

Introduction and Terms associated with vulnerability

vulnerability refers to the inability of an individual, group, society, or a nation to deal with disasters effectively. Many factors like economic, social, and political affect the capacity of people to deal with disasters.

Types of vulnerability:

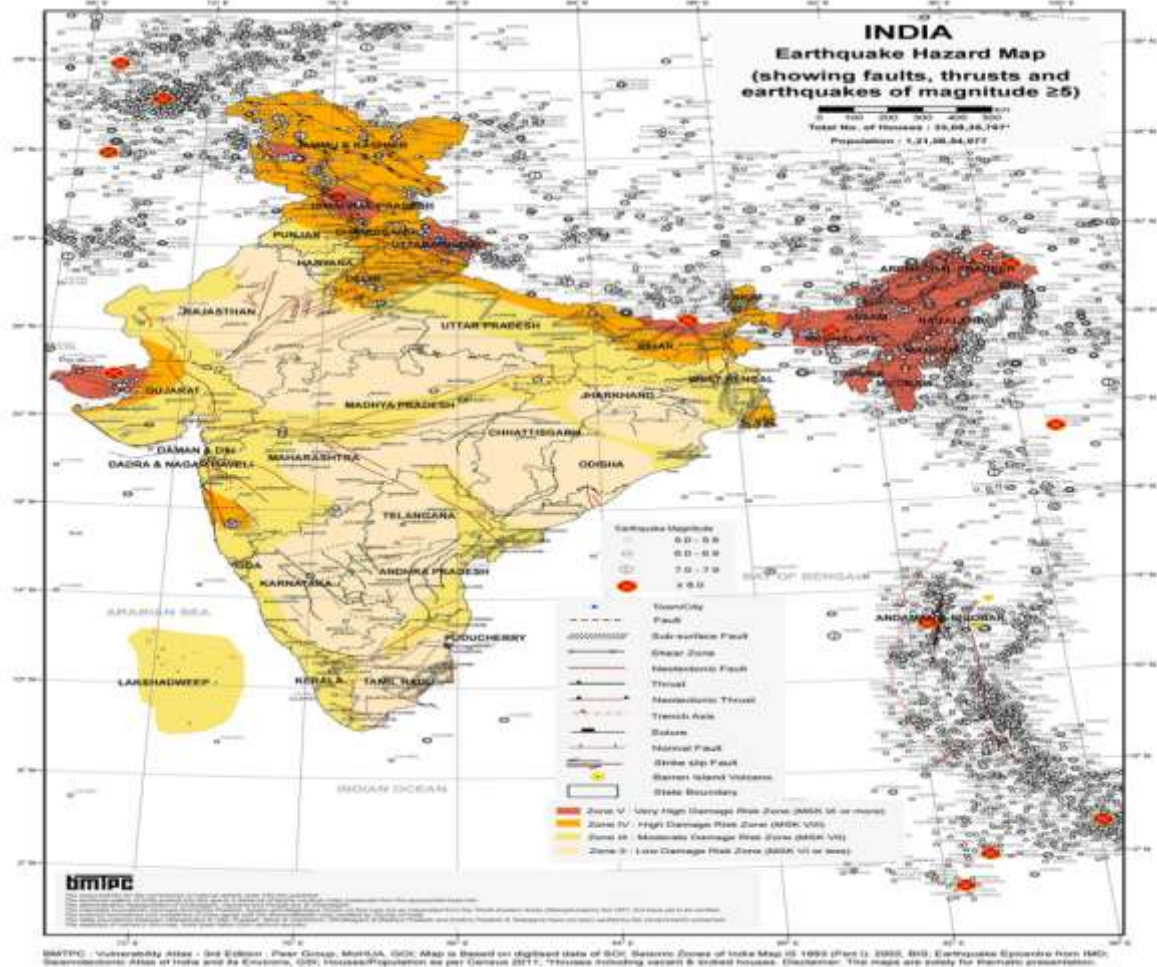
- Physical/ Material Vulnerability: (Example: People living in unsafe buildings in earthquake-prone areas are physically vulnerable).
- Economic Vulnerability: (Example: People without financial and material resources are economically handicapped and therefore more vulnerable than the rich).
- Ecological Vulnerability: (Example: Communities and people unprotected from the on-going ecological degradation are ecologically vulnerable).
- Social Vulnerability: (Example: People without social connectivity and support are socially vulnerable).
- Organizational Vulnerability: (Example: Communities without capacity and organizational support are organizationally vulnerable)
- Communicational Vulnerability: (Example: Communities without access to information and telecommunication facilities suffer from communicational vulnerability).
- Attitudinal Vulnerability: (Example: Communities without behavioral training, education, and awareness suffer from attitudinal vulnerability).
- Political Vulnerability: (Example: Locations without political patronage suffers from political vulnerability).

The vulnerability atlas of India

1. Earthquake hazard map
2. Wind hazard map
3. Wind & Cyclone hazard map
4. Potential Tsunamigenic Zones
5. Thunderstorm incidence map
6. Landslide incidence map
7. Flood hazard map
8. Map of drought prone districts of India

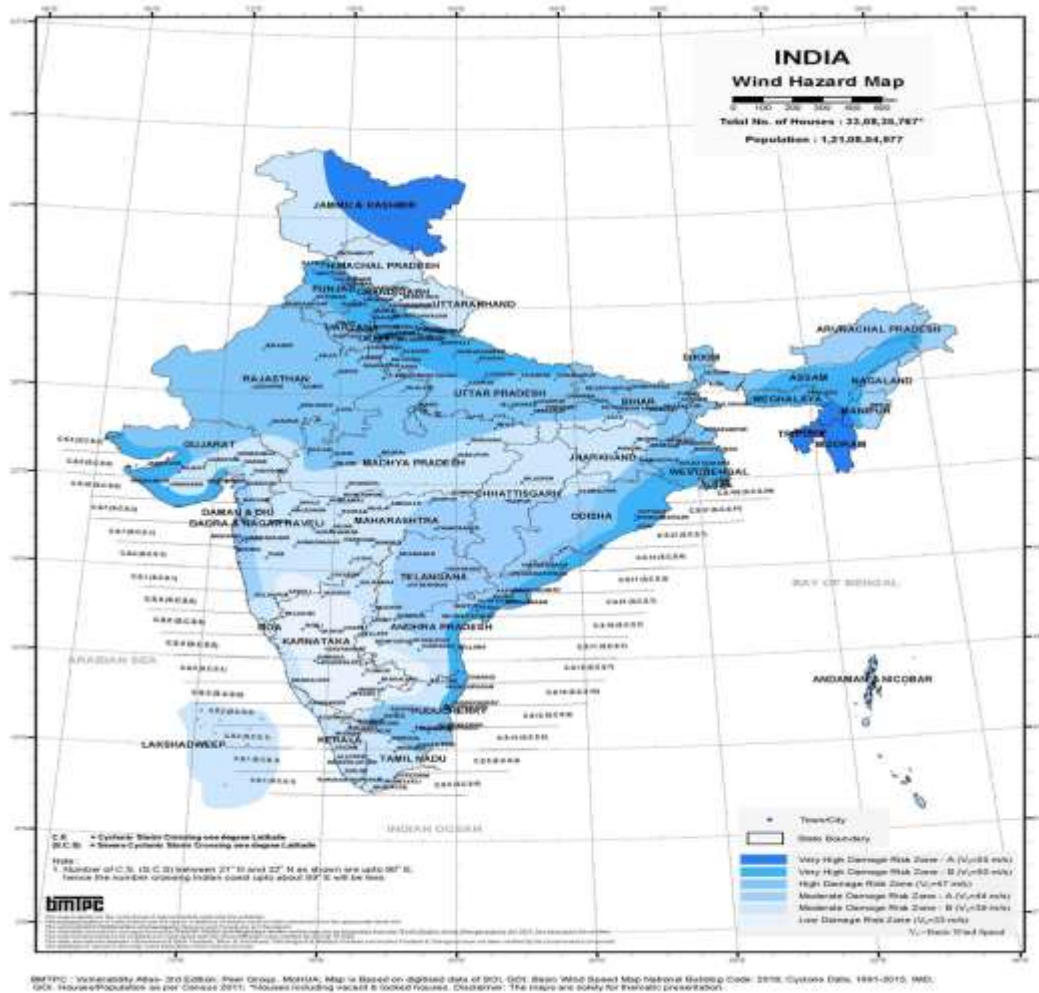





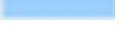
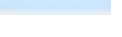
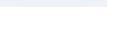
Earthquake Hazard Map



- The entire Indian landmass, susceptible to different levels of earthquake hazards, referred to as Zone II to V as per the Seismic Zoning Map of India.
- Zone V: Very high damage risk zone (IX or more of Mercalli scale)
- Zone IV: High damage risk zone (VIII of Mercalli scale)
- Zone III: Moderate damage risk zone (VII of Mercalli scale)
- Zone II: Low damage risk zone (VI or less of Mercalli scale)

Wind Hazard Map



- The wind hazard map of India includes 6 different zone:
-  Very high damage risk zone – A (Wind velocity = 55m/s)
-  Very high damage risk zone – B (Wind velocity = 50m/s)
-  High damage risk zone (Wind velocity = 47m/s)
-  Moderate damage risk zone – A (Wind velocity = 44m/s)
-  Moderate damage risk zone – B (Wind velocity = 39m/s)
-  Low damage risk zone – (Wind velocity = 33m/s)

Wind & Cyclone Hazard Map

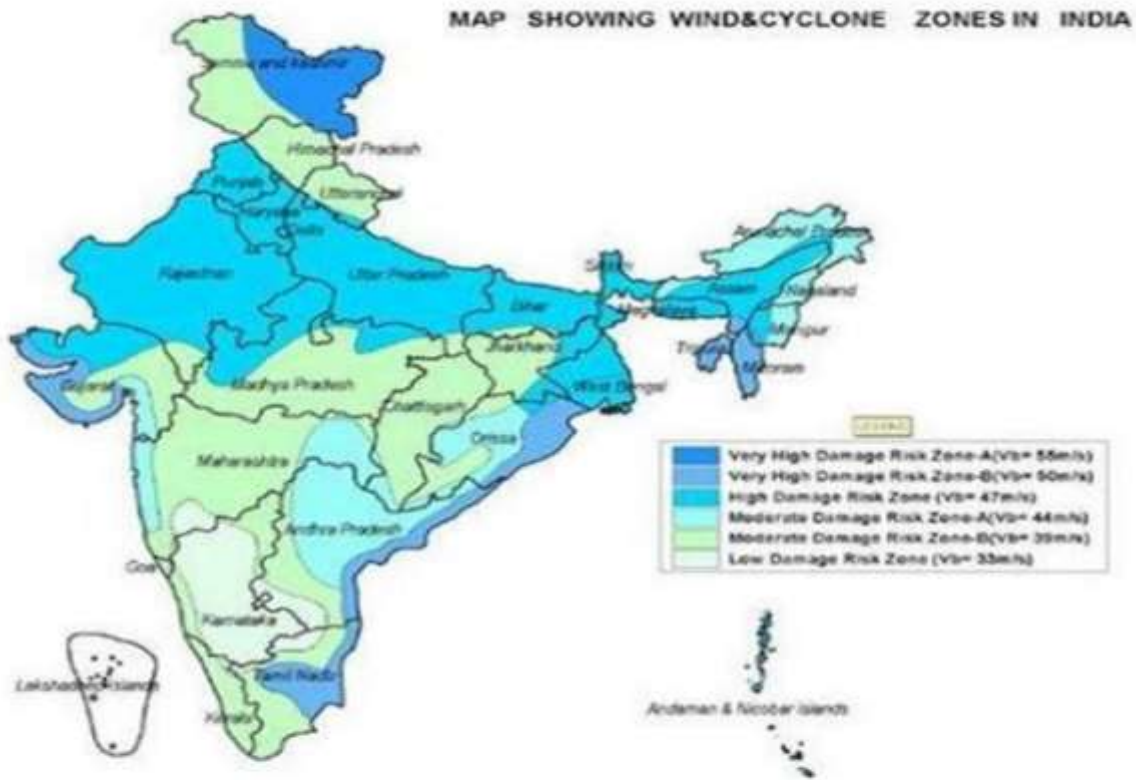






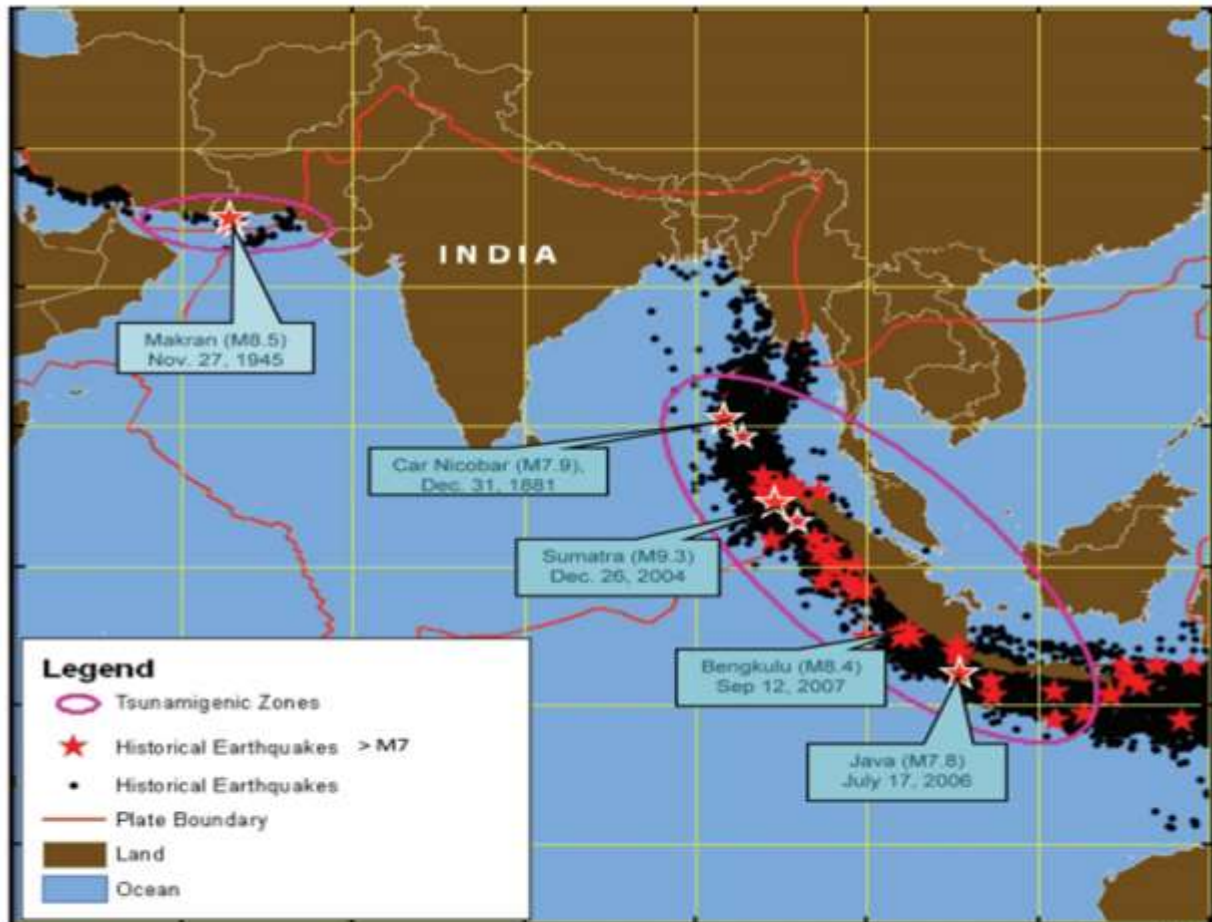


Figure 5 Wind & Cyclone Hazard Map

- The combined map of wind and cyclone map of India include 6 different zones.
-  Very high damage risk zone – A (Wind velocity = 55m/s)
-  Very high damage risk zone – B (Wind velocity = 50m/s)
-  High damage risk zone (Wind velocity = 47m/s)
-  Moderate damage risk zone – A (Wind velocity = 44m/s)
-  Moderate damage risk zone – B (Wind velocity = 39m/s)
-  Low damage risk zone – (Wind velocity = 33m/s)

Potential Tsunamigenic Zones

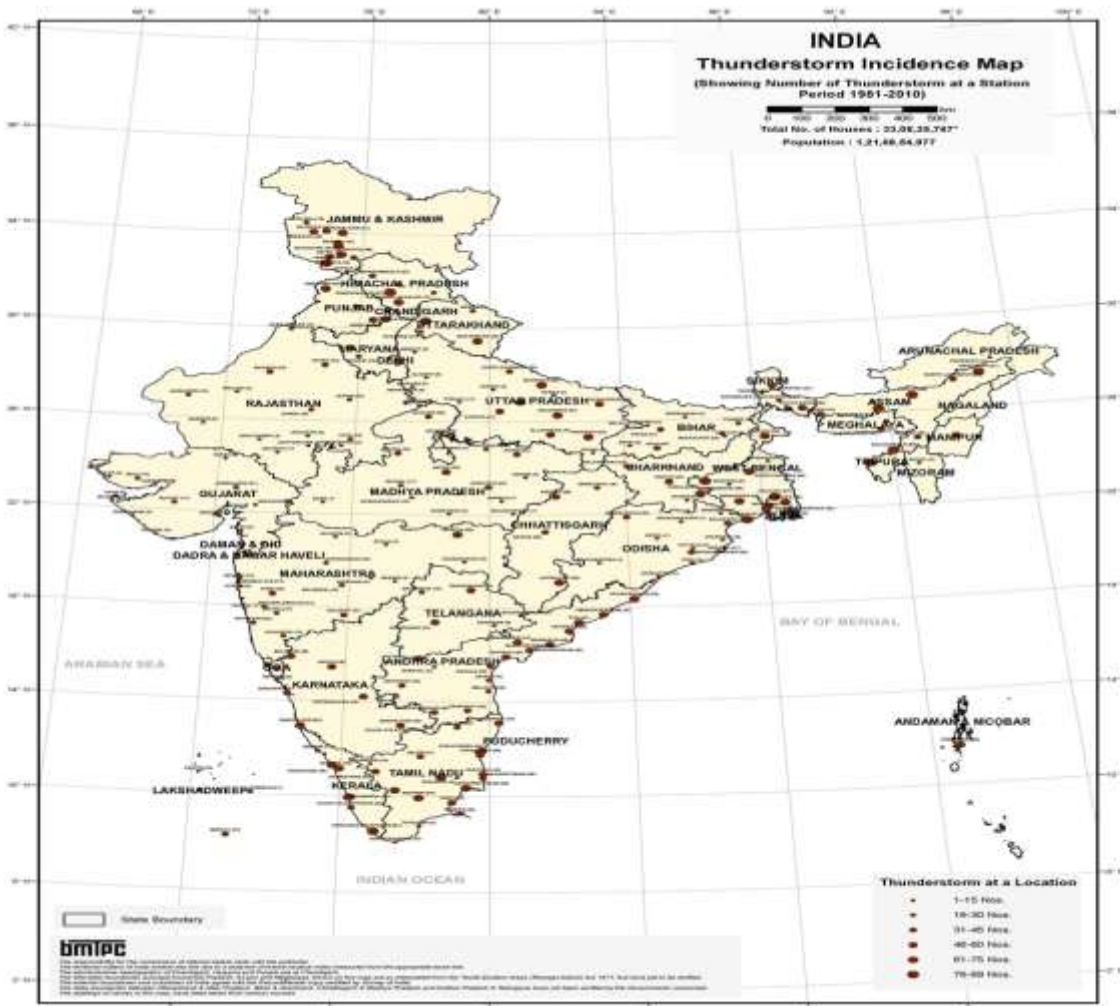


- Potential Tsunamigenic zones may be seen from the above map. For Tsunami to hit the Indian coast according to INCOIS, it is necessary that the earthquake of magnitude more than 7.0 on Richter scale should normally occur. The possible zones for such an event to occur are Andaman - Sumatra or Makran (Pakistan). Not all the major earthquakes are Tsunamigenic.

❖ Historical Tsunamis in India

- 12 Apr, 1762 (BoB EQ) – 1.8 M
- 31 Dec, 1881 (Car Nicobar EQ)
- 27 Aug, 1883 (Krakatoa) – 2 M
- 26 Jun, 1941 (Andaman EQ)
- 27 Nov, 1945 (Makran EQ) – 12 M
- 26 Dec, 2004 (Sumatra EQ) – 10 M

Thunder storm incidence Map



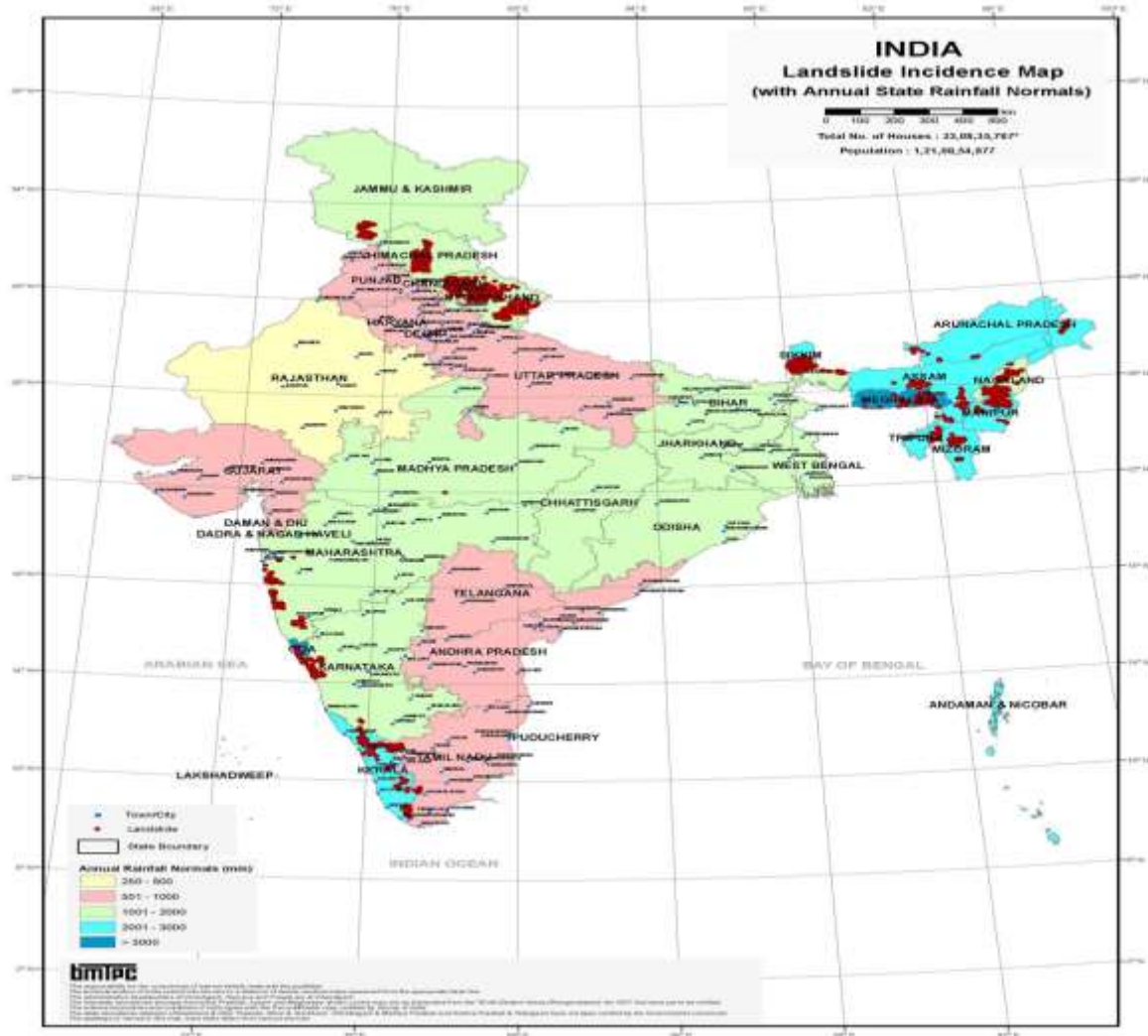
BMIPC: Vulnerability Atlas - 3rd Edition, Peer Group, MURUA, GSI. Map is based on digitized data of SOI/Thunderstorm data from IMD. Disclaimer: The maps are solely for thematic presentation.

- In the above map the relative number of thunderstorms is higher in southern regions of India as well as north – east and Himalayan regions.
- The larger size circles in depicting thunderstorm in the above map representing 76 to 89 no.s of thunderstorms of a particular location.
- The smaller size circles representing only 1 to 15 no.s of thunderstorms at a location.

AUDIT COURSE - DISASTER MANAGEMENT - THE VULNERABILITY ATLAS OF INDIA

Roshni.K.S, Department of Geology and Environmental Science

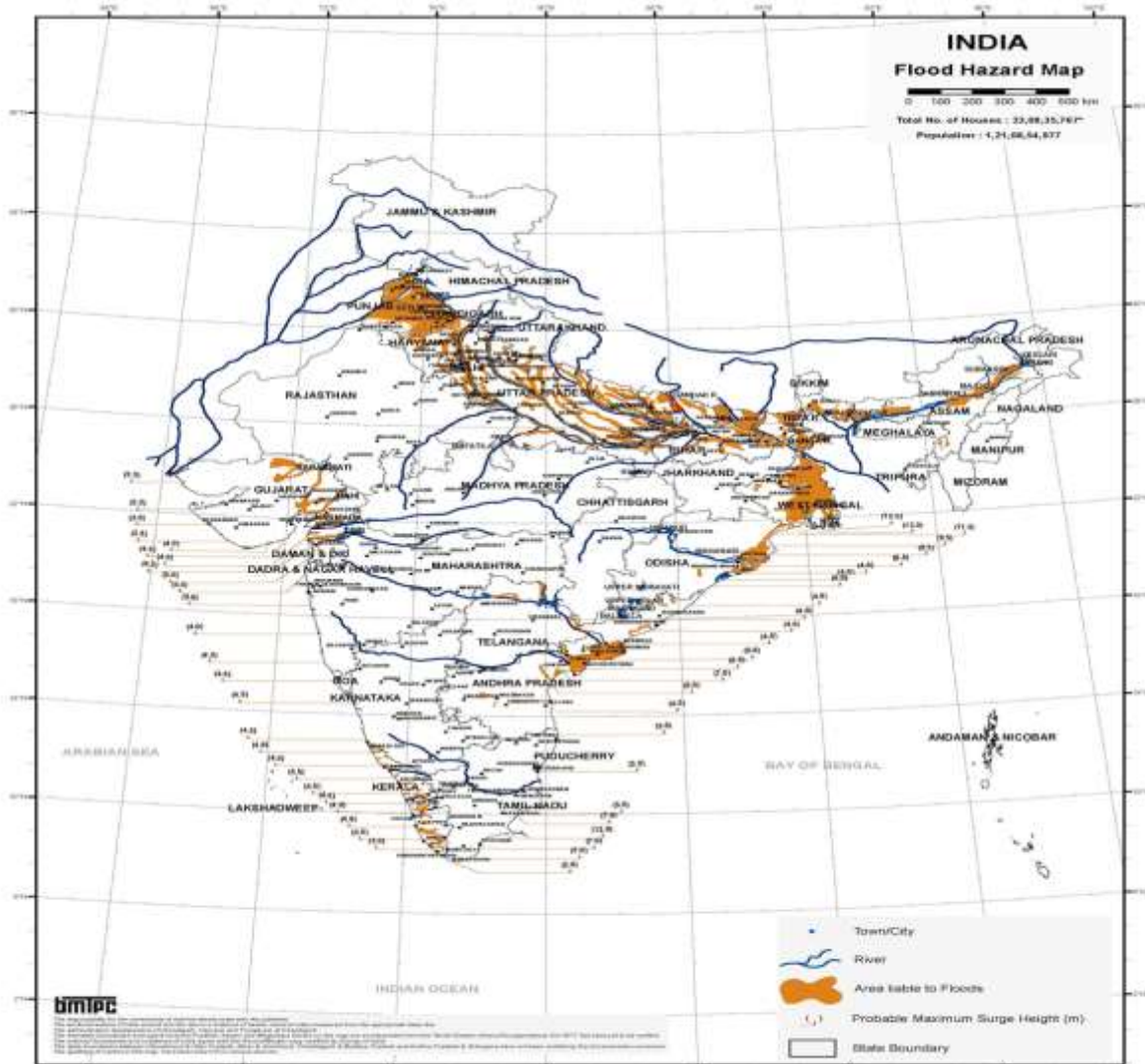
Landslide incidence map



DMTC: Vulnerability Atlas - 3rd Edition, Peer Group, Mumbai, GOI. Map is Based on digitized data of SOI. Landslide incidence data ISR. Annual Rainfall data IMD. Houses/Population as per Census 2011. Houses including vacant & locked houses. Disclaimer: The Maps are solely for thematic presentation.

- Landslides mainly affect the Himalayan region and the western Ghats of India.
- Landslides are also common in the Nilgiris range. It is estimated that 30 percent of the world's landslides occur in the Himalayas.
- The areas with relatively high rainfall rate are prone to landslides.
- In the above figure the Western Ghats region, Himalaya and North-East regions are the major areas where number of landslides are high.

Flood Hazard Map

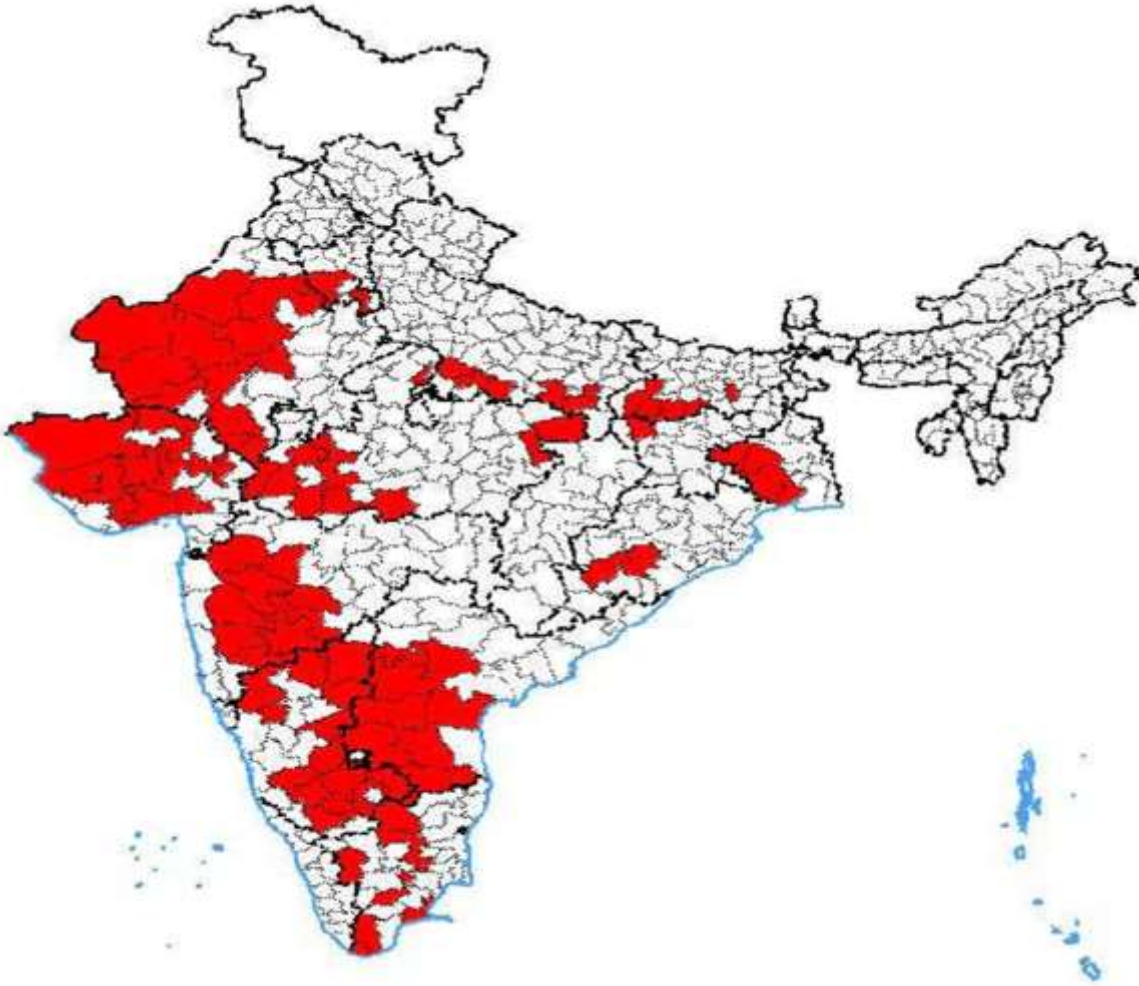


BMIPC: Vulnerability Atlas - 3rd Edition; Peer Group, Mumbai; Map is based on digitized data of S.O. D.C. Census of India 2011; Flood Atlas (1987), Task Force Report (2004), C.W.C., G.O.I. Houses/Population as per Census 2011; * Houses including vacant & locked houses. Disclaimer: The maps are solely for illustrative presentation.

- India is one of the most flood prone countries in the world. The principal reasons for flood lie in the very nature of natural ecological systems in this country.
- Most of the floods occur during the monsoon period and are usually associated with tropical storms, active monsoon conditions and break monsoon situations.
- Floods occur in almost all rivers basins in India.
- Twenty-three of the 35 states and union territories in the country are subject to floods and 40 million hectares of land, roughly one-eighth of the country's geographical area, is prone to floods.

Roshni.K.S, Department of Geology and Environmental Science

Map of drought prone districts of India (Drought prone areas are in red).



- A prolonged period of relatively dry weather leading to drought is a widely recognized climate anomaly.
- Drought can be devastating as water supplies dry up, crops fail to grow, animals die, and malnutrition and ill health become widespread.
- In India around 68 percent of the country is prone to drought in varying degrees.
- Of the entire area 35 percent receives rain falls between 750 mm and 1125 mm which is considers drought prone while 33 percent which receives rainfalls between less than 750 mm is considered to be chronically drought prone.

AUDIT COURSE - DISASTER MANAGEMENT - THE VULNERABILITY ATLAS OF INDIA

Roshni.K.S, Department of Geology and Environmental Science

Reference

- <https://www.bmtpc.org/DataFiles/CMS/file/VAI2019/Index.html>
- Vulnerability Atlas of India, Third Edition 2019, Building Materials and Technology Promotion Council(BMTPC)
- Hand book on Disaster management for nodal officers, National Institute of Disaster Management, New Delhi.
- Disaster Management in India, Ministry of Home Affairs, Government of India
- Rajendra Kumar Bhandari, Disaster Education and Management.
- Stephen 2012, Natural disasters in India with special reference to Tamil Nadu.