



Disaster Management System in India **: An Overview**

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INDIA : DISASTER PROFILE

INDIA'S VULNERABILITY TO DISASTERS



59% of the landmass is prone to earthquakes of moderate to high intensity



68% of the cultivable area is vulnerable to Drought



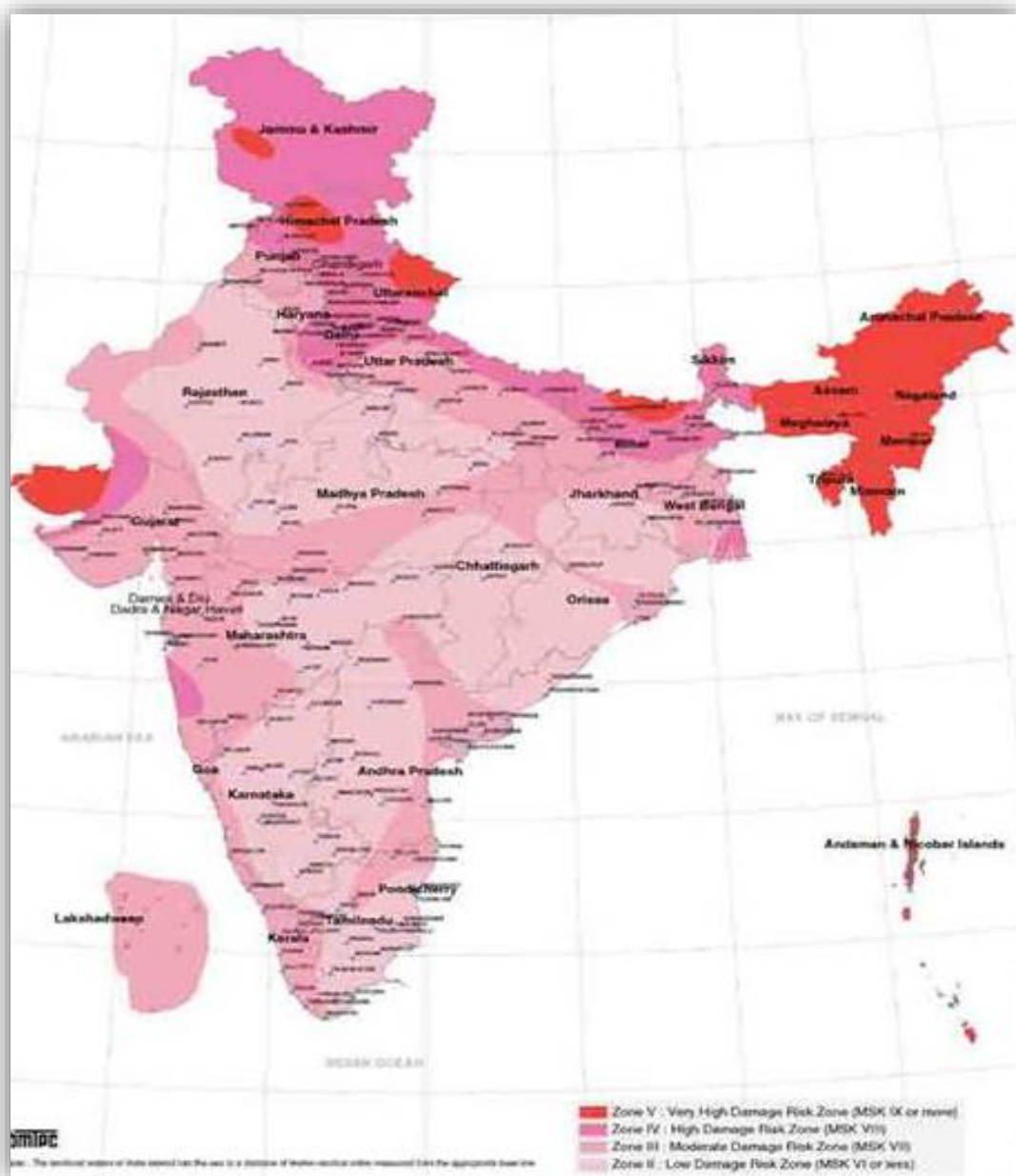
Over 40 million hectares (12% of land) is prone to Floods & River Erosion



Of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis



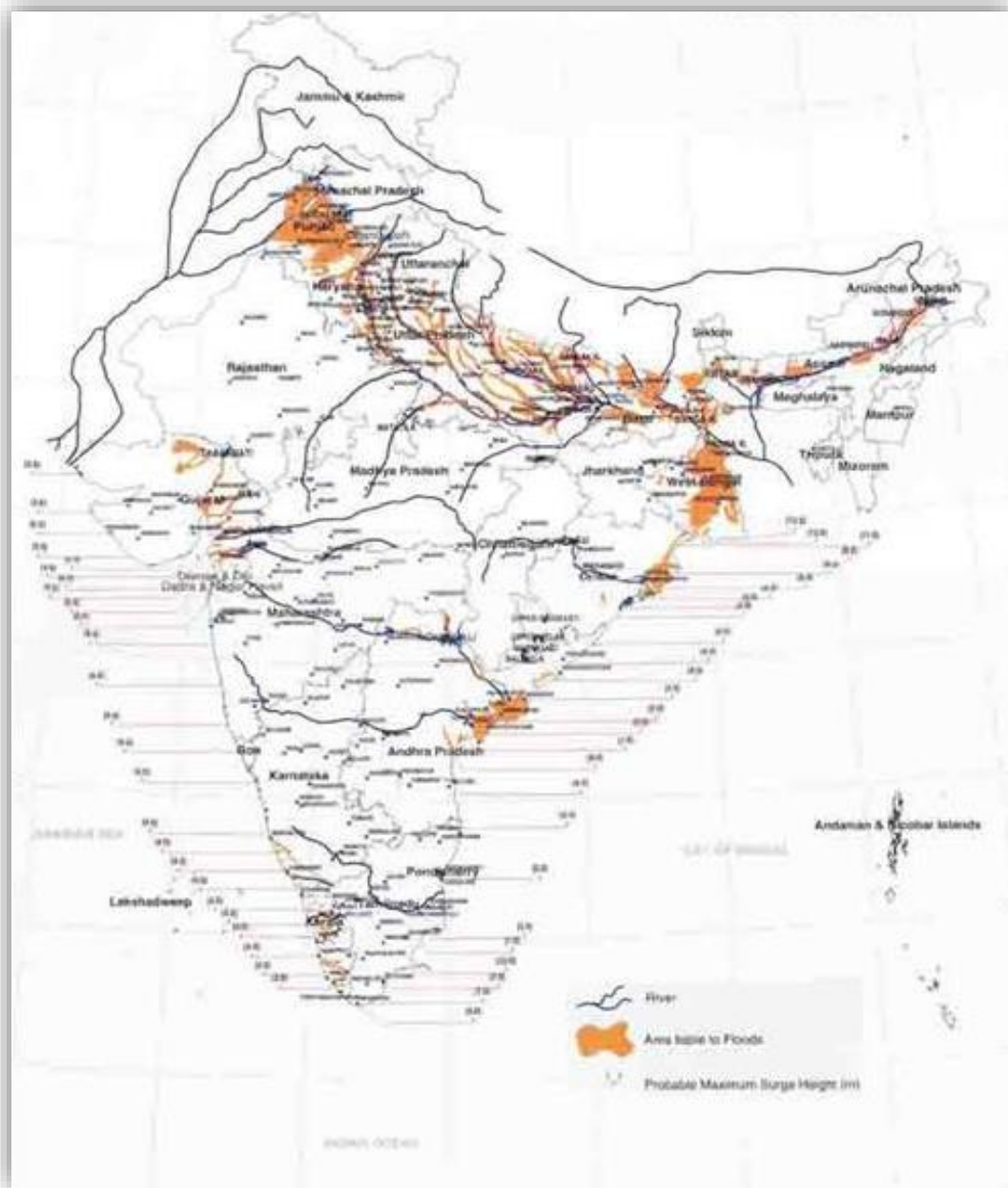
Further, the vulnerability of Chemical, Biological and Radiological & Nuclear disasters has also increased



**59% of the landmass
prone to earthquakes**



68% prone to drought



12% prone to floods

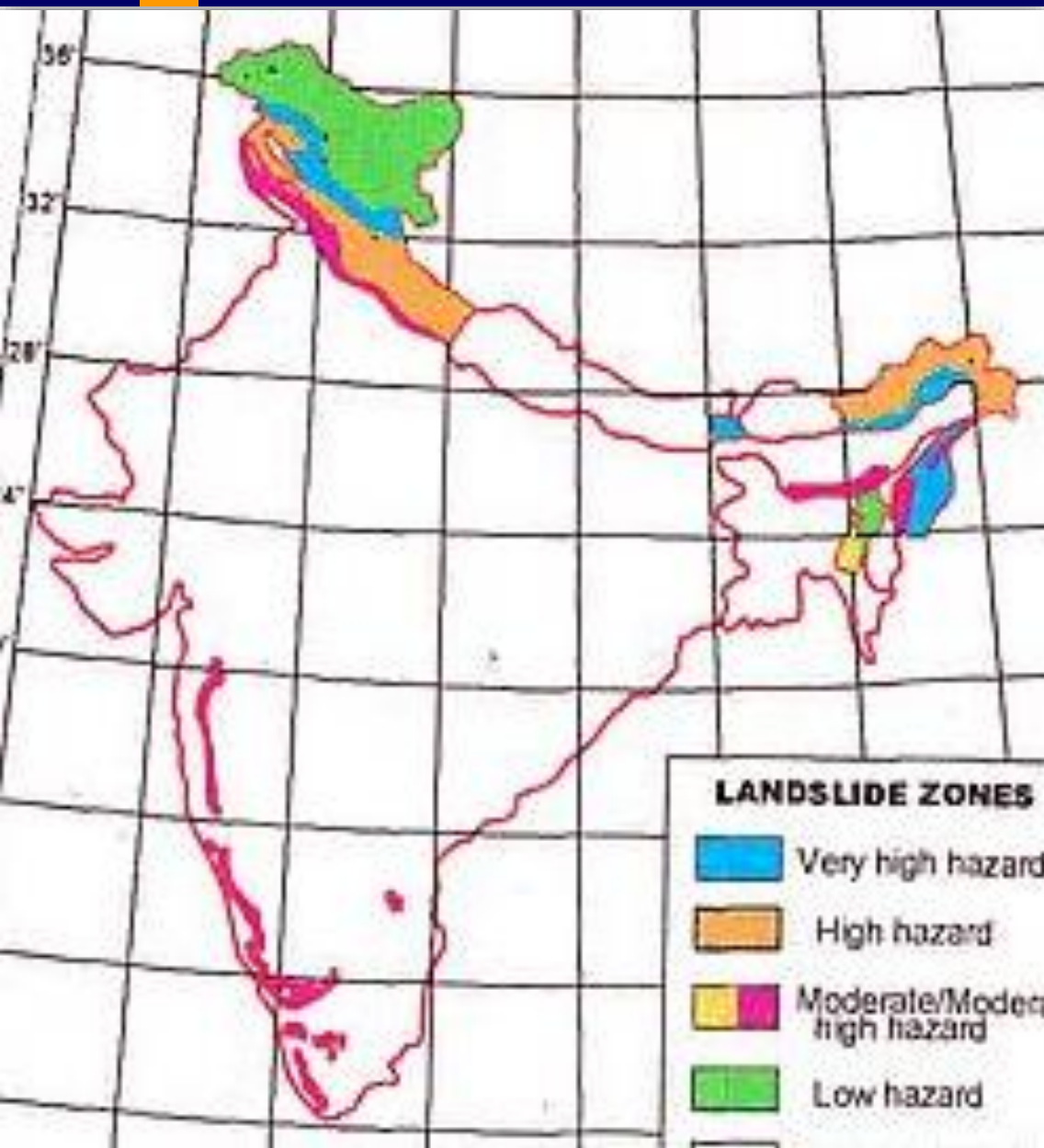


Wind and Cyclone Hazard Map

0 30 150 210 300 450 km



**7516 Kms of Coastline
prone to cyclone and
tsunamis**



**Hilly regions
vulnerable to...**

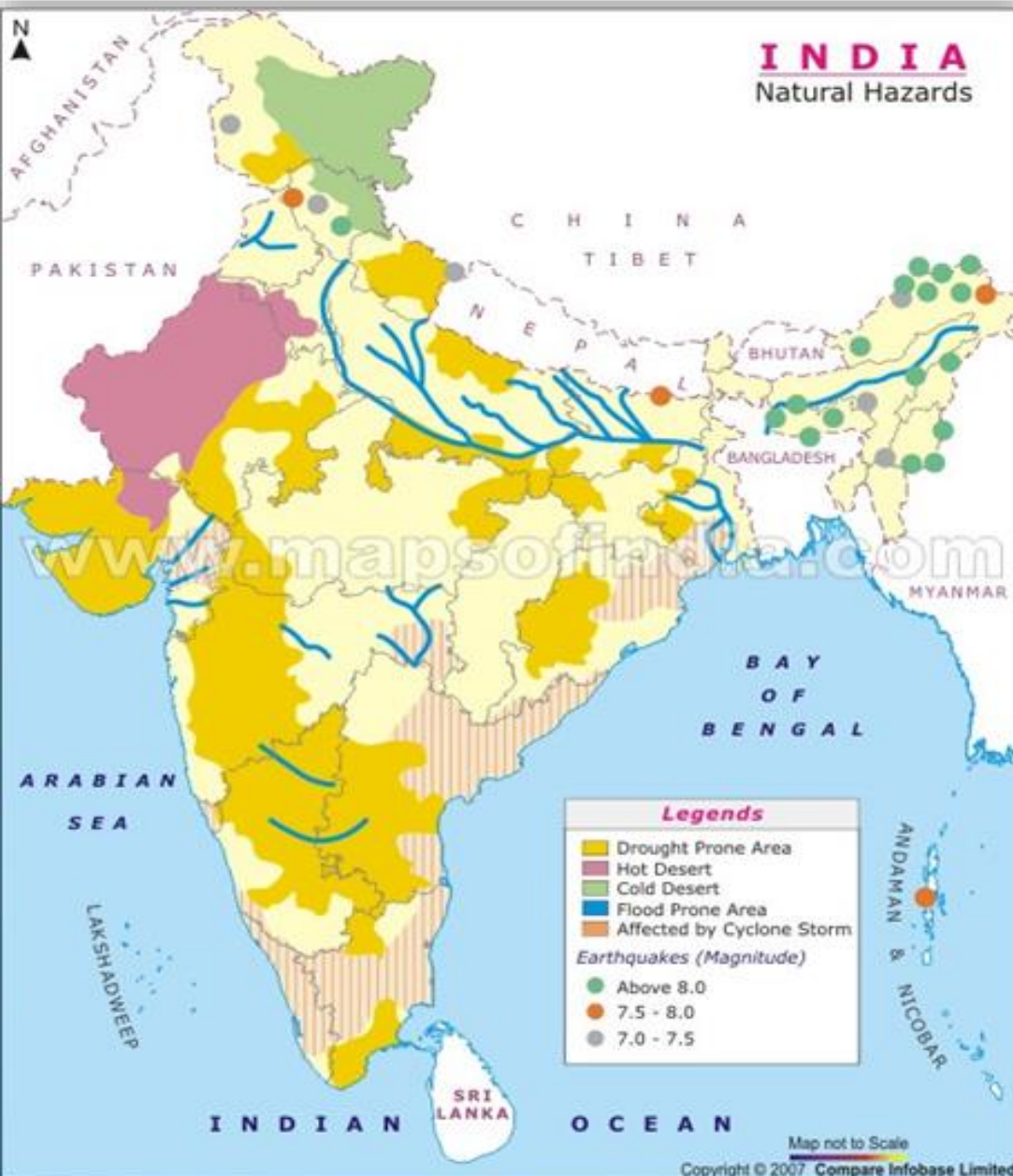
- Avalanches**
- Landslides**
- Hailstorms**
- Cloudbursts**
- GLOF**

Chemical, Industrial, Biological, Radiological and Nuclear Disasters





India – One of the top five countries affected by disasters

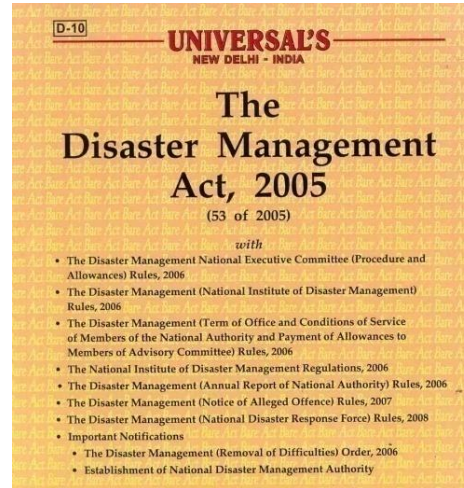




Disaster Management Act 2005

Disaster Management

Reactive
Response &
Relief centric
approach

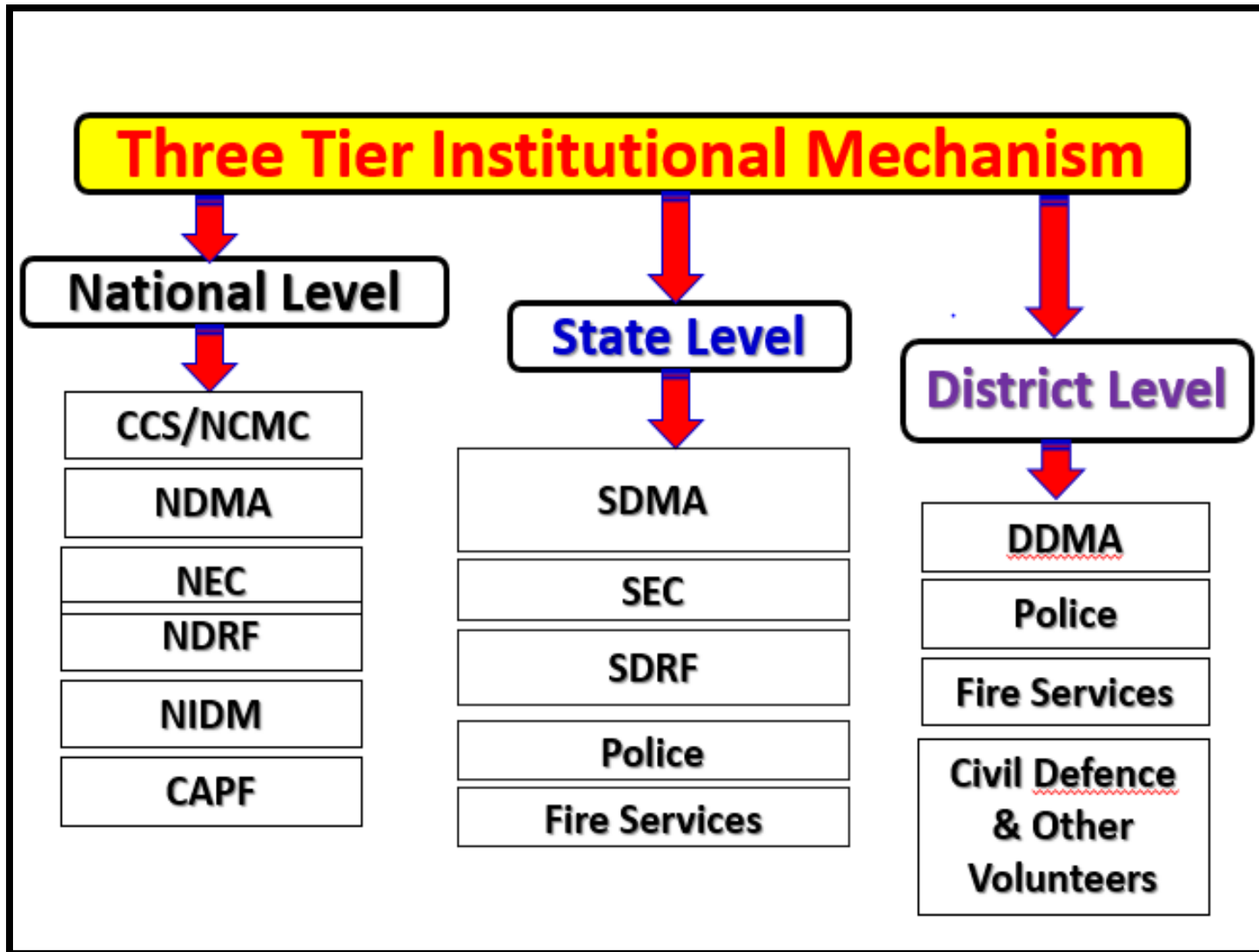


Paradigm shift

Disaster Risk Management

Pro-active
Prevention,
Mitigation &
Preparedness
driven
approach

Legal & institutional framework at National, State & District level





SALIENT FEATURES – DM STRUCTURE

NATIONAL LEVEL

- NDMA set up as the Apex Body with Hon'ble PM as Chairperson
- Responsible for laying down policies, plans and guidelines

STATE LEVEL

- SDMA at State Level, headed by Chief Minister.
- Approve the State Plan and coordinate & monitor its implementation.

DISTRICT LEVEL

- DDMA headed by District Magistrate.
- Preparation of District Disaster Management Plan (DDMP).

OTHERS

- National Institute of Disaster Management (NIDM).
- National Disaster Response Force (NDRF).
- Disaster Response Fund at National and State level constituted.



Mandate of NDMA

- **Approve the National Plan;**
- **Policies on disaster management;**
- **Guidelines for preparation of plans by Ministries/ Departments and States;**
- **Approve plans prepared by the Ministries or Departments;**
- **Recommend funds for disaster mitigation;**
- **Take measures for prevention, preparedness, and capacity building.**



National Policy on Disaster Management 2009



GOVERNMENT OF INDIA
MINISTRY OF HOME AFFAIRS

NATIONAL POLICY
ON
DISASTER MANAGEMENT
2009



NATIONAL DISASTER MANAGEMENT AUTHORITY

Covers all key aspects of disaster management - institutional, legal and financial arrangements, disaster prevention, mitigation and preparedness, techno-legal regime, response, relief and rehabilitation, reconstruction and recovery, capacity development, knowledge management and research and development.



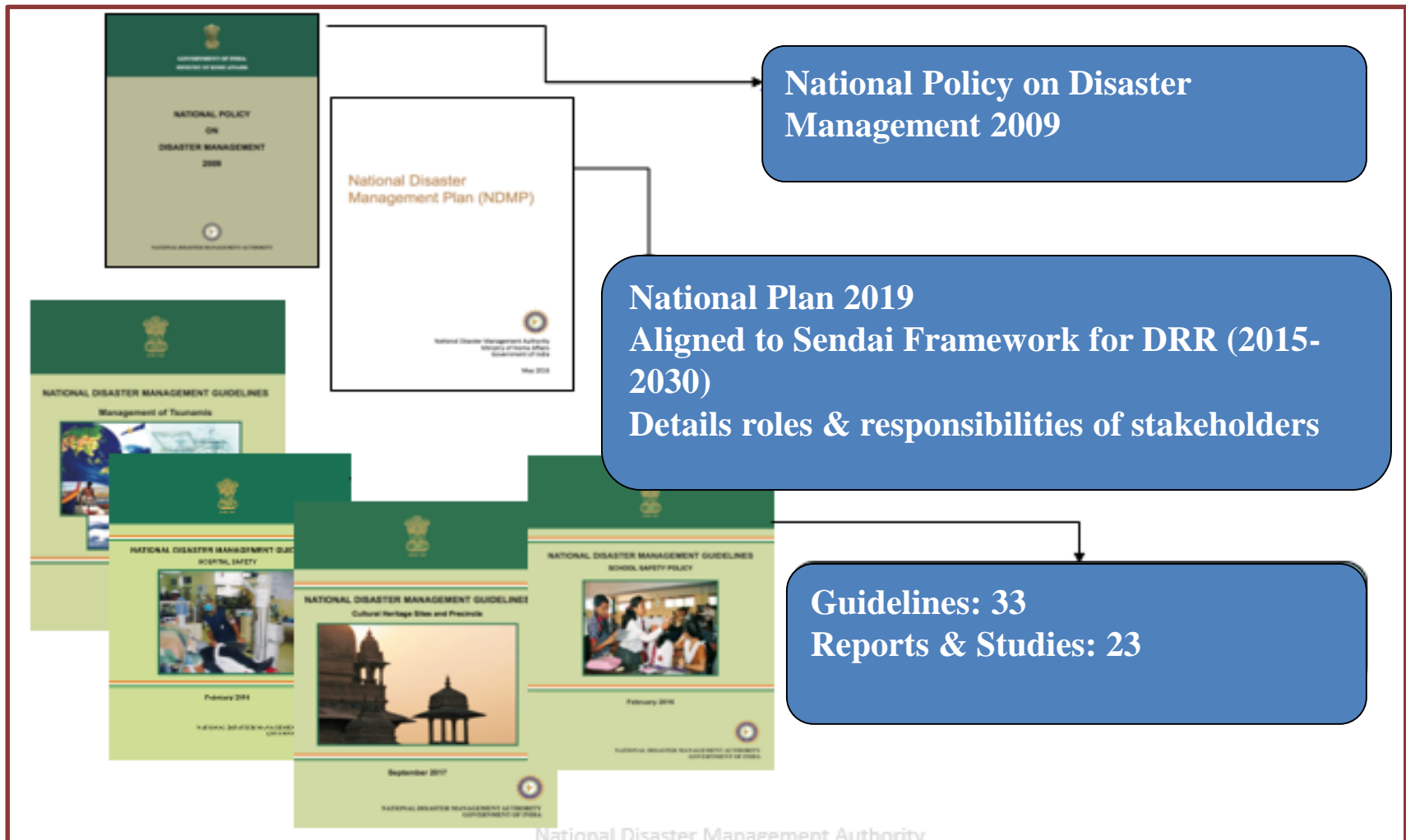
National Disaster Management Plan



Hon'ble Prime Minister Shri Narendra Modi released National Disaster Management Plan on 01.06.2016. This is first ever national plan prepared on the lines of SFDRR. The Plan has been subsequently revised in 2019.



Policy, Plans and Guidelines





Key Initiatives of NDMA, Government of India

National Disaster Management Guidelines



33 Guidelines Issued

Hazard Specific	Facility Specific	Cross-Cutting
<ol style="list-style-type: none"> 1. Earthquake 2. Floods 3. Cyclones 4. Tsunami 5. Drought 6. Chemical (Industrial) 7. Chemical (Terrorism) 8. Biological Disasters 9. Nuclear and Radiological Emergencies 10. Landslides, Snow Avalanches 11. Urban Flooding 12. Boat Safety 13. Heat-wave 14. Thunderstorm, Squall and Lightning 15. Landslides Risk Management Strategy 16. Cold Wave and Frost 17. GLOF 	<ol style="list-style-type: none"> 1. School Safety 2. Hospital Safety 3. Museum Safety 4. Cultural Heritage and precincts 5. Training of Fire Services 6. Seismic Retrofitting 7. Temporary Shelters 8. Home Owners Guide 	<ol style="list-style-type: none"> 1. Medical Preparedness and Mass Casualty Management 2. Psycho-social support and mental health services 3. Incident Response System (IRS) 4. Information and Communication System 5. Management of Dead in the Aftermath of Disaster 6. Minimum Standards in Relief Camps 7. Disability Inclusive DRR 8. State Disaster Management Plans

NCRMP – National Cyclone Risk Mitigation Project



Multi Purpose Cyclone Shelters (MPCS)



Bridges



Saline Embankments



Connecting Roads



Underground Cabling



NCRMP-I & II: Early Warning Dissemination System (EWDS)



EWDS Spun tower, Ganjam, Odisha



EWDS Monopole, Ganjam, Odisha

Salient Features

- Towers designed to withstand wind speed as per wind hazard vulnerability.
- Facility- Hooting, pre recorded voice and live voice message along with strobe lights
- Multi language facility
- Remote triggering through GSM-GPRS and Ethernet from SEOC & DEOC
- Workable on both battery and grid power
- Alert Siren with an area of influence of 1.5-2.0 Kms radius



National School Safety Programme (NSSP)



A Pilot Initiative

- **8600** Schools
- **43** Districts
- **22** States/UTs
(Seismic Zone IV & V)
- **Yr 2011-2019**

Training Modules & IEC Material
Teachers trained as Master Trainers
School DM Plans & Mock Drills
Non-Structural Measures
Demonstrative Retrofitting





AAPDA MITRA – Friends in Disaster

Training of Community Volunteers in Earthquake, Landslide, Cyclone and Flood Response

350 Districts of **36** States/UTs

5500+ volunteers trained/ **1,00,000** to be trained



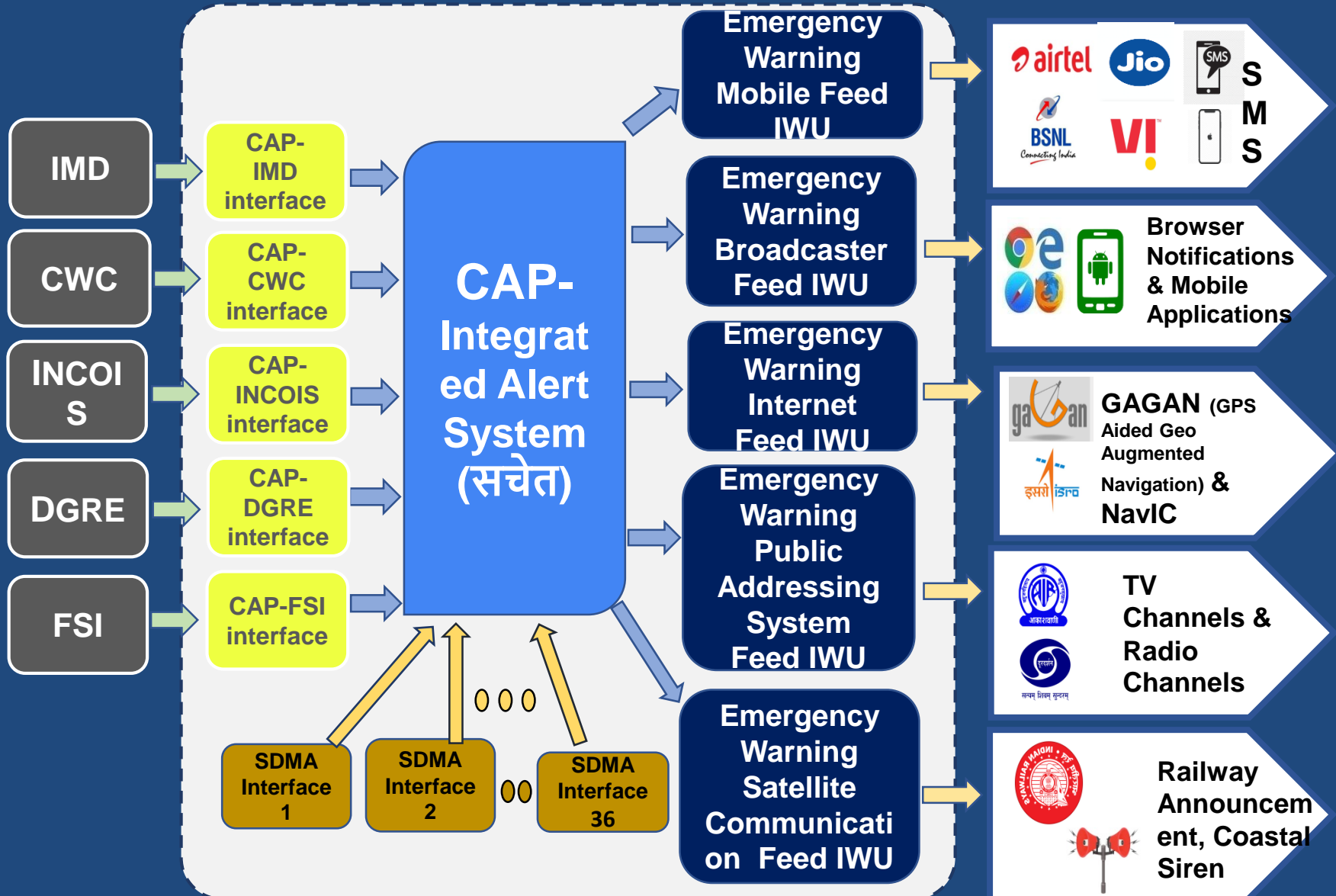
Simulation Exercises and Mock Drills



800+ Mock Exercises



Common Alerting Protocol (CAP) Alert System





CAP Coverage - penetration, granularity and redundancy



Disaster related -
150 Cr



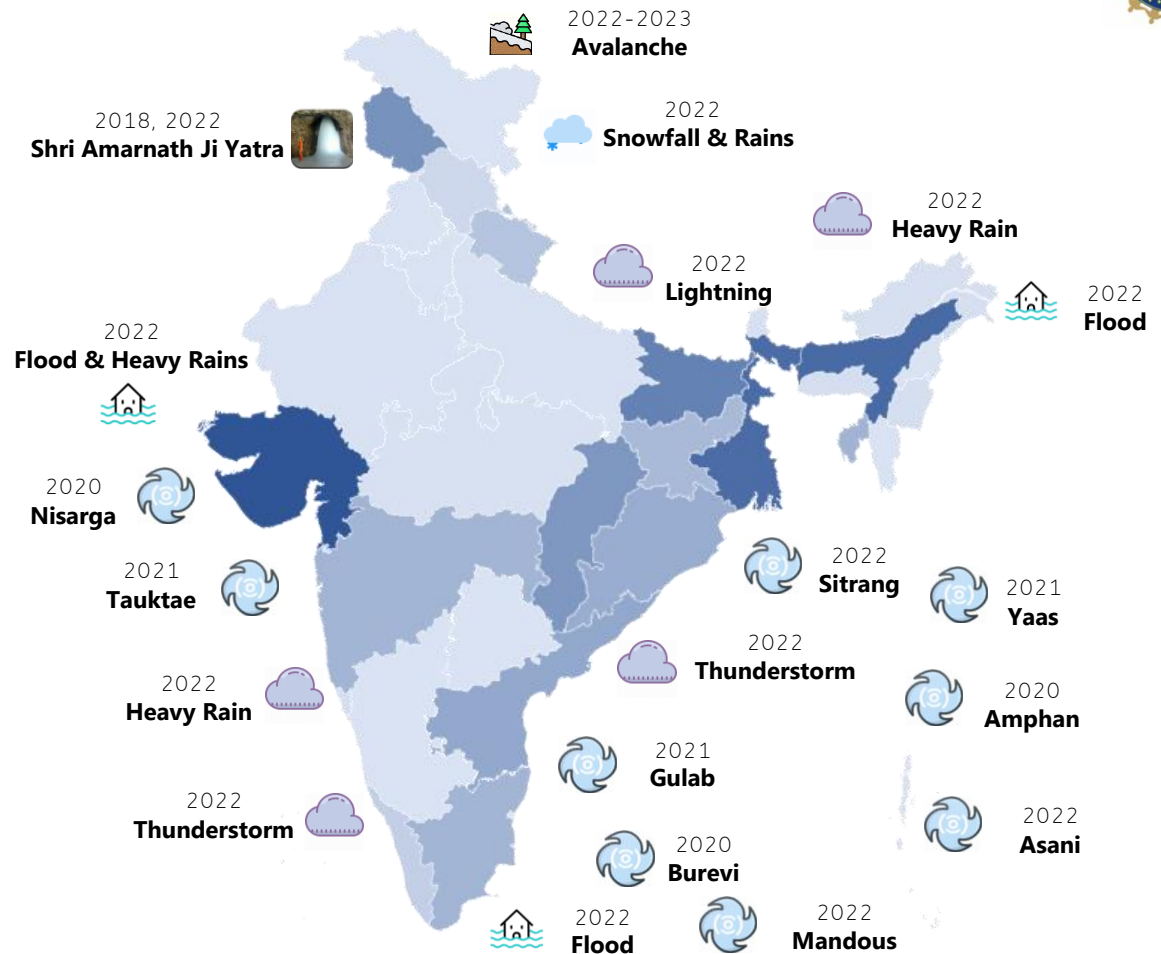
59.41% of Telecom
Subscribers



Alert disseminated
over 50.78% districts



19 Languages





Emergency Response Support System (ERSS)

- Single Emergency number 112 (ERSS) established for emergency calls.
- Person in emergency dials 112 number or presses panic button on the mobile application.
- Call lands at a facility - Public Safety Access Point (PSAP). PSAPs established PAN India.
- At PSAP, based on type of emergency, call is transferred to appropriate responder agency.



ISRO – Disaster Management Support Programme

Observational Systems

Satellites, Airborne, UAV RS
Ground systems – DWRs, LDN

SATCOM & SATNAV

Emergency Comm., DAT, SAS&R

National Database & DSS

for Emergency Management

Institutional Mechanism

Decision Support Centre
& NDEM

in association with Nodal Agencies

MHA, NDMA, MOA, Cabinet
Secretariat, State Agencies, ...

Early Warning Systems

Strengthening DRR effort

International Commitments

International Charter, UN-SPIDER,
Sentinel Asia, ...

Pre-Disaster Phase

Hazard/
Risk Evaluation

Database/DSS

Precursor/
Early Warning

During Disaster

Tracking/Monitoring

Emergency Comm.

Relief/Logistics

Post-Disaster

Impact/ Loss

Rehabilitation



Use of Space Technology Inputs for Disaster Risk Reduction



FLOOD

- Hazard Zonation
- **Early warning**
- Near Real-time Monitoring
- Damage Assessment



LANDSLIDE

- Susceptibility
- **Early warning**
- Inventory
- Damage estimation



CYCLONE

- **Early warning** – Genesis, Track, Intensity, Landfall, Rainfall, Storm Surge
- Near real-time Monitoring
- Damage assessment



DROUGHT

- Monitoring
- Vulnerability assessment



FOREST FIRE

- Near real-time detection
- Burnt area assessment
- **Fire Risk & Spread**



EARTHQUAKE

- Hazard assessment
- Precursors
- Damage Assessment



Mitigation of Cyclone and Tidal surges thro' Mangrove Plantation in Sunderbans (W.B.)



OFFSHORE DYNAMICS



NEARSHORE DYNAMICS



HABITAT



IMPACTS



CONSEQUENCES

IMPACT WITH MANGROVES



IMPACT WITHOUT MANGROVES



Offshore

Nearshore

Onshore



Growing into a people's movement



altitude: 22°5'13"
 longitude: 88°36'5"
 elevation: 19.646 m
 accuracy: 0.8 m
 time: 22-09-2021 11:07
 src:

ইয়াস ঘূর্ণিকড়ের প্রভাবে ম্যানগ্রোভের ক্ষতি হয়েছে। তাই সুন্দরবনের ম্যানগ্রোভ গাছ বাঁচাতে নানান রঙের রাধি পরিয়ে ম্যানগ্রোভ বাঁচানোর উদ্যোগ নিল বনদপ্তর। সুন্দরবনের ম্যানগ্রোভ গাছে রাধি ও মাছ পরিয়ে সচেতনতার বার্তা দিলেন পরিবেশপ্রেমীরাও। ছবি: আজকাল

VILLAGERS TIE RAKHI ON MANGROVES



On the day of Raksha Bandhan, villagers in Sundarbans tied Rakhi on trees as the mangroves protect them from natural disasters. This was a part of the state forest department's information education and communication campaign on "saving mangroves"



Efforts have started to bear fruit

2021 Mangrove Plantation North 24 Parganas



Sandeshkhali-II Block



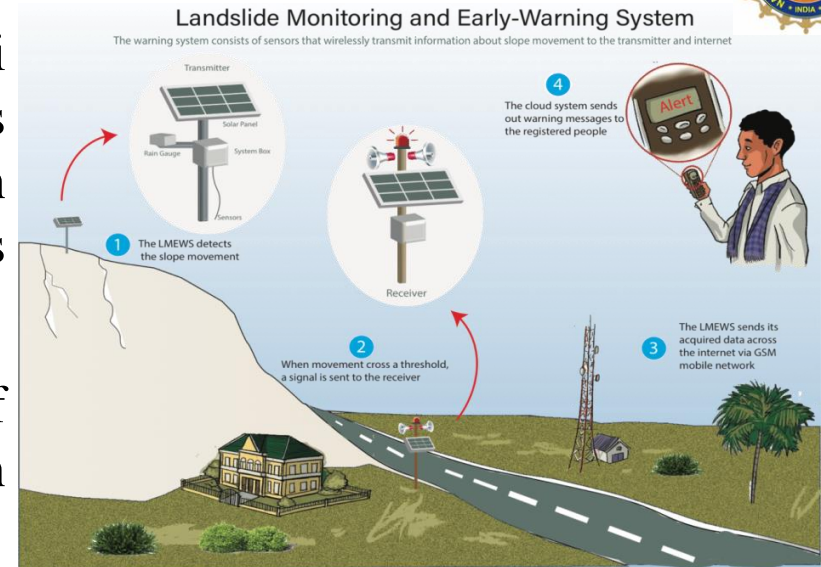
CBRN Training Program for Airports, Seaports

- Scope – Training for in-house management, to handle any chemical/ biological/ radiological/ nuclear (CBRN) event, till the arrival of NDRF/ SDRF/ Experts.
- Duration and mode of training – 3 days, via lectures and field exercises.
- Training Resources – NDMA, NDRF, DRDO, NIMHANS and MoHFW.
- 28 training programs (16 Airports + 12 Seaports) completed in 1st phase (2019-2020).
- 12 CBRN training programs for Airports have been completed so far, out of total 40 airports and Seaports planned in 2nd phase (2021- March 2024).



Development of Low-Cost Landslide Monitoring Solutions

- NDMA in collaboration with IIT Mandi developed a low cost sensors and instruments for landslide monitoring & EWS based on Micro Electrical Mechanical Sensors (MEMS) technology
- Application of machine learning, Internet of Things (IoT) & algorithms with calibration & validation of sensors completed
- Cost approximately 25-30 lacs for one site as compared to 1.5-2.0 crore available commercially
- Project successfully closed in January, 2021
- Project reduced cost of landslide monitoring and EWS in India



Operational Diagram of Monitoring & EWS



Installed Low Cost Sensors



National Platform for Disaster Risk Reduction

- A multi stakeholder and multi sectoral National Platform for Disaster Risk Reduction (NPDRR) was constituted by Govt of India, in February 2013.
-
- Through platform, Govt recognized the need to evolve a participatory process in the disaster management, with involvement of all concerned stakeholders.
- NPDRR is a process that facilitates dialogue, sharing of experiences, views, ideas, present findings of research and explores opportunities for mutual cooperation in DRR.
- On the lines of National Platform, now States are focusing on State Platform for Disaster Risk Reduction (**SPDRR**).



National Platform for Disaster Risk Reduction

Contd..

- 1st Session of NPDRR - May 2013, Theme “Mainstreaming DRR in Development: From Risk to Resilience”.
- 2nd Session of NPDRR - May 2017, Theme “DRR for Sustainable Development: Making India Resilient by 2030”.
- 3rd Session of NPDRR - 10-11 March 2023, Theme “Building Local Resilience in a Changing Climate”.





National Disaster Response Force

- Constituted under Section 44 of DM Act
- Initially started with 8 battalions in 2006
- At present, 16 battalions, each consisting of 1149 personnel
- Women officers also part of NDRF Team
- Provides specialized response by pre-positioning & deployment; search & rescue, conducts mock drills & community capacity building; train SDRF etc.



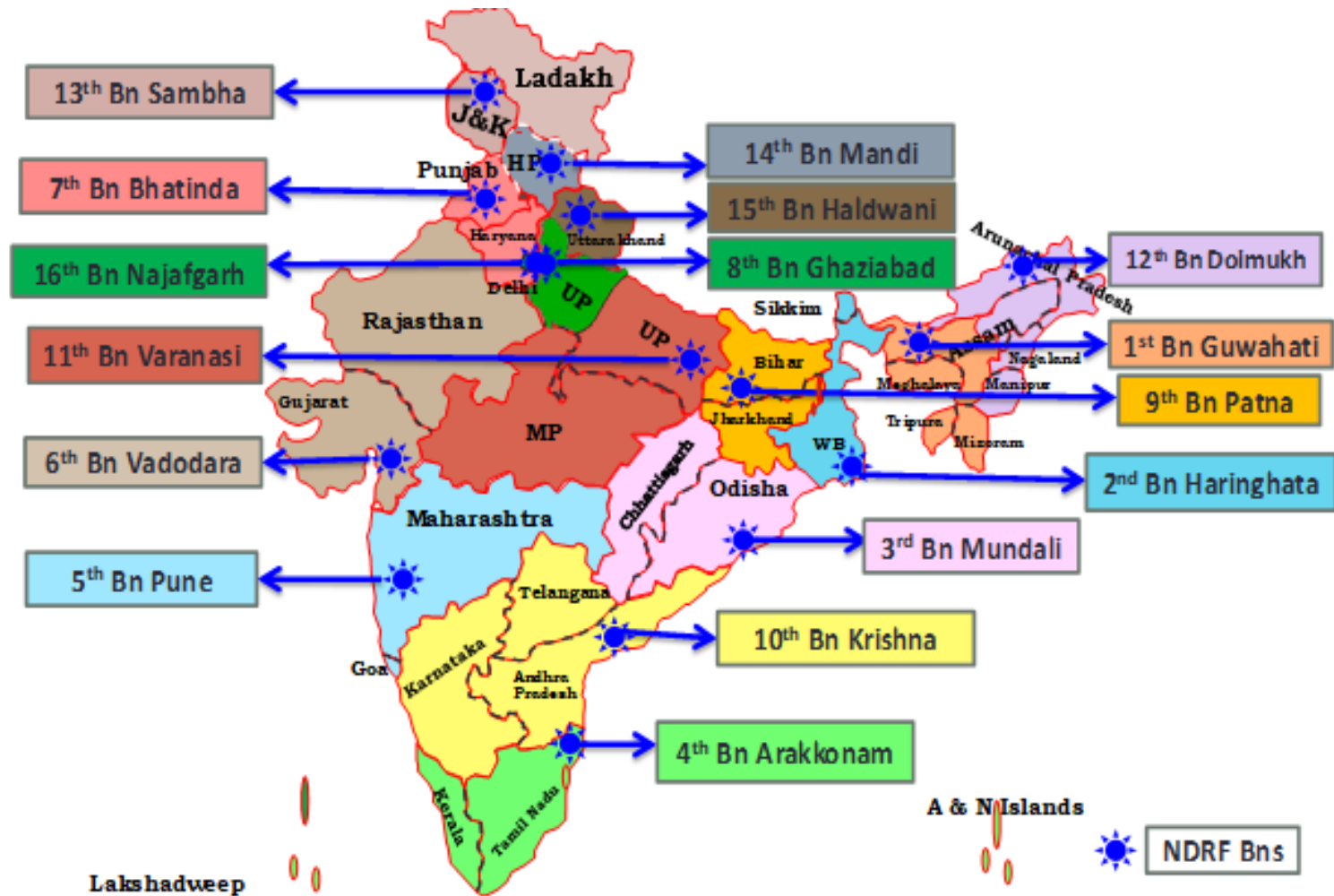
National Disaster Response Force cont..

□ Specialization of NDRF

- ✓ Collapsed Structure Search & Rescue (CSSR) (Earthquake)
- ✓ Water Rescue/Diving
- ✓ Mountaineering/High – Altitude Rescue
- ✓ Medical First Response (MFR)
- ✓ Chemical, Biological, Radiological & Nuclear (CBRN) Emergencies



National Disaster Response Force Bns





Search & Rescue Operation by NDRF in Turkiye





National Institute of Disaster Management (NIDM)

- Initially set up as National Centre for Disaster Management in 1995 at New Delhi
- Upgraded and re-designated as NIDM in 2003; accorded statutory status under DM Act in 2006
- Nodal institute for capacity building, training and research on DM in the country
- Headed by the Executive Director and governed by Governing Body and Institute Body
- NIDM developed knowledge network with universities and institutions, including IIT, IIM, ISRO etc.
- South campus of NIDM (Vijayawada, Andhra Pradesh) became functional in 2016



National Institute of Disaster Management (NIDM)

- NIDM develop training modules, undertake research and documentation on DM and organize training programmes, and other functions as per DM Act.
- NIDM training programmes address various capacity building issues primarily in respect of DM and DRR, for all the concerned stakeholders. Based on the mode of delivery, the programmes are classified as:





Regional and Global Level

- **Regional Joint Response Exercises:**
 - SAARC – SADMEEx (2015)
 - BIMSTEC DMEx (2017) (2019-20) PANEx (2021)
 - SCO Joint Ex New Delhi (2019)
 - SCO Workshop on Flood and Earthquake (2023)
- **Meetings/ Events:**
 - Asian Ministerial Conf. (AMCDRR 2016)
 - BRICS DM Ministerial Meeting (2016), JTF Meeting (2022)
 - BIMSTEC Expert Group Meeting (2022)
 - Indian Ocean Rim Association WGDRM (2022)
 - G 20 DRR WG Meetings (2023)
- **Coalition for Disaster Resilient Infrastructure (CDRI).**
 - Lead role to bolster cooperation among 31 Member Countries



Coalition for Disaster Resilient Infrastructure (CDRI)



Launched at the **UN Climate Action Summit** in September 2019

- › **Inclusive** multi-stakeholder platform led and managed by **national governments**
- › Aligned with the **SDGs, Climate Action & Sendai** frameworks
- › Mainstreaming **gender and social inclusion** for disaster and climate resilient infrastructure
- › **Promotes economic, social and climatic well-being** of societies through climate and disaster resilient infrastructure
- › Global, regional and local **technical support, capacity building and knowledge platform** for disaster and climate resilient infrastructure



Current/Planned Engagements across India, member countries under CDRI



Power Sector Resilience, Odisha

- Assessing power delivery infrastructure in **Odisha** (preparedness, recovery, reconstruction)
- Advisories/SOPs for cyclone affected regions
- Scaling up in additional states

Resilience of Telecommunications

- National/Subnational assessment and recommendations to strengthen resilience of assets, network and systems
- Ph 1 - **Assam, Odisha, Tamil Nadu, Gujarat, Himachal Pradesh**
- Ph 2- three CDRI countries



Global Study on Airport Resilience

- Perception survey of airport managers on risks and impacts of hazards - 57 countries, 111 airports (25 airports from India)
- In-depth study on 12 airports across 11 countries (**Bhubaneswar, Bengaluru**)

Financing Disaster Resilience

- Fiscal risk assessment study (States - **Odisha, Gujarat, Himachal Pradesh, Tamil Nadu**; National - Fiji, Mauritius, India and Nepal)
- Appraisal of National Infrastructure Pipeline (NIP) projects using a resilience lens



Current/Planned Engagements across India, member countries under CDRI



Urban Resilience

- Assessing risk of urban flooding and extreme heat in Cuttack, Odisha
- Scaling up in additional states, member countries

Fellowship Program

- 35 fellows from 20 countries (**16 from India**) supported to research on DRI problems
- Innovation – new apps, technologies to address multiple hazards

Financing Disaster Resilience

- Fiscal risk assessment study (States - **Odisha, Gujarat, Himachal Pradesh, Tamil Nadu**; National - Fiji, Mauritius, India and Nepal)
- Appraisal of National Infrastructure Pipeline (NIP) projects using a resilience lens

Infrastructure Resilience Academic eXchange (IRAX)

- Developing a network of global academic institutions to develop new curriculum, research and trainings on disaster and climate resilient infrastructure
- Successful pilot between Indian Universities (IIT B, IIHS, SRM) UK Universities (UCL, Teeside, Durham)





India's Reconstruction Experience - Building Back Better



- Bhuj city map before land readjustment exercise:
 - Narrow streets before 2001
 - Dead ends, bottlenecks



- Map of same area after readjustment exercise:
 - Wider streets after 2001
 - Continuous & safer roads



Involving local community and NGOs in reconstruction, helped architects & engineers to cater to the specific local needs.

**Ex: Bamboo technology (based on locally available material)
Kosi Flood Reconstruction 2008.**



- Hut type traditional housing reconstruction, J&K 2014 (Flash Flood), with support from NGOs.

Lessons Learnt w.r.t. Rehab. and Reconstruction



- Reconstruction must be seen as a developmental process, rather than just a disaster response.
- NGOs can support in technical assistance, capacity building, social rehabilitation and knowledge transfer.
- Building back better- with futuristic rehabilitation, reconstruction and perspective planning.
- Owner-Driven Reconstruction (ODR) has more ownership and acceptance.
- Registration of houses in the joint names of husband and wife to avoid gender discrimination.
- Multi stakeholder partnership need of the hour, synergy is the key amongst Govt, Private, NGOs and Community.



Lessons from Super Cyclone, 1999

- Sketchy weather prediction
- Preparedness not adequate
- Capacity to respond to a Super Cyclone lacking
- Disaster proof infrastructure missing

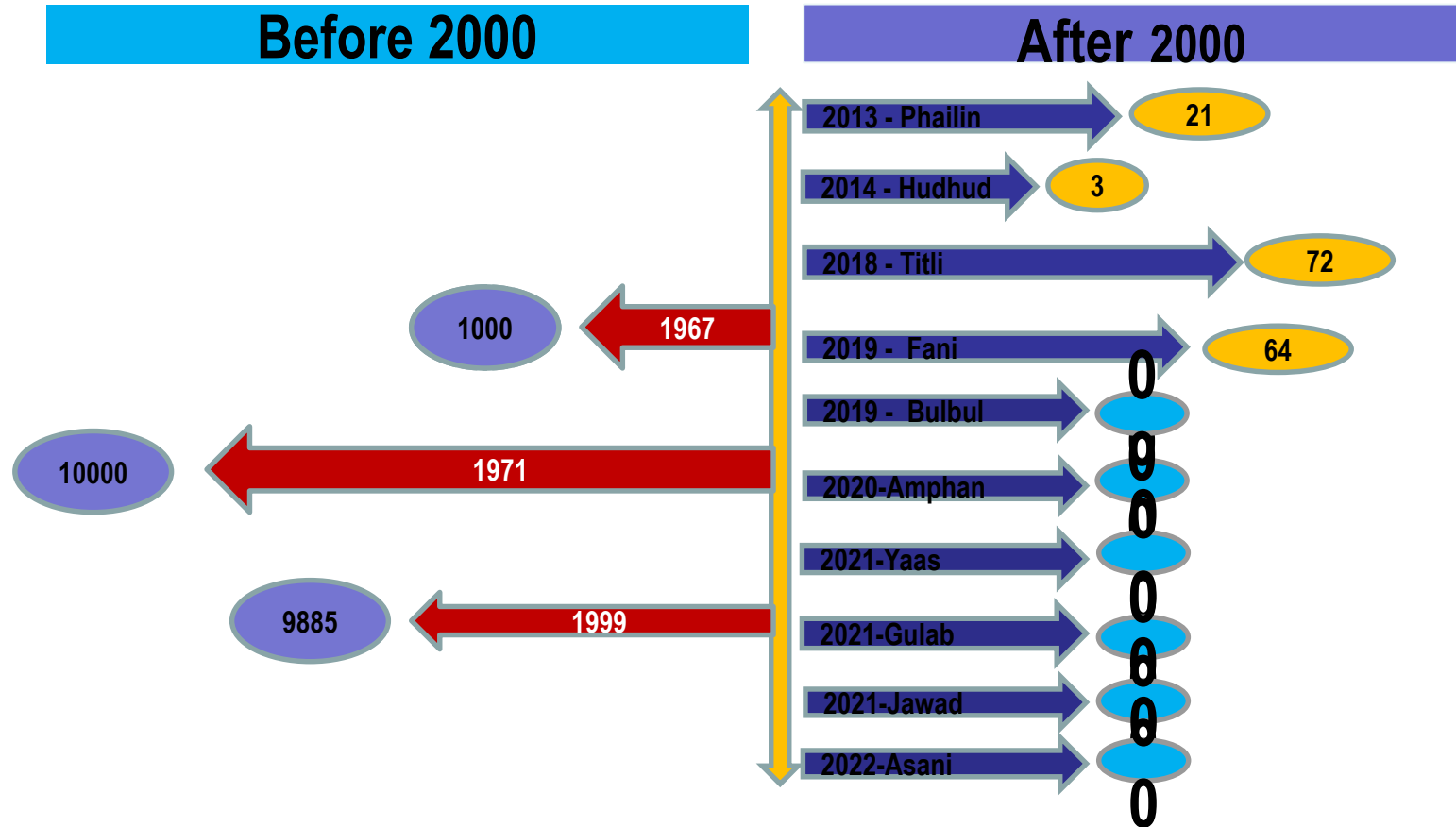
Result:

- 10,000 human lives lost
- Extensive Damage to Public Infrastructure
- 2 million houses damaged
- About 18 lakhs hectares of crop damaged





Reducing loss of human lives due to Cyclones in India





Four Verticals – Proved Crucial in Reducing Disaster Risks



Institutional



Planning



**Capacity
Development**



Partnership

Robust DM
Framework
Impact based
forecasting
Community level
infrastructure
(including shelters)

State
District
Block
GP
Village

Govt. Officials
Public
representatives
Community
Self Help Group
School/College
Students

Communities
Global & National
level Institutions
NGOs
CBOs



***Thanks for your
attention !***