyclones of varying intensity each year.***
- Cyclonic activities on the east coast are more severe than on the west coast.
- The Indian continent is considered to be the worst cyclone-affected part of the world, as a result of low-depth Ocean-bed topography and coastal configuration.
- The principal threat from a cyclone are in the form of gales and strong winds; torrential rain and high tidal waves and storm surges
- More ***cyclones occur in the Bay of Bengal than in the Arabian Sea and the ratio is approximately 4:1.***

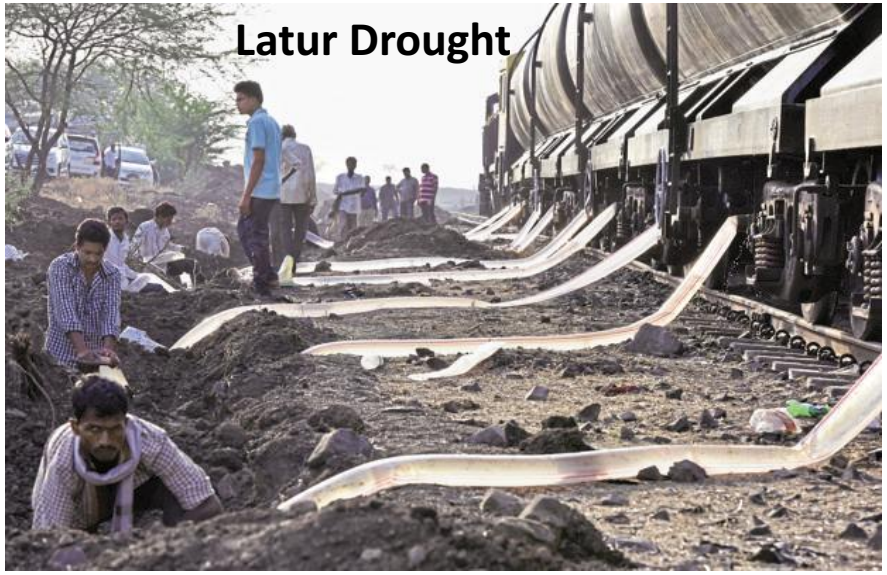


Projected Coastal Impacts

- **Coastal Zone**
  - About 7516 Kms of coastline
  - **Population density** of 455 pers /Km^2, **1.5 times** national average of 324 pers/ Km^2
  - Sea level rise highest along Gulf of Kutch/ coast of West Bengal
  - **1m Sea Level Rise**

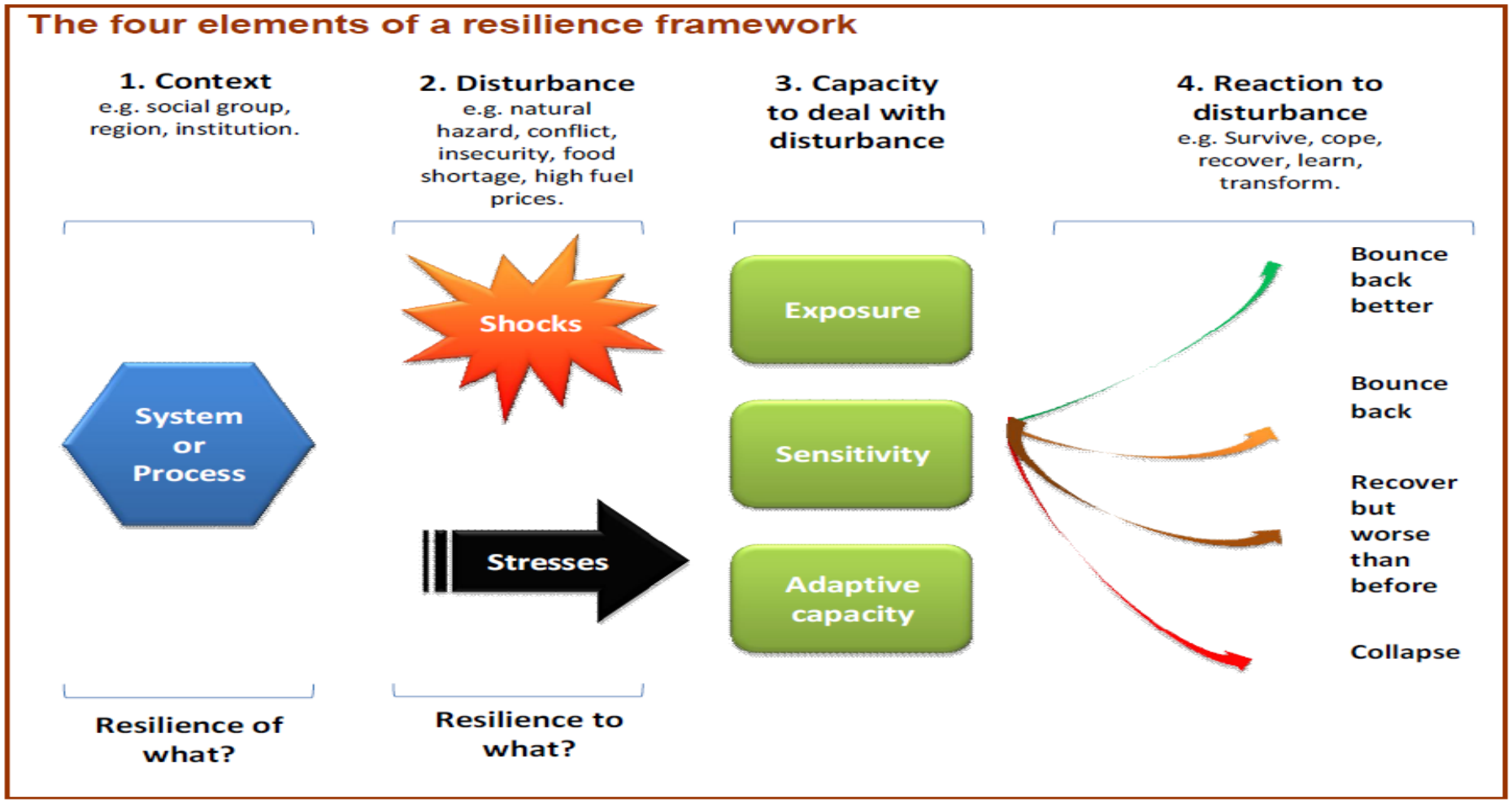
    - will displace aprox **7.1 million** people, about **5,764 Km^2** of land area will be lost and damage 4200 km of road network

India – last two years



Chennai – DailyO, Latur – Livemint, J&K- Indiatoday, Karnataka- TheHindu

Resilience Framework



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Resilience Options

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Keys to Managing Risk

- Assessing vulnerability
- Understanding climatic sensitivities and critical thresholds
- Characterizing adaptive capacity
- Engage decision makers
- Integrating risks due to climate change into on-going decision making processes

India's Climate Resilience Framework

- **National, state and local government initiative to:**

  - help jurisdictions develop individual resilience strategies

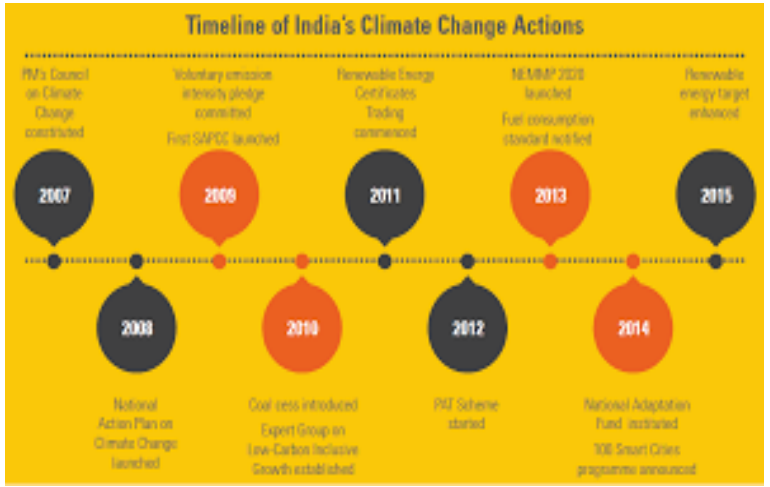
  - identify areas where jurisdictions can work together

- **Framework defines three broad needs**

  1. To build knowledge and understanding
  2. To increase awareness and engagement
  3. To build capacity to undertake / implement action

Resilience Building Initiatives

- National Action Plan on Climate Change (NAPCC)
  - National Solar Mission
  - National Mission for Enhanced Energy Efficiency
  - National Mission on Sustainable Habitat
  - National Water Mission
  - National Mission for Sustaining the Himalayan Ecosystem
  - National Mission for a “Green India”
  - National Mission for Sustainable Agriculture
  - National Mission on Strategic Knowledge for Climate Change



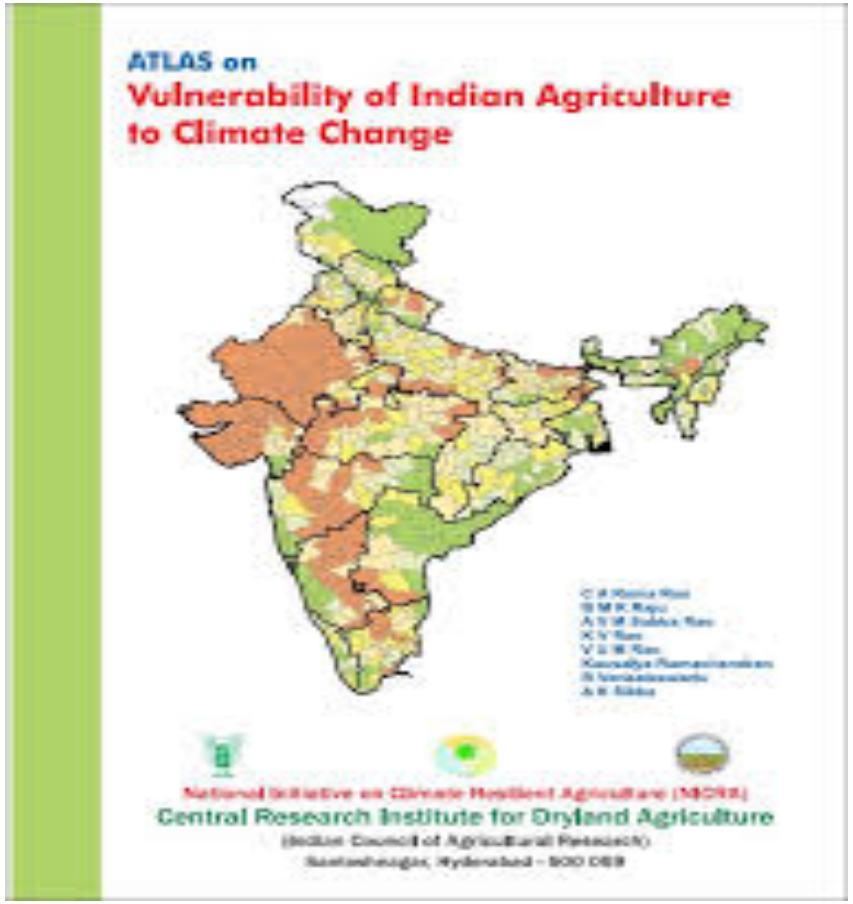
- State Action Plan on Climate Change (SAPCC) – 30 states
- National Adaptation Fund for Climate Change with an initial allocation of INR 3,500 million (USD 55.6 million)
- Urban
  - Jawaharlal Nehru National Urban Renewal Mission
  - Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT)
  - Climate proofing of Infrastructure
  - 100 Resilient cities

Resilience Building Initiatives

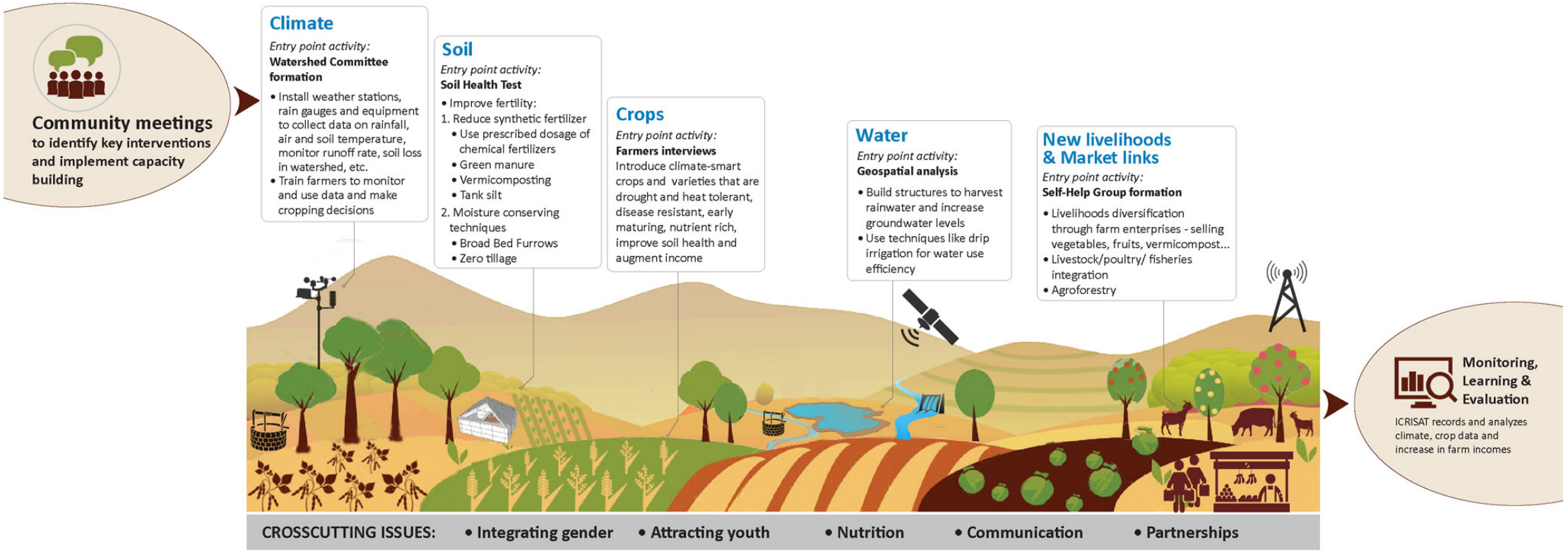
- Rural
  - Integrated adaptation in national schemes like MGNREGS
  - National Initiative on Climate Resilient Agriculture (NICRA)
  - National Agroforestry Policy (NAP)
  - National Mission for Clean Ganga
  - Watershed Management Projects
  - Afforestation programs
  - Climate proofed Infrastructure (roads, ports, check dams)
  - Weather based Insurance
- Fiscal Instruments
  - Taxes on fossil fuels, coal cess
  - Tax free Infrastructure bonds
  - Incentives for creation of carbon sinks
- Health
  - Integrated Disease Surveillance Programme (IDSP)
  - National Vector Borne Disease Control Programme (NVBDCP)
- Integrated Coastal Zone Management
- National and State Disaster Management Authority

National Initiative for Climate Resilient Agriculture (NICRA)

- Agricultural vulnerability atlas for India (2013)
- Integrated watershed management approach
- Climate & crop Modelling
- Agro advisories based on meteorology
- Climate information services
- Agronomic interventions
- Integrated farm management
- Training & capacity building
- Research & development



CCAFS - Community Oriented Approaches



IWMI, 2012

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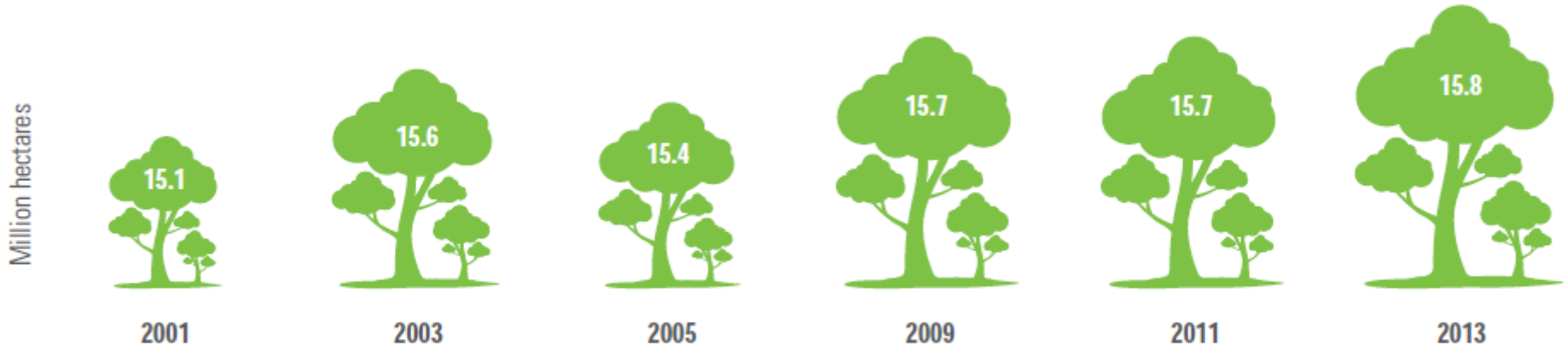
Forestry

Forest and tree cover of India



Source: The State of Forest Report, Forest Survey of India, 2001-2013
Note: The State of Forest Report was not published by Forest Survey of India in 2007

Urban Resilience

- Urban areas in India contribute to 60% of GDP. Expected grow by 70% by 2030
- About 70% of urban infrastructure is yet to be built in India. Huge opportunity for integrating resilience in future infrastructure development.
- Smart Cities Initiative (green infrastructure, energy efficiency, water conservation, waste management, sustainable transport systems)
- City specific vision documents

Key Constraints

- Inadequate Capacity
- Outdated acts & regulations
- Data quality and access
- Information flow – Moving target
- Research
- Diversity
- Weak Institutions – extension services
- Scattered institutional memory

Resilient Characteristics

- India has enough experience in dealing with natural disasters
- The lessons that we learnt from the Orissa cyclone of 2000, the Gujarat earthquake of 2001 and the tsunami of 2004 - the major disasters have helped us effect a paradigm shift in our approach to disaster management and building resilience
- Social capital is the biggest asset
- Rich traditional knowledge
- Advancement in science & technology

Looking ahead

- Promote evidence based research
- Transformative approaches
- Sound M&E
- Leveraging low-carbon technologies
- Knowledge sharing (best practices, tools & methods)
- Improved access to climate information
- Information support for decision making
- About 70% of urban infrastructure is yet to be built in India. Provides a big window of opportunity to build climate resilient infrastructure.
- Focus on peri-urban development

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