National Disaster Management Plan (NDMP)

National Disaster Management Plan (NDMP)

A publication of:

National Disaster Management Authority
Government of India
NDMA Bhawan
A-1, Safdarjung Enclave
New Delhi – 110 029

May, 2016

When citing this Hand Book, the following citation should be used:

National Disaster Management Plan, 2016.
A publication of the National Disaster Management Authority, Government of India.
May 2016, New Delhi

National Disaster Management Plan (NDMP)

National Disaster Management Authority
Ministry of Home Affairs
Government of India

May 2016

सत्यमेव जयते

प्रधान मंत्री

Prime Minister

MESSAGE

I am happy to present to the people of India the National Disaster Management Plan. The aim of the plan is to make India disaster resilient. It will help to maximize the ability of the country to cope with disasters at all levels by integrating disaster risk reduction into development and by increasing the preparedness to respond to all kinds of disasters.

The plan takes into account the global trends in disaster management. It incorporates the approach enunciated in the Sendai Framework for Disaster Risk Reduction 2015-2030, which is an agreement under the auspices of the United Nations to which India is a signatory.

The implementation of the plan requires sincere cooperation of the centre and state governments, coordination among various ministries and departments, as well as the active participation of the civil society, community based organisations, communities, and the private sector.

While the plan provides much clarity and a sound framework, only when all the stakeholders work together as a team it will be possible to realize our goals of making India safer by significantly reducing disaster risk and drastically improving our preparedness.

I congratulate NDMA for preparing a comprehensive plan integrating prevention, mitigation, preparedness and response. I am sure that the implementation of this plan will go a long way in making India disaster resilient.

(Narendra Modi)

New Delhi
18 May, 2016

राजनाथ सिंह
RAJNATH SINGH

गृह मंत्री
भारत
नई दिल्ली-110001
HOME MINISTER
INDIA
NEW DELHI-110001

MESSAGE

I am happy to note that in the recent years on account of establishment of national and state level institutions and many initiatives including those at the local levels across the country, we have been able to face various natural disaster situations much better than in the past

While natural hazards are beyond our control, our capability to reduce risks, prevent losses, prepare, respond, and recover has improved significantly. We have considerably enhanced our technical capabilities in forecasting and closely monitoring hazards like cyclone. Nevertheless, we still have to strive to make our disaster management system to rank among the very best in the world.

It is a matter of great satisfaction that NDMA has prepared the National Disaster Management Plan - an excellent planning framework for the whole country. India can take pride in fact that we have aligned our National Plan with the Sendai Framework for Disaster Risk Reduction 2015-2030, to which India is a signatory.

I heartily congratulate the NDMA for preparing a forward-looking National Plan and wish the Authority a grand success in all its future endeavours.

17.05.16

(Rajnath Singh)

Office : Room No. 104, Ministry of Home Affairs, North Block, New Delhi-110 001
Tel. : 23092462, 23094686 Fax : 23092979
E-mail : hm@nic.in

किरेन रीजीजू
KIREN RIJIJU

गृह राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HOME AFFAIRS
GOVERNMENT OF INDIA

MESSAGE

Disaster management in India has gone through what many have called a paradigm shift. Disaster Management Act 2005 provided the legal basis for the shift from a reactive, relief-based approach to one of proactive disaster risk reduction, meticulous preparedness, effective response, and well thought out build back better program after a major disaster. After enactment of the Act, the National Disaster Management Authority was set up to coordinate the disaster management initiatives across the country and the National Policy on Disaster Management was adopted in 2009. Institutional mechanisms have been strengthened or created in different states.

I am happy to know that the NDMA has come out with a plan in an easy to refer format that various ministries and departments can use to develop their own detailed plans and standard operating procedures for different aspects of disaster management. NDMA has incorporated the Sendai Framework for Disaster Reduction 2015-2030 and drawn from the rich pool of global good practices. The plan has measures that will be implemented in the short, medium and the long-term. The National Plan is of crucial importance in making India disaster-resilient while India is pursing the goals of sustainable development.

While the National Plan provides the overall direction and sets out the national goals, it is now for various ministries and departments to develop their own specific disaster management plans, including separate response plans and necessary standard operating procedures. I appreciate the efforts made by NDMA and call upon all stakeholders to work together to make India truly disaster-resilient.

(Kiren Rijiju)

10th May, 2016

New Delhi.

Office : Room No. 127, North Block, New Delhi-110 001 Telefax. : 23092073, 23094054

राष्ट्रीय आपदा प्रबंधन प्राधिकरण
National Disaster Management Authority
भारत सरकार
Government of India

सत्यमेव जयते

Preface

Indian sub-continent with a very large population spans several bio-geographic, hydro-meteorological and agro-climatic zones. India is vulnerable to multiple natural hazards and with large number of industries, also at risk of various industrial accidents. The Government of India has enacted a comprehensive Disaster Management Act in 2005 and has adopted the National Policy on Disaster Management in 2009. Both these milestones signaled a paradigm shift from relief-centric approach to a comprehensive, pro-active approach focused on disaster risk reduction encompassing all aspects of disaster management spectrum.

While legal frameworks are necessary to provide a new direction to disaster management, this needs to be supplemented by incorporating sound disaster risk reduction measures into our developmental decisions, policies and programmes. In other words, a systematic process of mainstreaming of DRR is required in our developmental agenda. Preparing a disaster management plan for India, taking into account global experiences, and incorporating the new global perspectives on disaster management, proved more challenging than we had initially envisaged. After the National Executive Committee had prepared the National Disaster Management Plan (NDMP), there were many new developments, particularly, the adoption of three landmark International Agreements in the year 2015 having significant bearing on disaster management, i.e.,

a) Sendai Framework for Disaster Risk Reduction in March 2015;
b) Sustainable Development Goals 2015-30 in September 2015; and
c) Paris Agreement on Climate Change at the 21st Conference of Parties under the United National Framework Convention on Climate Change in December 2015.

While Sendai Framework was the first International Agreement adopted within the context of the post 2015 development agenda, other two agreements have their implications as well in shaping the topology of disaster management plan. One can say, the Sendai Framework has a sharper focus on preventing the creation of new risks, and places enormous emphasis on improving the governance for disaster risk reduction.

The Sustainable Development Goals (SDG) also recognises the importance of disaster risk reduction as integral to sustainability and COP21 Paris Agreement notes the urgent need to take into account the increasing frequency of extreme weather events due to global climate change.

एन.डी.एम.ए. भवन, ए-1, सफदरजंग एन्कलेव, नई दिल्ली-110029/ NDMA Bhawan, A-1, Safdarjung Enclave, New Delhi-110 029
दूरभाष/Tel :+91 11 26701700 फैक्स/Fax : +91 11 26701831

It emphasises the importance of addressing the increased disaster risks from the adverse impacts of climate change. Besides the post 2015 re-prioritization and the new approaches reflected in these key global agreements, the post 2015 agenda sets the end of 2030 for all the nations to assess the outcomes of their plans and actions in terms of realized outcomes. Therefore, this national plan on disaster management reflects the changes in our outlook and priorities, both national and global.

The National Disaster Management Plan (NDMP) has adopted a novel, concise and action oriented approach towards structuring of the document. The structure adopted has tried to minimise excessive narrative text and has focused sharply on thematic areas for planning and implementation with clear defined roles and responsibilities. It has attempted to highlight who among the central and state agencies are responsible for what and when. The document enjoins all the stakeholders to develop detailed plans in accordance with the responsibilities commensurate with their roles to reduce disaster risk nationally and to respond when a disaster strikes in any part of India, if their involvement is required as per assessment of the situation.

The National Disaster Management Plan (NDMP) is highly ambitious. It has short, medium and long term measures that will be completed within the time frames of 5, 10 and 15 years. Some of these will have to be implemented concurrently rather than sequentially. Beside the different time frames, the scales of implementation as well as institutional complexity involved in implementation also vary depending on the specific measures. Therefore, it is important to keep in mind that not only is the NDMP dynamic by its very nature having to periodically factor-in new elements, it also has components that can be completed only in phased manner at different scales in diverse geographies.

While we have tried to make the plan both intensive and extensive, there will surely be much room for its fine-tuning and scope for its improvement. The NDMA is open to suggestions and inputs to improve the national plan and on behalf of the NDMA, we can assure that NDMA will consider the feedbacks when we undertake periodic review and revision of the plan, as a task we are firmly committed to.

Kamal Kishore
Member, NDMA

D. N. Sharma
Member, NDMA

Lt. Gen. **N. C. Marwah** (Retd.)
Member, NDMA

R. K. Jain, IAS (Retd.)
Member, NDMA

Acknowledgements

Preparation of a national document such as the National Disaster Management Plan is a mammoth exercise that can only be accomplished through team work that extends beyond the confines of institutions working only on disaster risk management. The national and state level institutions and individuals who have provided inputs to the preparation of this document are numerous. It is not possible to mention all of them. We gratefully acknowledge all of their support, and mention some of the key contributors here.

Head of Policy and Planning Division of NDMA Dr. V. Thiruppugazh worked assiduously and led the finalization of the National Disaster Management Plan. Under his guidance the Plan was thoroughly revised and aligned with the Sendai Framework for Disaster Risk Reduction. He was ably supported by Nawal Prakash, Senior Research Officer of NDMA who coordinated inputs from a range of institutions and individuals. Valuable technical assistance was provided by Dr. Geevan P Chandanathil and Shri. Birju Patel in distilling inputs from secondary sources and making the Plan concise and accessible. UNNATI provided technical support for the first draft of the revised plan. Joint Secretaries, staff and consultants of NDMA provided specific inputs to different sections of the document.

Valuable inputs were received from the National Institute of Disaster Management, National Disaster Response Force, and the Disaster Management Division of the Ministry of Home Affairs. In addition, a number of other Ministries and Departments of Government of India, and several State governments provided timely feedback and suggestions on different sections of the Plan. It draws on a large number of documents, guidelines, manuals and records. We acknowledge the contribution of the authors of all such reference documents.

Finalization of the first National Disaster Management Plan is the culmination of a long process. During this period several rounds of consultations were held, inputs sought and draft sections prepared. We would like to gratefuly acknowledge the contribution of the members of the National Executive Committee who prepared the initial draft. The former Members of NDMA played a critical role in providing substantive guidance to the preparation of the earlier drafts. These inputs have proved to be a bedrock on which the current Plan stands.

In summary, the preparation of the National Disaster Management Plan exemplifies team work that spans across different parts of the national and state governments, civil society organizations and the academia. This sets the tone for the team work that will be required for its effective implementation.

***

Contents

List of Figures

List of Tables

Abbreviations

AAI	:	Airport Authority of India
AERB	:	Atomic Energy Regulatory Board
AHD	:	Animal Husbandry Department
AICTE	:	All India Council of Technical Education
AP	:	Andhra Pradesh
ARG	:	Automatic Rain Gauge
ASI	:	Archaeological Survey of India
ASSOCHAM	:	Associated Chambers of Commerce and Industry of India
ATI	:	Administrative Training Institute
BAI	:	Builders Association of India
BBB	:	Build Back Better
BIS	:	Bureau of Indian Standards
BMTPC	:	Building Materials and Technology Promotion Council
BRO	:	Border Roads Organisation
CADA	:	Coastal Area Development Authority
CAPF	:	Central Armed Police Forces
CAZRI	:	Central Arid Zone Research Institute
CBO	:	Community Based Organisation
CBRI	:	Central Building Research Institute, Roorkee
CBRN	:	Chemical, Biological, Radiological and Nuclear
CBSE	:	Central Board of Secondary Education
CCG	:	Central Crisis Group
CCS	:	Cabinet Committee on Security
CDMM	:	Centre for Disaster Mitigation and Management, Vellore
CFCB	:	Central Flood Control Board
CFI	:	Construction Federation of India
CGWB	:	Central Ground Water Board
CIDC	:	Construction Industry Development Council
CII	:	Confederation of Indian Industry
CMG	:	Crisis Management Group
CoA	:	Council of Architecture
CoP	:	Conference of the Parties
CoR	:	Commissioner of Relief
CPCB	:	Central Pollution Control Board
CRIDA	:	Central Research Institute for Dryland Agriculture
CRPF	:	Central Reserved Police Force
CRRI	:	Central Road Research Institute
CRZ	:	Coastal Regulation Zone
CSIR	:	Council of Scientific and Industrial Research
CSS	:	Centrally Sponsored Schemes
CWC	:	Central Water Commission
CWDS	:	Cyclone Warning Dissemination System
CZMA	:	Coastal Zone Management Authority

DAE	:	Department of Atomic Energy
DCG	:	District Crisis Group
DDMA	:	District Disaster Management Authority
DeitY	:	Department of Electronics and Information Technology
DEOC	:	District Emergency Operation Center
DGM	:	Directorates of Geology and Mining
DM	:	Disaster Management
DMC	:	Drought Monitoring Cell
DMP	:	Disaster Management Plan
DoACFW	:	Department of Agriculture, Cooperation and Farmers Welfare
DoAHDF	:	Department of Animal Husbandry, Dairying, and Fisheries
DoPT	:	Department of Personnel and Training
DoS	:	Department of Space
DoT	:	Department of Telecommunications
DRD	:	Department of Rural Development
DRDO	:	Defence Research and Development Organization
DRR	:	Disaster Risk Reduction
DSJE	:	Department of Social Justice and Empowerment
DSS	:	Decision Support System
DST	:	Department of Science and Technology
DWR	:	Doppler Weather Radar
EHRA	:	Earthquake Hazard and Risk Assessment
EIA	:	Environment Impact Assessment
EOC	:	Emergency Operations Centre
ERC	:	Emergency Response Centers
EREC	:	Earthquake Risk Evaluation Centre
ESF	:	Emergency Support Functionaries
EWS	:	Early Warning System
FC	:	Finance Commission
FCI	:	Food Corporation of India
FES	:	Fire and Emergency Services
FICCI	:	Federation of Indian Chambers of Commerce and Industry
GAR	:	Global Assessment Report
GDP	:	Gross Domestic Product
GIS	:	Geographical Information System
GoI	:	Government of India
GSI	:	Geological Survey of India
GST	:	Goods and Service Tax
HAZCHEM	:	Hazardous Chemicals
HF	:	High Frequency
HFL	:	Highest Flood Level
HLC	:	High Level Committee
HRVA	:	Hazard Risk and Vulnerability Assessment
IAEA	:	International Atomic Energy Agency
IAF	:	Indian Air Force
IAP	:	Incident Action Plan

ICAR	:	Indian Council of Agricultural Research
ICG	:	Indian Coast Guard
ICSE	:	Indian Certificate of Secondary Education
ICT	:	Information Communication Technology
IDMC	:	India Drought Management Centre
IDRN	:	Indian Disaster Resource Network
IDS	:	Integrated Defence Staff
IE(I)	:	Institution of Engineers (India)
IEC	:	Information Education Communication
IERMON	:	Indian Environmental Radiation Monitoring Network
IIA	:	Indian Institute of Architects
IIE	:	Indian Institute of Entrepreneurship
IIRS	:	Indian Institute of Remote Sensing
IIT	:	Indian Institute of Technology
IITM	:	Indian Institute of Tropical Meteorology
IMA	:	Indian Medical Association
IMD	:	India Meteorological Department
INCOIS	:	Indian National Centre for Ocean Information Services
IND	:	Improvised Nuclear Device
INES	:	International Nuclear Event Scale
INSARAG	:	International Search and Rescue Advisory Group
IPS	:	Indian Police Service
IRC	:	Indian Roads Congress
IRDA	:	Insurance Regulatory and Development Authority
IRS	:	Incident Response System
IRT	:	Incident Response Team
ISDR	:	International Strategy for Disaster Reduction
ISRO	:	Indian Space Research Organisation
ITI	:	Industrial Training Institute
IWAI	:	Inland Waterways Authority of India
IWRM	:	Integrated Water Resources Management
LBSNAA	:	Lal Bahadur Shastri National Academy of Administration
M&E	:	Monitoring and Evaluation
MAH	:	Major Accident Hazard
MAI	:	Moisture Adequacy Index
MANAGE	:	National Institute of Agricultural Extension Management
MCI	:	Medical Council of India
MEA	:	Ministry of External Affairs
MHA	:	Ministry of Home Affairs
MoAFW	:	Ministry of Agriculture and Farmers Welfare
MoCA	:	Ministry of Civil Aviation
MoCAFPD	:	Ministry of Consumer Affairs, Food and Public Distribution
MoCF	:	Ministry of Chemicals and Fertilizers
MoCI	:	Ministry of Commerce and Industry
MoCIT	:	Ministry of Communications and Information Technology
MoD	:	Ministry of Defence

MoDWS	:	Ministry of Drinking Water and Sanitation
MoEFCC	:	Ministry of Environment, Forests and Climate Change
MoES	:	Ministry of Earth Sciences
MoF	:	Ministry of Finance
MoFPI	:	Ministry of Food Processing Industries
MoHFW	:	Ministry of Health and Family Welfare
MoHIPE	:	Ministry of Heavy Industries and Public Enterprises
MoHRD	:	Ministry of Human Resource Development
MoHUPA	:	Ministry of Housing and Urban Poverty Alleviation
MoIB	:	Ministry of Information and Broadcasting
MoLE	:	Ministry of Labour and Employment
MoM	:	Ministry of Mines
MoMSME	:	Ministry of Micro Small and Medium Enterprises
MoNRE	:	Ministry of New and Renewable Energy
MoP	:	Ministry of Power
MoPA	:	Ministry of Parliamentary Affairs
MoPNG	:	Ministry of Petroleum and Natural Gas
MoPR	:	Ministry of Panchayati Raj
MoR	:	Ministry of Railways
MoRD	:	Ministry of Rural Development
MoRTH	:	Ministry of Road Transport and Highways
MoSDE	:	Ministry of Skill Development and Entrepreneurship
MoSJE	:	Ministry of Social Justice and Empowerment
MoST	:	Ministry of Science and Technology
MoU	:	Memorandum of Understanding
MoUD	:	Ministry of Urban Development
MoWCD	:	Ministry of Women and Child Development
MoWR	:	Ministry of Water Resources
MoYAS	:	Ministry of Youth Affairs and Sports
MP	:	Madhya Pradesh
MPCS	:	Multi-Purpose Cyclone Center
MSIHC	:	Manufacture Storage and Import of Hazardous Chemicals
NABARD	:	National Bank for Agriculture and Rural Development
NAC	:	National Academy of Construction
NATMO	:	National Atlas and Thematic Mapping Organization
NBCC	:	National Buildings Construction Corporation
NCC	:	National Cadet Corps
NCERT	:	National Council of Educational Research and Training
NCFC	:	National Crop Forecasting Centre
NCMC	:	National Crisis Management Committee
NCMRWF	:	National Centre of Medium Range Weather Forecasting
NCT	:	National Capital Territory
NDMA	:	National Disaster Management Authority
NDMF	:	National Disaster Mitigation Fund
NDMP	:	National Disaster Management Plan
NDRF	:	National Disaster Response Force

NDVI	:	Normalized Differential Vegetation Index
NEC	:	National Executive Committee
NECN	:	National Emergency Communication Network
NEOC	:	National Emergency Operations Center
NER	:	North East Region
NGOs	:	Non-Governmental Organisations
NHAI	:	National Highways Authority of India
NHWIS	:	National Hazardous Waste Information System
NIC	:	National Informatics Centre
NICMAR	:	National Institute of Construction Management and Research
NIDM	:	National Institute of Disaster Management
NIO	:	North Indian Ocean
NIRD	:	National Institute of Rural Development
NISA	:	National Institute of Security Academy
NITTTR	:	National Institute of Technical Teachers' Training and Research
NPDM	:	National Policy on Disaster Management
NRAA	:	National Rainfed Area Authority
NRE	:	Nuclear and Radiological Event
NREMP	:	National Radiation Emergency Management Plan
NRSC	:	National Remote Sensing Centre
NSDA	:	National Skill Development Agency
NSDC	:	National Skill Development Corporation
NSS	:	National Service Scheme
NWDA	:	National Water Development Agency
NYKS	:	Nehru Yuvak Kendra Sangathan
O&M	:	Operation and Maintenance
PG	:	Post Graduate
PRD	:	Panchayati Raj Department
PRIs	:	Panchayati Raj Institutions
PWD	:	Public Works Department
R&D	:	Research and Development
RBI	:	Reserve Bank of India
RDD	:	Radiological Dispersal Device
RDSO	:	Research Designs and Standards Organization
RO	:	Reverse Osmosis
RTSMN	:	Real Time Seismic Monitoring Network
SAC	:	Space Applications Centre
SASE	:	Snow and Avalanche Study Establishment
SAU	:	State Agricultural University
SAVI	:	Soil Adjusted Vegetation Index
SBSE	:	State Board of Secondary Education
SDMA	:	State Disaster Management Authority
SDMC	:	State Drought Monitoring Cell
SDMF	:	State Disaster Mitigation Fund
SDRF	:	State Disaster Response Force
SDRN	:	State Disaster Resource Network

SEC	:	State Executive Committee
SEOC	:	State Emergency Operation Center
SERC	:	Structural Engineering Research Centre
SFAC	:	Standing Fire Advisory Council
SHG	:	Self Help Group
SIDM	:	State Institute of Disaster Management
SIRD	:	State Institute of Rural Development
SLBC	:	State Level Bankers' Committee
SOG	:	Standard Operating Guidelines
SoI	:	Survey of India
SOP	:	Standard Operating Procedure
SPCB	:	State Pollution Control Board
SRSAC	:	State Remote Sensing Application Centre
SRSC	:	State Remote Sensing Centers
SWAN	:	State Wide Area Network
TN	:	Tamil Nadu
ToT	:	Training of Trainers
UDD	:	Urban Development Department
UFDM	:	Urban Flood Disaster Management
UGC	:	University Grants Commission
ULB	:	Urban Local Bodies(municipal corporations, municipalities, *nagarpalikas*)
UN	:	United Nations
UNDP	:	United Nations Development Programme
UNISDR	:	United Nations International Strategy for Disaster Reduction
UP	:	Uttar Pradesh
USDDM	:	Urban Storm Drainage Design Manual
UT	:	Union Territory
VHF	:	Very High Frequency
WRD	:	Water Resources Department

Executive Summary

Background

The Disaster Management Act, 2005 (DM Act 2005) lays down institutional and coordination mechanism for effective Disaster Management (DM) at the national, state, district and local levels. As mandated by this Act, the Government of India (GoI) created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMAs) headed by the respective Chief Ministers and the District Disaster Management Authorities (DDMAs) headed by the District Collectors and co-chaired by Chairpersons of the local bodies. These bodies have been set up to facilitate a paradigm shift from the hitherto relief-centric approach to a more proactive, holistic and integrated approach of strengthening disaster preparedness, mitigation, and emergency response.

The National Disaster Management Plan (NDMP) provides a framework and direction to the government agencies for all phases of disaster management cycle. The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in disaster management. It is in accordance with the provisions of the Disaster Management Act, 2005, the guidance given in the National Policy on Disaster Management, 2009 (NPDM), and the established national practices.

The NDMP recognizes the need to minimize, if not eliminate, any ambiguity in the responsibility framework. It, therefore, specifies who is responsible for what at different stages of managing disasters. The NDMP is envisaged as ready for activation at all times in response to an emergency in any part of the country. It is designed in such a way that it can be implemented as needed on a flexible and scalable manner in all phases of disaster management: a) mitigation (prevention and risk reduction), b) preparedness, c) response and d) recovery (immediate restoration to build-back better).

The NDMP is consistent with the approaches promoted globally by the United Nations, in particular the Sendai Framework for Disaster Risk Reduction 2015-2030. It is a non-binding agreement, which the signatory nations will attempt to comply with on a voluntary basis. India will make all efforts to contribute to the realization of the global targets by improving the entire disaster management cycle in India by following the recommendations in the Sendai Framework and by adopting globally accepted best practices. The four priorities for action under the Sendai Framework are:

1. Understanding disaster risk
2. Strengthening disaster risk governance to manage disaster risk
3. Investing in disaster risk reduction for resilience
4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework. By 2030, the Sendai Framework aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NDMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for DRR. While the four cross-cutting Sendai priorities will be present explicitly or

implicitly in every aspect of this plan, certain chapters will have specific priorities as the dominant theme. The plan includes measures that will be implemented over the short, medium, and long-term more or less over the time horizon of the Sendai Framework ending in 2030. The measures mentioned here are indicative and not exhaustive. Based on global practices and national experiences, the plan will incorporate changes during the periodic reviews and updates.

Vision

> *Make India disaster resilient, achieve substantial disaster risk reduction, and significantly decrease the losses of life, livelihoods, and assets – economic, physical, social, cultural, and environmental – by maximizing the ability to cope with disasters at all levels of administration as well as among communities.*

Multi-Hazard Vulnerability

India, due to its, physiographic and climatic conditions is one of the most disaster prone areas of the world. Vulnerability to disasters/emergencies of Chemical, Biological, Radiological and Nuclear (CBRN) origin also exists. Heightened vulnerabilities to disaster risks can be related to increasing population, urbanisation, industrialisation, development within high-risk zones, environmental degradation, and climate change. The DM Act of 2005 and DM Policy of 2009 consider disasters to be natural or human-induced for defining the roles and responsibilities. The human-induced category includes CBRN disasters. Besides, with the natural factors discussed earlier, various human-induced activities are also responsible for accelerated impact and increase in frequency of disasters in the country. The NDMP covers disaster management cycle for all types of hazards faced in India – both natural and human-induced.

Reducing Risk; Enhancing Resilience

The role of the central agencies is to support the disaster-affected State or the UT in response to requests for assistance. However, the central agencies will play a pro-active role in disaster situations. In the domains of DM planning, preparedness, and capacity building, the central agencies will constantly work to upgrade Indian DM systems and practices as per global trends. The planning framework has arranged the actions envisaged for risk reduction under five thematic areas for action with one of the four priorities for action of Sendai Framework as its dominant feature.

For each hazard, the approach used in this national plan incorporates the four priorities enunciated in the Sendai Framework into the planning framework for Disaster Risk Reduction under the five Thematic Areas for Action:

1. Understanding Risk
2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development

For each thematic area for action, the NDMP has identified a set of major themes for undertaking actions within the broad planning framework. For each hazard, themes for action are presented in a separate responsibility matrix assigning roles of centre and state for each of the thematic areas for action. The activities envisaged in the NDMP and the Sendai Framework fall into short/ immediate (within 5 years), medium (within 10 years), and long-term (within 15 years) categories, which will be implemented in many instances concurrently, and not necessarily sequentially. For both

implementation and the realization of outcomes, they correspond to widely differing scope in terms of geographic spread, institutional complexity, and time scales. Some of the actions under immediate response are short-lived, while many of the measures for risk reduction and strengthening resilience are long term, which become part of all facets of developmental process through mainstreaming.

Response

Response measures are those taken immediately after receiving early warning, anticipating an impending disaster, or post-disaster in cases where an event occurs without warning. The primary goal of response to a disaster is saving lives, protecting property, environment, and meeting basic needs of human and other living beings after the disaster. The immediate focus will be on search and rescue of those affected and to evacuate those likely to be affected by the disaster or secondary disaster that is likely to happen. In the section on response, roles, function and responsibilities of ministries and agencies that have a key role to play are described. Since contexts, knowledge base, and technologies change, DM plans must be updated periodically to reflect any changes in the key roles envisaged to particular ministries or agencies.

At the national level, the central government has assigned nodal responsibilities to specific ministries for coordinating disaster-specific responses. The NDMA will be coordinating with relevant nodal ministry. The disaster-specific nodal ministry will ensure liaison with the state government where the disaster has occurred and coordination among various relevant ministries and departments to provide quick and efficient response. The state government will activate the Incident Response Teams (IRT) at state, district, or the block level as required. The IRTs will coordinate with the state EOC. The SDMA[1] (or its equivalent, CoR, or Dept. of Revenue) will provide technical support to the response.

Different central ministries and departments will provide emergency support to the response effort as per request from the State Government. It may be noted that the SDMA, Department of Revenue or Commissioner of Relief (as applicable) is the nodal agency for coordination of disaster response. The various agencies whose responsibilities are defined in detailed DM plans for the state and district will be responsible specific response measures. The DDMA is the nodal agency for coordination of response at district level supported by other district level agencies. The department wise specific activities at central ministries and state government are summarised in matrix providing clarity to the roles and responsibilities of various agencies.

Recovery and Building Back Better

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of betterment reconstruction. While disasters result in considerable disruption of normal life, enormous suffering, loss of lives and property, global efforts consider the recovery, rehabilitation and reconstruction phase as an opportunity to build back better integrating disaster risk reduction into development measures, and making communities resilient to disasters. BBB is not limited to the built environment and has a wide applicability encompassing the economy, societal systems, institutions, and environment. The Sendai Framework envisages that the stakeholders will be prepared for BBB after a disaster. Existing mechanisms may require strengthening in order to provide effective support and achieve better implementation. Disaster recovery tends to be very difficult and long-drawn out. The reconstruction will vary depending on the actual disaster, location,

[1]Where ever SDMA is used, unless otherwise mentioned, it stands for the nodal agency of the state, which may be SDMA, or others such as the Commissioner of Relief, or the Department of Revenue, as applicable to the particular state.

pre-disaster conditions, and the potentialities that emerge at that point of time. The NDMP provides a generalized framework for recovery since it is not possible to anticipate all the possible elements of betterment reconstruction.

Capacity Development

Capacity development covers strengthening of institutions, mechanisms, and capacities of all stakeholders at all levels. The plan recognizes the need for a strategic approach to capacity development and the need for enthusiastic participation of various stakeholders to make it effective. The plan addresses the challenge of putting in place appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters. The planning needs of capacity development are described for all the four aspects of disaster management:

a) Prevention or mitigation to reduce risk from hazards
b) Preparedness for response
c) Effective response when disaster occurs
d) Ability to recover and build back better

Financial Arrangements

The financing of disaster relief has been an important aspect of federal fiscal relations. The primary responsibility for undertaking rescue, relief, and rehabilitation measures during a disaster lies with the State Governments. The Union Government supplements their efforts through logistic and financial support. The DM Act 2005 provides the legal framework for disaster management and all related matters, including the financial aspects. The Act envisages the constitution of two types of funds: response and mitigation, which are to be set up at the national, state and district levels. Thus, for disaster response, the Act envisages a National Disaster Response Fund, a State Disaster Response Fund in each State and, within the States, a District Disaster Response Fund in each district. Similarly, the Act envisages a National Disaster Mitigation Fund, State Disaster Mitigation Fund and District Disaster Mitigation Fund for disaster mitigation. Section 47 of the DM Act 2005, pertaining to setting up of the National Disaster Mitigation Fund, has not been notified by the Government so far. The financing of the entire disaster management cycle will be as per norms set by the Government of India. The disaster risk reduction will be achieved by mainstreaming the requirements into the developmental plans.

Structure of the Plan

The NDMP has ten chapters starting with the introduction to the plan. The second chapter gives a summary of the 'Hazard Risk and Vulnerability Profile' of India. The third chapter – 'Reducing Risk; Enhancing Resilience' – presents the planning framework aimed at significant reduction in disaster risk and considerably enhance resilience to various disasters. The fourth chapter covers the planning needs for preparedness and response. The fifth focuses on strengthening disaster risk governance. The sixth chapter is on the planning needs for effective recovery and successful building back better. The seventh chapter summarizes planning needs for 'Capacity Development' articulated in the plan. The eighth chapter dwells on 'Financial Arrangements' and the ninth is 'International Cooperation'. The tenth and the last chapter, is 'Maintaining and Updating the Plan'.

1 Introduction

1.1 Rationale

The National Disaster Management Plan (NDMP) provides a framework and direction to the government agencies for all phases of disaster management cycle (Figure 1-1). The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the global best practices and knowledge base in disaster management. It is in accordance with the provisions of the Disaster Management Act 2005, the guidance given in the National Policy on Disaster Management 2009 (NPDM), and the established national practices. Relevant agencies – central or state – will carry out disaster management activities in different phases in the disaster-affected areas depending on the type and scale of disaster.

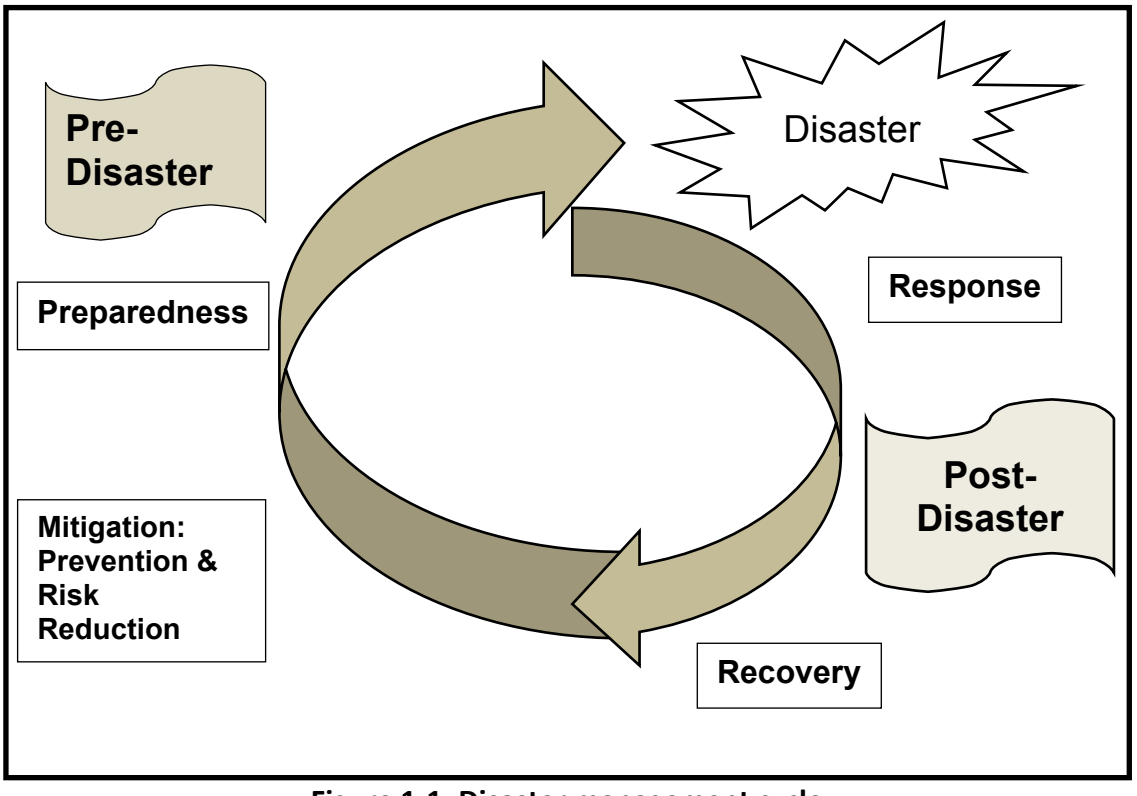


Figure 1-1: Disaster management cycle

Within each state, the state government is primarily responsible for disaster. However, in situations where the resources of the state are inadequate to cope effectively with the situation, the State Government can seek assistance from the Central Government. In addition, there may be situations in which the Central Government will have direct responsibilities in certain aspects of disaster management. While the NDMP pertains to both these exigencies, in most cases the role of central agencies will be to support the respective state governments. Barring exceptional circumstances, the state governments will deploy the first responders and carry out other activities pertaining to disaster management.

The NDMP provides a framework covering all aspects of the disaster management cycle. It covers disaster risk reduction, mitigation, preparedness, response, recovery, and betterment

reconstruction. It recognises that effective disaster management necessitates a comprehensive framework encompassing multiple hazards. The NDMP incorporates an integrated approach that ensures the involvement of government agencies, numerous other relevant organisations, private sector participants, and local communities.

The NDMP recognizes the need to minimize, if not eliminate, any ambiguity in the responsibility framework. It, therefore, specifies who is responsible for what at different stages of managing disasters. The NDMP is envisaged as ready for activation at all times in response to an emergency in any part of the country. It is designed in such a way that it can be implemented as needed on a flexible and scalable manner in all phases of disaster management: a) mitigation (prevention and risk reduction), b) preparedness, c) response and d) recovery (immediate restoration to long-term betterment reconstruction).

The NDMP provides a framework with role clarity for rapid mobilization of resources and effective disaster management by the Central and State Governments in India. While it focuses primarily on the needs of the government agencies, it envisages all those involved in disaster management including communities and non-government agencies as potential users. The NDMP provides a well-defined framework for disaster management covering scope of work and roles of relevant agencies along with their responsibilities and accountability necessary to ensure effective mitigation, develop preparedness, and mobilize adequate response.

1.2 Vision

Make India disaster resilient, achieve substantial disaster risk reduction, and significantly decrease the losses of life, livelihoods, and assets – economic, physical, social, cultural, and environmental – by maximizing the ability to cope with disasters at all levels of administration as well as among communities.

1.3 Legal Mandate

Section 11 of the DM Act 2005 mandates that there shall be a National Disaster Management Plan (NDMP) for the whole of India. The proposed NDMP complies with the National Policy on Disaster Management (NPDM) of 2009 and conforms to the provisions of the DM Act making it mandatory for the Government of India and various central ministries to have adequate DM plans. While the national plan will pertain to the disaster management for the whole of the country, the hazard-specific nodal ministries and departments notified by the Government of India will prepare detailed DM plans specific to the disaster assigned. As per Section 37 of the DM Act, every ministry and department of the Government of India, including the hazard-specific nodal ministries, shall prepare comprehensive DM plans detailing how each of them will contribute to the national efforts in the domains of disaster prevention, preparedness, response, and recovery.

1.4 Scope

As per the DM Act 2005, the National Plan shall include:

a. Measures to be taken for prevention of disasters or the mitigation of their effects
b. Measures to be taken for the integration of mitigation measures in the development plans
c. Measures to be taken for preparedness and capacity building to effectively respond to any threatening disaster situations or disaster
d. Roles and responsibilities of different Ministries or Departments of the Government of India in respect of measures of the three aspects mentioned above

The NDMP provides an over-arching planning framework for DM for the whole country, which must be reviewed and updated annually. Central Government shall make appropriate provisions for financing the Plan. Disaster management, covering prevention, preparedness, response, and recovery, necessarily involves multiple agencies and it is even more so in a large country like India. Hence, the inter-agency coordination and collaboration among stakeholders are of utmost importance for the successful implementation of the NDMP and in ensuring effective risk reduction, response and recovery.

The NDMP is highly ambitious requiring a very long period spanning as much as 15 years for the complete implementation of some of the larger targets such as rolling out all the measures for DRR in all parts of the country. Depending on the nature of the suggested measure, they will be implemented within a span of five, ten, or fifteen years from the start of implementation, as short, medium, and long-term measures.

The NDMP provides the framework for mobilization and coordination of the central ministries, departments and other agencies among themselves and the devolution of responsibilities between central and state government in all spheres of disaster prevention, preparedness, response and recovery within India. The deployment of armed forces[2] and central agencies during disaster within India will be subject to norms adopted by the Central government and the relevant protocols agreed upon between Central and State Governments. Any State may seek the assistance and support of the Centre and other States at any time during a disaster. Responding to incident specific emergencies is the responsibility of designated agencies.

The plan is based on detailed hazard-specific guidelines (Annexure-I) prepared by the NDMA. The GoI has notified certain central ministries and departments for hazard-specific nodal responsibilities for overall coordination of disaster management for the particular hazard. In addition, GoI has notified certain ministries disaster-wise for coordinating immediate post-disaster response. These notified ministries / departments have to prepare detailed DM plans to carry out the roles assigned to them. At the same time, each central ministry, department, state, and district has to formulate respective DM plans specifying how each entity can contribute to effectively manage disasters.

The measures included in the NDMP, which is a dynamic document, are indicative and not exhaustive. Based on global practices and national experiences, the plan will incorporate changes during the periodic reviews and updates. The suggested measures are short (within 5 years), medium (within 10 years), and long-term (within 15 years) in terms of complete implementation. While some of the suggested measures in all categories – short, medium, and long-term – are already under implementation or in need of upgrading, many need to be initiated. Since there is considerable variation in the current status of the proposed measures across ministries, departments, states, and UTs, in this document the measures have not been arranged into short, medium and long-term categories. Each central Ministry, Department, and the State Government will categorize the items in their DM Plans into these three time frames for implementation while preparing their plan or at the time of revising existing plans. The proposed responsibilities of the State agencies are indicative. The States may assign responsibilities to appropriate agencies.

In the case of recovery, there are three recovery periods after a disaster: a) Early – three to eighteen months, b) Medium – within five years and c) Long-term – within five to ten years. These depend on the specific disaster and are relevant only with reference to particular recovery programmes. Hence, the NDMP discusses them only in general terms.

[2]Armed Forces includes the Army, Air Force, and Navy.

1.5 Objectives

Along with the mandate given in the DM Act 2005 and the NPDM 2009, the national plan has incorporated the national commitment towards the Sendai Framework. Accordingly, the broad objectives of the NDMP are:

1) Improve the understanding of disaster risk, hazards, and vulnerabilities
2) Strengthen disaster risk governance at all levels from local to centre
3) Invest in disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development
4) Enhance disaster preparedness for effective response
5) Promote "Build Back Better" in recovery, rehabilitation and reconstruction
6) Prevent disasters and achieve substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental)
7) Increase resilience and prevent the emergence of new disaster risks and reduce the existing risks
8) Promote the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures to prevent and reduce hazard exposure and vulnerabilities to disaster
9) Empower both local authorities and communities as partners to reduce and manage disaster risks
10) Strengthen scientific and technical capabilities in all aspects of disaster management
11) Capacity development at all levels to effectively respond to multiple hazards and for community-based disaster management
12) Provide clarity on roles and responsibilities of various Ministries and Departments involved in different aspects of disaster management
13) Promote the culture of disaster risk prevention and mitigation at all levels
14) Facilitate the mainstreaming of disaster management concerns into the developmental planning and processes

1.6 Sendai Framework

The NDMP is consistent with the approaches promoted globally by the United Nations, in particular the Sendai Framework for Disaster Risk Reduction 2015-2030 (hereafter "Sendai Framework") adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015 (UNISDR 2015a) as the successor instrument to the Hyogo Framework for Action 2005-2015. It is a non-binding agreement, which the signatory nations, including India, will attempt to comply with on a voluntary basis. However, India will make all efforts to contribute to the realization of the global targets by improving the entire disaster management cycle in India by following the recommendations in the Sendai Framework and by adopting globally accepted best practices.

The Sendai Framework was the first international agreement adopted within the context of the post-2015 development agenda. Two other major international agreements followed it in the same year: the Sustainable Development Goals 2015 – 2030 in September, and the UNCOP21 Climate Change agreement to combat human-induced climate change in December. DRR is a common theme in these three global agreements. The Paris Agreement on global climate change points to the importance of averting, minimizing, and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage. These three agreements recognize the desired outcomes in DRR as a product of complex and interconnected social and economic processes, which overlap across the agendas of the three agreements. Intrinsic to sustainable

development is DRR and the building of resilience to disasters. Further, effective disaster risk management contributes to sustainable development.

In the domain of disaster management, the Sendai Framework provides the way forward for the period ending in 2030. There are some major departures in the Sendai Framework:

- For the first time the goals are defined in terms of outcome-based targets instead of focusing on sets of activities and actions.
- It places governments at the center of disaster risk reduction with the framework emphasizing the need to strengthen the disaster risk governance.
- There is significant shift from earlier emphasis on disaster management to addressing disaster risk management itself by focusing on the underlying drivers of risk.
- It places almost equal importance on all kinds of disasters and not only on those arising from natural hazards.
- In addition to social vulnerability, it pays considerable attention to environmental aspects through a strong recognition that the implementation of integrated environmental and natural resource management approaches is needed for disaster reduction
- Disaster risk reduction, more than before, is seen as a policy concern that cuts across many sectors, including health and education

As per the Sendai Framework, in order to reduce disaster risk, there is a need to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing such information. The Sendai Framework notes that it is "urgent and critical to anticipate, plan for and reduce disaster risk" to cope with disaster. It requires the strengthening of disaster risk governance and coordination across various institutions and sectors. It requires the full and meaningful participation of relevant stakeholders at different levels. It is necessary to invest in the economic, social, health, cultural and educational resilience at all levels. It requires investments in research and the use of technology to enhance multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction.

The four priorities for action under the Sendai Framework are:

1. Understanding disaster risk
2. Strengthening disaster risk governance to manage disaster risk
3. Investing in disaster risk reduction for resilience
4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

India is a signatory to the Sendai Framework for a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the "substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries." India will make its contribution in achieving the seven global targets set by the Sendai Framework:

1) Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005– 2015;
2) Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;

3) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
4) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;
5) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
6) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
7) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

1.7 Integrating Sendai Framework into NDMP

The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework. By 2030, the Sendai Framework aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NDMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for DRR. The framework states that to realize this outcome, it is necessary to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. These measures must cover various sectors such as economic, structural, legal, social, health, cultural, educational, environmental, technological, political, and institutional. The plan includes measures that will be implemented over the short, medium, and long-term more or less over the time horizon of the Sendai Framework ending in 2030. The incorporation of four priorities for action under the Sendai Framework into the NDMP is summarised in here for quick reference (Table 1-1)

Table 1-1: Incorporation of four priorities for action under the Sendai Framework into the NDMP

Sendai Framework for DRR (2015-2030) Priority	Chapters with the priority as its dominant theme
1. Understanding disaster risk	Chapters 2 and 3
2. Strengthening disaster risk governance to manage disaster risk	Chapters 3, 4, 5, 6, 8, and 9
3. Investing in disaster risk reduction for resilience	Chapters 3, 4, 5, 6, 7, and 8
4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction	Chapters 4, 6, 7, 8, 9, and 10

1.8 Disasters, Risk Reduction and Management - Definitions

The terms used in this document, unless otherwise specified, will have the same meaning as in the Disaster Management Act 2005 and those defined by the United Nations International Strategy for Disaster Reduction (UNISDR) in the handbook on terminology (UNISDR2009) or in UNISDR's proposed updates to terminology (UNISDR2015b).

1.8.1 Disasters

The UNISDR (2009) defines disaster as:

> "A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources."

UNISDR considers disaster to be a result of the combination of many factors such as the exposure to hazards, the conditions of vulnerability that are present, and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injuries, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

The DM Act 2005 uses the following definition for disaster:

> "Disaster" means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area."

1.8.2 Disaster Management

The UNISDR defines disaster risk management as the systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises of all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards. A definition for the term 'Disaster Management' is not included in the UNISDR's handbook of terminology. However, the proposed, but not yet adopted, 'Updated Terminology on Disaster Risk Reduction' of UNISDR[3] has proposed the following definition for the term Disaster Management (UNISDR 2015b):

> "The organization, planning and application of measures preparing for, responding to and, initial recovery from disasters."

As per this definition, 'Disaster Management' focuses on creating and implementing preparedness and others plans to decrease the impact of disasters and build back better. Failure to create/apply a plan could result in damage to life, assets and lost revenue. However, it may not completely avert or eliminate the threats.

The term Disaster Management as used in the NPDM 2009 and the DM Act 2005 document is comprehensive covering all aspects – disaster risk reduction, disaster risk management, disaster preparedness, disaster response, and post-disaster recovery. This document uses the term with the same meaning as defined in the DM Act 2005:

[3]Proposed Updated Terminology on Disaster Risk Reduction: A Technical Review. http://www.preventionweb.net/files/45462_backgoundpaperonterminologyaugust20.pdf (accessed 10-Apr-2016)

"A continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient" for the following: 1) Prevention of danger or threat of any disaster, 2) Mitigation or reduction of risk of any disaster or its severity or consequences, 3) Capacity-building, 4) Preparedness to deal with any disaster, 5) Prompt response to any threatening disaster situation or disaster, 6) Assessing the severity or magnitude of effects of any disaster 7) Evacuation, rescue and relief, and 8) Rehabilitation and reconstruction."

1.8.3 Disaster Risk Reduction (Mitigation)

Disaster Risk Reduction, as per UNISDR, consists of a framework of elements that will help to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

1.9 Types of Disasters

Primarily disasters are triggered by natural hazards or human-induced, or result from a combination of both. In particular, human-induced factors can greatly aggravate the adverse impacts of a natural disaster. Even at a larger scale, globally, the UN Inter-Governmental Panel on Climate Change (IPCC) has shown that human-induced climate change has significantly increased both the frequency and intensity of extreme weather events. While heavy rains, cyclones, or earthquakes are all natural, the impacts may, and are usually, worsened by many factors related to human activity. The extensive industrialization and urbanization increases both the probability of human-induced disasters, and the extent of potential damage to life and property from both natural and human-induced disasters. The human society is also vulnerable to Chemical, Biological, Radiological, and Nuclear (CBRN) disasters.

1.9.1 Natural Hazards

The widely accepted classification system used by the Disaster Information Management System of DesInventar[4] classifies disasters arising from natural hazards into five major categories (DesInventar2016):

1) Geophysical: Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Hydro-meteorological factors are important contributors to some of these processes. Tsunamis are difficult to categorize; although they are triggered by undersea earthquakes, and other geological events, they are essentially an oceanic process that is manifested as a coastal water-related hazard.
2) Hydrological: Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up
3) Meteorological: Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)
4) Climatological: Events caused by long-lived meso- to macro-scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)
5) Biological: Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may

[4] http://www.desinventar.net/definitions.html (accessed 10-Apr-2016)

cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

A brief description of these five major categories of the disasters arising from natural factors with the sub-categories is given in Table 1-2. The below classification is not a water tight one. In real life situations, many disasters are a combination of different types of disasters. In addition, secondary disasters may occur after a disaster has occurred.

Table 1-2: Categories of Natural Hazards

	Family	Main Event	Short Description/ Secondary Disaster
1	Geophysical	Earthquake/Mass movement of earth materials	• Landslide following earthquake; • Urban fires triggered by earthquakes; • Liquefaction - the transformation of (partially) water-saturated soil from a solid state to a liquid state caused by an earthquake • Mass movement of earth materials, usually down slopes • Surface displacement of earthen materials due to ground shaking triggered by earthquakes
		Volcano	• Surface displacement of earthen materials due to ground shaking triggered by volcanic eruptions • A type of geological event near an opening/vent in the Earth's surface including volcanic eruptions of lava, ash, hot vapour, gas, and pyroclastic material. • Ash fall; Lahar - Hot or cold mixture of earthen material flowing on the slope of a volcano either during or between volcanic eruptions; • Lava Flow • Pyroclastic Flow - Extremely hot gases, ash, and other materials of more than 1,000 degrees Celsius that rapidly flow down the flank of a volcano (more than 700 km/h) during an eruption
		Tsunami	A series of waves (with long wavelengths when traveling across the deep ocean) that are generated by a displacement of massive amounts of water through underwater earthquakes, volcanic eruptions or landslides. Tsunami waves travel at very high speed across the ocean but as they begin to reach shallow water, they slow down and the wave grows steeper.
2	Hydrological	• Flood • Landslides • Wave Action	• Avalanche, a large mass of loosened earth material, snow, or ice that slides, flows or falls rapidly down a mountainside under the force of gravity • Coastal Erosion - The temporary or permanent loss of sediments or landmass in coastal margins due to the action of waves, winds, tides, or anthropogenic activities • Coastal flood - Higher-than-normal water levels along the coast caused by tidal changes or thunderstorms that result in flooding, which can last from days to weeks • Debris Flow, Mud Flow, Rock Fall - Types of

	Family	Main Event	Short Description/ Secondary Disaster
			landslides that occur when heavy rain or rapid snow/ice melt send large amounts of vegetation, mud, or rock down slope by gravitational forces • Flash Flood Hydrological - Heavy or excessive rainfall in a short period of time that produce immediate runoff, creating flooding conditions within minutes or a few hours during or after the rainfall • Flood Hydrological - A general term for the overflow of water from a stream channel onto normally dry land in the floodplain (riverine flooding), higher-than normal levels along the coast and in lakes or reservoirs (coastal flooding) as well as ponding of water at or near the point where the rain fell (flash floods) • Wave Action: Wind-generated surface waves that can occur on the surface of any open body of water such as oceans, rivers and lakes, etc. The size of the wave depends on the strength of the wind and the travelled distance (fetch).
3	Meteorological	Hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that may last for minutes to days	• Cyclone, Storm Surge, Tornado, Convective Storm, Extratropical Storm, Wind • Cold Wave, Derecho • Extreme Temperature, Fog, Frost, Freeze, Hail, Heat-wave • Lightning, Heavy Rain • Sand-Storm, Dust-Storm • Snow, Ice, Winter Storm, Blizzard
4	Climatological	Unusual, extreme weather conditions related to long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal (long-term) climate variability	• Drought • Extreme hot/cold conditions • Forest/Wildfire Fires • Glacial Lake Outburst • Subsidence
5	Biological	Exposure to germs and toxic substances	• Epidemics: viral, bacterial, parasitic, fungal, or prion infections • Insect infestations • Animal stampedes

1.9.2 Human-Induced Disasters

The NPDM notes that rise in population, rapid urbanization and industrialization, development within high-risk zones, environmental degradation, and climate change aggravates the vulnerabilities to various kinds of disasters. Due to inadequate disaster preparedness, communities, and animals are at increased risk from many kinds of human-induced hazards arising from accidents (industrial, road, air, rail, on river or sea, building collapse, fires, mine flooding, oil spills, etc.). Chemical,

Biological, Radiological, and Nuclear (CBRN) hazards rank very high in among the human-induced risks. Terrorist activities and secondary incidents add to these risks and call for adequate preparedness and planning.

1.10 Levels of Disasters

The disaster management and its planning at various tiers must take into account the vulnerability of disaster-affected area, and the capacity of the authorities to deal with the situation. Using this approach, the High Power Committee on Disaster Management[5], in its report of 2001, categorized disaster situations into three 'levels': L1, L2, and L3. The period of normalcy, L0, should be utilized for disaster risk reduction.

Level-L1: The level of disaster that can be managed within the capabilities and resources at the District level. However, the state authorities will remain in readiness to provide assistance if needed.

Level-L2: This signifies the disaster situations that require assistance and active mobilization of resources at the state level and deployment of state level agencies for disaster management. The central agencies must remain vigilant for immediate deployment if required by the state.

Level-L3: This corresponds to a nearly catastrophic situation or a very large-scale disaster that overwhelms the State and District authorities.

The categorization of disaster situations into levels L0 to L3 finds no mention in DM Act 2005. Further, the DM Act does not have any provision for notifying any disaster as a 'national calamity' or a 'national disaster'.

1.11 Institutional Framework

1.11.1 National Level

The overall coordination of disaster management vests with the Ministry of Home Affairs (MHA). The Cabinet Committee on Security (CCS) and the National Crisis Management Committee (NCMC) are the key committees involved in the top-level decision-making with regard to disaster management. The NDMA is the lead agency responsible for the preparation DM plans and the execution of DM functions at the national level. Figure 1-2 provides a schematic view of the basic institutional structure for DM at national level. The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

In most cases, state governments will be carrying out disaster management with the central government playing a supporting role. The central agencies will participate only on the request from the state government. Within each state, there is a separate institutional framework for disaster management at the state-level. The DM Act of 2005 provides for the setting up of NDMA at national level, and, the SDMA at the state level. The role, composition and the role of the key decision-making bodies for disaster management at national-level are briefly described in the Table 1-3. The

[5]The High Powered Committee was constituted in August 1999 to make recommendation for institutional reforms and preparation of Disaster Management Plans at the National, State and District levels at the behest of the Prime Minister by the Ministry of Agriculture.

extent of involvement of central agencies will depend on the type, scale, and administrative spread of the disaster. If the situation requires the direct assistance from central government or the deployment of central agencies, the central government will provide all necessary support irrespective of the classification of the disaster (L1 to L3).

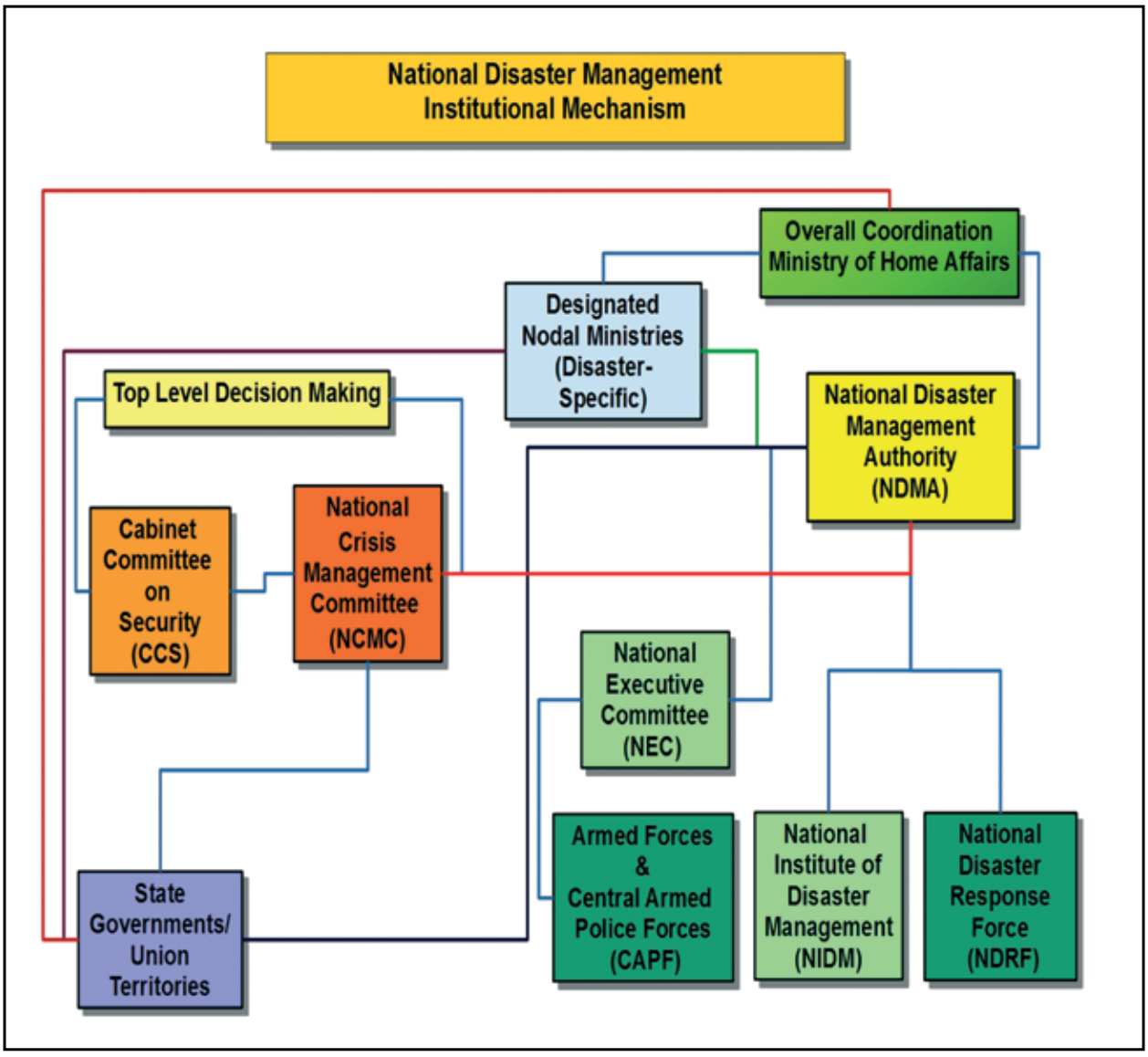


Figure 1-2: National-level disaster management - basic institutional framework

Note: This represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

Table 1-3: Key national-level decision-making bodies for disaster management

	Name	Composition	Vital role
1	**Cabinet Committee on Security (CCS)**	Prime Minister, Minister of Defence, Minister of Finance, Minister of Home Affairs, and Minister of External Affairs	• Evaluation from a national security perspective, if an incident has potentially security implications • Oversee all aspects of preparedness, mitigation and management of Chemical, Biological, Radiological and Nuclear (CBRN) emergencies and of disasters with security implications • Review risks of CBRN emergencies from time to time, giving directions for measures considered necessary for disaster prevention, mitigation, preparedness and effective response
2	**National Crisis Management Committee (NCMC)**	• Cabinet Secretary (Chairperson) • Secretaries of Ministries / Departments and agencies with specific DM responsibilities	• Oversee the Command, Control and Coordination of the disaster response • Give direction to the Crisis Management Group as deemed necessary • Give direction for specific actions to face crisis situations
3	**National Disaster Management Authority (NDMA)**	• Prime Minister (Chairperson) • Members (not exceeding nine, nominated by the Chairperson)	• Lay down policies, plans and guidelines for disaster management • Coordinate their enforcement and implementation throughout the country • Approve the NDMP and the DM plans of the respective Ministries and Departments of Government of India • Lay down guidelines for disaster management to be followed by the different Central Ministries, Departments and the State Governments
4	**National Executive Committee (NEC)**	• Union Home Secretary (Chairperson) • Secretaries to the GOI in the Ministries / Departments of Agriculture, Atomic Energy, Defence, Drinking Water and sanitation, Environment, Forests and Climate Change Finance (Expenditure), Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications,	• To assist the NDMA in the discharge of its functions • Preparation of the National Plan • Coordinate and monitor the implementation of the National Policy • Monitor the implementation of the National Plan and the plans prepared by the Ministries or Departments of the Government of India • Direct any department or agency of the Govt. to make available to the NDMA or SDMAs such men, material or resources as are available with it for the purpose of emergency response, rescue and relief • Ensure compliance of the directions issued by the Central Government • Coordinate response in the event of any threatening disaster situation or disaster • Direct the relevant Ministries / Departments of the GoI, the State Governments and the SDMAs regarding measures to be taken in response to

	Name	Composition	Vital role
		Urban Development, Water Resources, River Development and Ganga Rejuvenation, The Chief of the Integrated Defence Staff of the Chiefs of Staff Committee, ex officio as members. • Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways and Secretary, NDMA are special invitees to the meetings of the NEC.	any specific threatening disaster situation or disaster. • Coordinate with relevant Central Ministries/ Departments / Agencies which are expected to provide assistance to the affected State as per Standard Operating Procedures (SOPs) • Coordinate with the Armed Forces, Central Armed Police Forces[6] (CAPF), the National Disaster Response Force (NDRF) and other uniformed services which comprise the GoI's response to aid the State authorities • Coordinate with India Meteorological Department (IMD) and a number of other specialised scientific institutions which constitute key early warning and monitoring agencies • Coordinate with Civil Defence volunteers, home guards and fire services, through the relevant administrative departments of the State Governments
5	**National Disaster Response Force (NDRF)**	Specially trained force headed by a Director General Structured like para military forces for rapid deployment	Provide assistance to the relevant State Government/District Administration in the event of an imminent hazard event or in its aftermath
6	**National Institute of Disaster Management (NIDM)**	Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national levels scientific, research and technical organizations, besides eminent scholars, scientists and practitioners.	• Human resource development and capacity building for disaster management within the broad policies and guidelines laid down by the NDMA • Design, develop and implement training programmes • Undertake research • Formulate and implement a comprehensive human resource development plan • Provide assistance in national policy formulation, assist other research and training institutes, state governments and other organizations for successfully discharging their responsibilities • Develop educational materials for dissemination • Promote awareness generation

From time to time, the central government notifies hazard-specific nodal ministries to function as the lead agency in managing particular types of disasters (see Table 1-4 for current list of disaster-specific nodal ministries notified by GoI).

[6]CAPF includes BSF, CRPF, ITBP, CISF, SSB, Assam Rifles, and Coast Guard.

Table 1-4: Nodal Ministry for Management / Mitigation of Different Disasters

	Disaster	Nodal Ministry/ Department
1	Biological	Min. of Health and Family Welfare (MoHFW)
2	Chemical and Industrial	Min. of Environment, Forest sand Climate Change (MoEFCC)
3	Civil Aviation Accidents	Min. of Civil Aviation (MoCA)
4	Cyclone/Tornado	Min. of Earth Sciences (MoES)
5	Tsunami	Min. of Earth Sciences (MoES)
6	Drought/Hailstorm/Cold Wave and Frost/Pest Attack	Min. of Agriculture and Farmers Welfare (MoAFW)
7	Earthquake	Min. of Earth Sciences (MoES)
8	Flood	Min. of Water Resources (MoWR)
9	Forest Fire	Min. of Environment, Forests, and Climate Change (MoEFCC)
10	Landslides	Min. of Mines (MoM)
11	Avalanche	Min. of Defence (MoD)
12	Nuclear and Radiological Emergencies	Dept. of Atomic Energy (DAE)
13	Rail Accidents	Min. of Railways (MoR)
14	Road Accidents	Min. of Road Transport and Highways (MoRTH)
15	Urban Floods	Min. of Urban Development (MoUD)

1.11.1.1 National Disaster Management Authority (NDMA)

The Government of India established the NDMA in 2005, headed by the Prime Minister. Under the DM Act 2005, the NDMA, as the apex body for disaster management, shall have the responsibility for laying down the policies, plans, and guidelines for disaster management for ensuring timely and effective response to disaster. The guidelines of NDMA will assist the Central Ministries, Departments, and States to formulate their respective DM plans. It will approve the National Disaster Management Plans and DM plans of the Central Ministries / Departments. It will take such other measures, as it may consider necessary, for the prevention of disasters, or mitigation, or preparedness and capacity building, for dealing with a threatening disaster situation or disaster. Central Ministries / Departments and State Governments will extend necessary cooperation and assistance to NDMA for carrying out its mandate. It will oversee the provision and application of funds for mitigation and preparedness measures.

NDMA has the power to authorise the Departments or authorities concerned, to make emergency procurement of provisions or materials for rescue and relief in a threatening disaster situation or disaster. The general superintendence, direction, and control of the National Disaster Response Force (NDRF) is vested in and will be exercised by the NDMA. The National Institute of Disaster Management (NIDM) works within the framework of broad policies and guidelines laid down by the NDMA. The NDMA has the mandate to deal with all types of disasters – natural or human-induced. However, other emergencies such as terrorism (counter-insurgency), law and order situations, hijacking, air accidents, CBRN weapon systems, which require the close involvement of the security forces and/or intelligence agencies, and other incidents such as mine disasters, port and harbour emergencies, forest fires, oilfield fires and oil spills will be handled by the National Crisis Management Committee (NCMC). Nevertheless, NDMA may formulate guidelines and facilitate training and preparedness activities in respect of CBRN emergencies.

1.11.1.2 National Institute of Disaster Management (NIDM)

As per the provisions of the Chapter-VII of the DM Act, Government of India constituted the National Institute of Disaster Management (NIDM) under an Act of Parliament with the goal of being the premier institute for capacity development for disaster management in India and the region. The vision of NIDM is to create a Disaster Resilient India by building the capacity at all levels for disaster prevention and preparedness. NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation, and policy advocacy in the field of disaster management. The NIDM has built strategic partnerships with various ministries and departments of the central, state, and local governments, academic, research and technical organizations in India and abroad and other bi-lateral and multi-lateral international agencies. It provides technical support to the state governments through the Disaster Management Centres (DMCs) in the Administrative Training Institutes (ATIs) of the States and Union Territories. Presently it is supporting as many as 30 such centres. Six of them are being developed as Centres of Excellence in the specialised areas of risk management – flood, earthquake, cyclone, drought, landslides, and industrial disasters.

1.11.1.3 National Disaster Response Force (NDRF)

The NDRF has been constituted as per the Chapter-VIII of the DM Act 2005 as a specialist response force that can be deployed in a threatening disaster situation or disaster. As per the DM Act, the general superintendence, direction and control of the NDRF shall be vested and exercised by the NDMA. The command and supervision of the NDRF shall vest with the Director General appointed by the Government of India. The NDRF will position its battalions at different locations as required for effective response. NDRF units will maintain close liaison with the designated State Governments and will be available to them in the event of any serious threatening disaster situation. The NDRF is equipped and trained to respond to situations arising out of natural disasters and CBRN emergencies. The NDRF units will also impart basic training to all the stakeholders identified by the State Governments in their respective locations. Further, a National Academy will be set up to provide training for trainers in disaster management and to meet related National and International commitments. Experience in major disasters has clearly shown the need for pre-positioning of some response forces to augment the resources at the State level at crucial locations including some in high altitude regions.

1.11.2 State Level

As per the DM Act of 2005, each state in India shall have its own institutional framework for disaster management. Among other things, the DM Act, mandates that each State Government shall take necessary steps for the preparation of state DM plans, integration of measures for prevention of disasters or mitigation into state development plans, allocation of funds, and establish EWS. Depending on specific situations and needs, the State Government shall also assist the Central Government and central agencies in various aspects of DM. Each state shall prepare its own State Disaster Management Plan.

The DM Act mandates the setting of a State Disaster Management Authority with the Chief Minister as the *ex officio* Chairperson. Similar system will function in each Union Territory with Lieutenant Governor as the Chairperson. At the district level, District Disaster Management Authority (DDMA), the District Collector or District Magistrate or the Deputy Commissioner, as applicable, will be responsible for overall coordination of the disaster management efforts and planning. Detailed DMP will be developed, subject to periodic review and revision, at the levels of state, district, towns and blocks (taluka). Figure-1-3 provides schematic view of the typical state-level institutional framework.

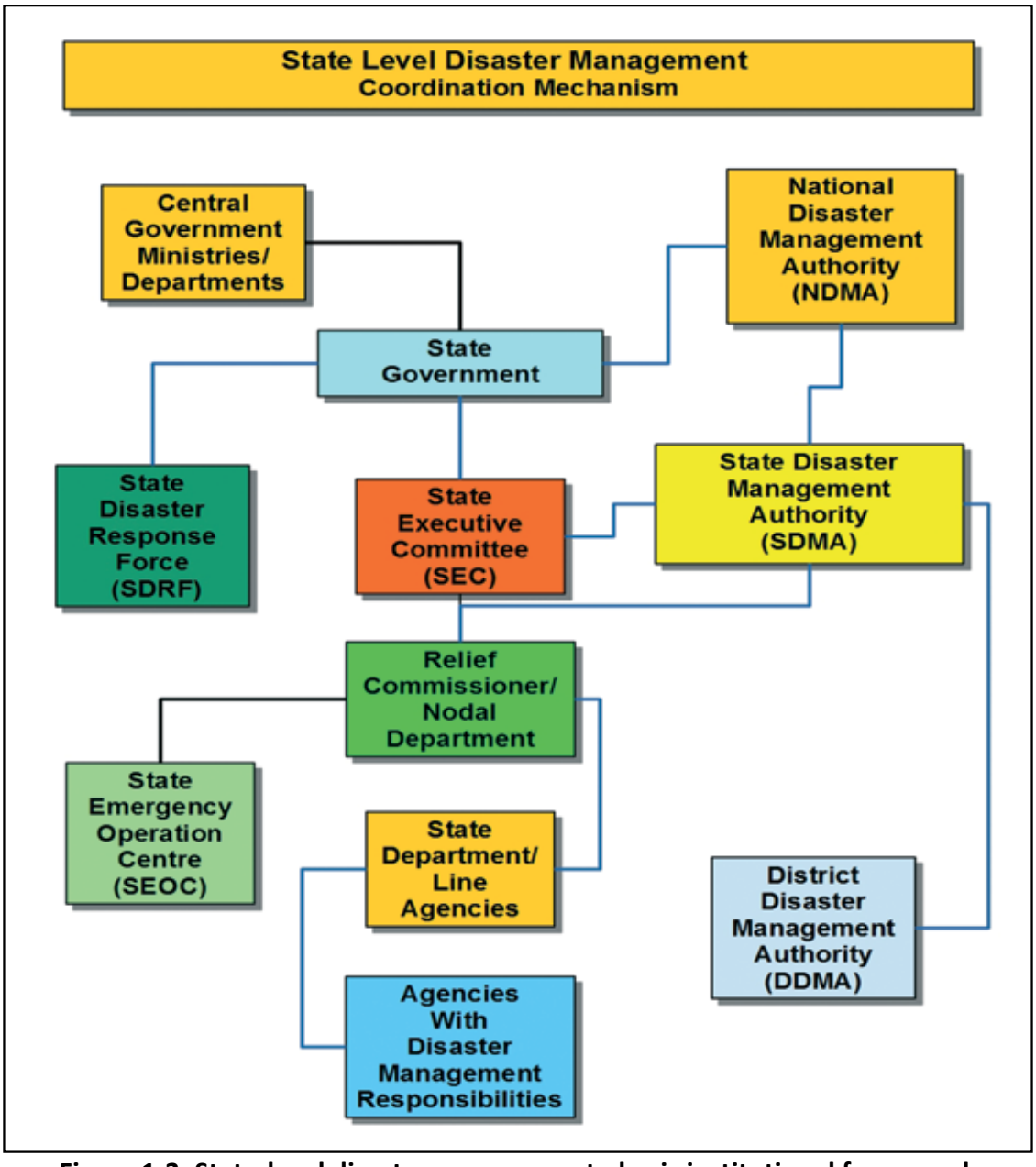


Figure 1-3: State-level disaster management - basic institutional framework

Note: The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

1.11.2.1 State Disaster Management Authority (SDMA)

As per provisions in Chapter-III of the DM Act, each State Government shall establish a State Disaster Management Authority (SDMA) or its equivalent under a different name with the Chief Minister as the Chairperson. In case of other UTs, the Lieutenant Governor or the Administrator shall be the Chairperson of that Authority. For the UT of Delhi, the Lieutenant Governor and the Chief Minister shall be the Chairperson and Vice-Chairperson respectively of the State Authority. In the case of a UT having Legislative Assembly, except the UT of Delhi, the Chief Minister shall be the Chairperson of the Authority established under this section. The SDMA will lay down policies and plans for DM in the State. It will, inter alia approve the State Plan in accordance with the guidelines laid down by the NDMA, coordinate the implementation of the State Plan, recommend provision of funds for mitigation and preparedness measures and review the developmental plans of the different

Departments of the State to ensure the integration of prevention, preparedness and mitigation measures. The State Government shall constitute a State Executive Committee (SEC) to assist the SDMA in the performance of its functions. The SEC will be headed by the Chief Secretary to the State Government. The SEC will coordinate and monitor the implementation of the National Policy, the National Plan, and the State Plan. The SEC will also provide information to the NDMA relating to different aspects of DM.

1.11.2.2 District Disaster Management Authority (DDMA)

As per provisions in Chapter-IV of the DM Act, each State Government shall establish a District Disaster Management Authority for every district in the State with such name as may be specified in that notification. The DDMA will be headed by the District Collector, Deputy Commissioner, or District Magistrate as the case may be, with the elected representative of the local authority as the Co-Chairperson. The State Government shall appoint an officer not below the rank of Additional Collector or Additional District Magistrate or Additional Deputy Commissioner, as the case may be, of the district to be the Chief Executive Officer of the District Authority. The DDMA will act as the planning, coordinating and implementing body for DM at the District level and take all necessary measures for the purposes of DM in accordance with the guidelines laid down by the NDMA and SDMA. It will, inter alia, prepare the DM plan for the District and monitor the implementation of the all relevant national, state, and district policies and plans. The DDMA will also ensure that the guidelines for prevention, mitigation, preparedness, and response measures laid down by the NDMA and the SDMA are followed by all the district-level offices of the various departments of the State Government.

1.12 Plan Implementation

The DM Act 2005 enjoins central and state governments to make provisions for the implementation of the disaster management plans. In this respect, the sections of the DM Act 2005 applicable for national, state, and district DM plans are 11, 23, and 31. The Chapters V and VI of the DM Act spell out the responsibilities of the central, state, and local governments with respect to disaster management. The DM Act states that every Ministry or Department of the Government of India shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan. The Act mandates that every Ministry and Department of the Government of India and every state must prepare a DMP in accordance with the NDMP. Annually, respective DM authorities must review and update their DM plans. Central ministries and state governments will integrate DRR into their development policy, planning and programming at all levels. They must adopt a holistic approach and build multi-stakeholder partnerships at all levels, as appropriate, for the implementation of the DM plans. Depending on its nature, different components of the NDMP will be implemented within a span of five, ten, or fifteen years. The plan is highly ambitious and the complete implementation of all elements across the country may take a very long time. Nevertheless, both central and state governments have already made considerable progress and they are expected to make sincere efforts for the implementation of the DM plans. The NDMA has prepared and published hazard-specific guidelines covering various aspects of disaster management and including a separate one for response (list is given in Annexure-I).

2 Hazard Risk and Vulnerability - National Profile

2.1 Background

India is the seventh-largest country by area, the second-most populous country with over 1.2 billion people and the most populous democracy in the World. Bounded by the Indian Ocean on the south, the Arabian Sea on the south-west, and the Bay of Bengal on the south-east, it shares land borders with Pakistan to the west; China, Nepal, and Bhutan to the north-east; and Burma and Bangladesh to the east. In the Indian Ocean, India's neighbours are Sri Lanka and Maldives. Andaman and Nicobar Islands share a maritime border with Thailand and Indonesia.

Table 2-1: India - General profile

	Feature	Description
1	Area	3.3 million sq.km
2	Location	Situated in southern Asia, the Indian peninsula is separated from mainland Asia by the Himalayas; Lying entirely in the northern hemisphere, India lies between latitudes 8° 4' North and 37° 6' North; longitudes 68° 7' East and 97° 25' East
3	Borders/ Neighbouring Countries	North: China, Bhutan and Nepal; Himalayan mountain ranges Northwest: Afghanistan and Pakistan South: Sri Lanka and Maldives; Indian Ocean, Palk Strait and the Gulf of Mannar East: Myanmar and Bangladesh; Bay of Bengal West: Arabian Sea
4	Major Rivers	Twelve with total catchment area of 252.8 million hectares
5	Forest	692,027 sq.km(21.5 percent of the total geographical area)
6	Coastline	7,517 km encompassing the mainland, Lakshadweep Islands, and the Andaman and Nicobar Islands
7	Desert	442,289 sq.km
8	Population	1.2 billion (Census 2011)
9	States	29
10	Union Territories	7
11	Sex Ratio	940 females per 1,000 males (Census 2011)
12	Population Density	382 persons per sq.km (Census 2011)
13	Annual exponential population growth rate	1.64 per cent in 2001-2011 (Census 2011)
14	Population share	Rural: 69%; Urban: 31% (Census 2011)
15	Climate	Tropical monsoon; tropical climate marked by relatively high summer temperatures and dry winters. Main seasons: a) Winter (December-February) b) Summer (March-June) c) South-West monsoon (June-September) and d) Post monsoon (October-November)

Source: https://india.gov.in/india-glance/profile

2.2 Hazard, Risk and Vulnerability Profile

2.2.1 Multi-Hazard Vulnerability

As per the definition adopted by UNISDR, hazard is a dangerous phenomenon, substance, human activity, or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. India, due to its, physiographic and climatic conditions is one of the most disaster prone areas of the World. Nearly 59 per cent of the landmass is prone to earthquakes of moderate to very high intensity. More than 40 million hectares (12 per cent of land) is prone to floods and river erosion. Of the nearly 7,500 km long coastline, close to 5,700 km is prone to cyclones and tsunamis. Nearly 68 percent of the cultivable area is vulnerable to drought. Large tracts in hilly regions are at risk from landslides and some are prone to snow avalanches. Vulnerability to disasters/emergencies of CBRN origin also exists. Heightened vulnerabilities to disaster risks can be related to expanding population, urbanisation and industrialisation, development within high-risk zones, environmental degradation, and climate change.

In the context of human vulnerability to disasters, the economically and socially weaker segments of the population are the ones that are most seriously affected. Within the vulnerable groups, elderly persons, women, children— especially women rendered destitute, children orphaned on account of disasters and differently-abled persons are exposed to higher risks. The DM Act of 2005 and National DM Policy of 2009, consider disasters to be a) natural and; b) human-induced including CBRN for defining the roles and responsibilities.

Besides with the natural factors discussed earlier, various human-induced activities like increasing demographic pressure, deteriorating environmental conditions, deforestation, unscientific development, faulty agricultural practices and grazing, unplanned urbanisation, construction of large dams on river channels etc. are also responsible for accelerated impact and increase in frequency of disasters in the country. Building Material and Technology Promotion Council (BMTPC) has come out with Vulnerability Atlas of India as a tool for formulating proactive policies, strategies, and programmes to face the threat caused due to natural hazards. The Annexure-II has the hazard vulnerability maps of India for a) Earthquake b) Flood and c) Wind and cyclone.

2.2.2 Natural Hazards

2.2.2.1 Cyclone and Wind

India's long coastline of nearly 7,500 km consists of 5,400 km along the mainland, 132 km in Lakshadweep and 1,900 km in the Andaman and Nicobar Islands. About 10 per cent of the World's tropical cyclones affect the Indian coast. Of these, the majority have their initial genesis over the Bay of Bengal and strike the east coast of India. On an average, five to six tropical cyclones form every year, of which two or three could be severe. Cyclones occur frequently on both the west coast in the Arabian Sea and the east coast in the Bay of Bengal. More cyclones occur in the Bay of Bengal than in the Arabian Sea and the ratio is approximately 4:1. An analysis of the frequency of cyclones on the east and west coasts of India between 1877 and 2005 shows that nearly 283 cyclones occurred (106 severe) in a 50 km wide strip on the East Coast; comparatively the West Coast has had less severe cyclonic activity (35 cyclones) during the same period[7]. More than a million people lost their lives during this period due to these cyclones.

[7]Vulnerability Atlas of India. http://www.bmtpc.org/topics.aspx?mid=56&Mid1=180 (accessed 10-Apr-2016)

In India, tropical cyclones occur in the months of May-June and October-November. The cyclones of severe intensity and frequency in the northern part of the Indian Ocean are bi-modal in character, with their primary peak in November and secondary peak in May. The disaster potential is particularly high at the time of landfall in the northern part of Indian Ocean (Bay of Bengal and the Arabian Sea) due to the accompanying destructive wind, storm surges and torrential rainfall. Of these, storm surges are the greatest killers of a cyclone, by which sea water inundates low lying areas of coastal regions and causes heavy floods, erodes beaches and embankments, destroys vegetation and reduces soil fertility.

2.2.2.1.1 Tropical Cyclones

Tropical cyclone, generally known as 'cyclone', is the term used globally to cover tropical weather systems in which winds equal or exceed 'gale force' (minimum of 34 knot, i.e., 62 kmph). These are intense low pressure areas of the earth-atmosphere coupled system and are extreme weather events of the tropics. Although the North Indian Ocean Basin (NIO-Basin, including the Indian coast) generates only about seven percent of the World's cyclones, their impact is comparatively high and devastating, especially when they strike the coasts bordering the North Bay of Bengal. The frequency of these cyclones is bi-modal, which is specific to this region. Cyclones occur in the months of May–June and October–November, with their primary peak in November and secondary peak in May. As per broad scale assessment of the population at risk, nearly one third of India's population, is vulnerable to cyclone-related hazards. Climate change with the resultant sea-level rise and expected increase in severity of cyclones can significantly increase the vulnerability of the coastal population.

Tropical cyclones generally originate in the eastern side of the NIO-Basin and initially move in a west-north westerly direction. It has been observed that between 1891 and 2006, 308 cyclones crossed the east coast, out of which 103 were severe. Less cyclonic activity was observed on the west coast during the same period, with 48 cyclones crossing the west coast, out of which 24 were of severe intensity. There are 13 coastal states and union territories (UTs) in the country, encompassing 84 coastal districts which are affected by tropical cyclones. Four states (Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and one UT (Puducherry) on the east coast and one state (Gujarat) on the west coast are highly vulnerable to cyclone disasters.

Though tropical cyclones differ by name across regions, they are classified according to their wind speed. The classification, however, varies from region to region. The classification used in India[8] of these intense low pressure systems (cyclonic disturbances) is given in Table 2-2.

Table 2-2: Classification used in India for tropical cyclones

	Type	Wind Speed	
		km per hour (kmph)	***Knots***
1	Low Pressure area	Less than 31	Less than 17
2	Depression	31 to 49	17 to 27
3	Deep Depression	50 to 61	28 to 33
4	Cyclonic Storm	62 to 88	34 to 47
5	Severe Cyclonic Storm	89 to 118	48 to 63
6	Very Severe Cyclonic Storm	119 to 221	64 to 119
7	Super Cyclone	More than 221	More than 119

Note: One kmph = 0.54 knots; one knot = 1.852 kmph

[8]Terminology on Cyclonic disturbances over the North Indian Ocean. http://www.rsmcnewdelhi.imd.gov.in/images/pdf/cyclone-awareness/terminology/terminology.pdf (accessed 15-Apr-2016)

2.2.2.1.2 Storm Surge

Storm surge, a coastal phenomenon, is the inherent destructive aspect of cyclones the World over. Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. It should not be confused with storm tide. The rise in water level can cause extreme flooding in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 6 metres or more in some cases.The degree of destructive potential depends on the storm surge amplitude associated with the cyclone. Most casualties during tropical cyclones occur as the result of storm surges.

2.2.2.2 Flood

Floods affect an average area of around 7.5 million hectares per year. According to the National Commission on Floods, the area susceptible to floods was estimated in 1980 to be around 40 million hectares and it is possible to provide reasonable degree of protection to nearly 80 per cent (32 million ha). Riverine flooding is perhaps the most critical climate-related hazard in India. Flood control is a key element of national policies for water resource management. The occurrence of floods and droughts is closely linked to the summer monsoon activity. Floods occur in almost all river basins of the country. Heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/rivers are the main causes of floods. Ice jams or landslides blocking streams; and cyclones also cause floods. Out of 40 million hectare of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectare per year. Floods in the Indo-Gangetic-Brahmaputra plains are an annual feature. On an average, a few hundred lives are lost, millions of people are rendered homeless, lakhs of hectares of crops are damaged, thousands of animals are affected (killed and injured). The National Flood Control Programme was launched in 1954. Since then, sizeable progress has been made in the flood protection measures.

2.2.2.3 Urban Floods

The problem of urban flooding is a result of both natural factors and land-use changes brought about by urban development. Urban flooding is significantly different from rural flooding as urbanisation leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes. Urban flooding is caused by the combination of meteorological, hydrological, and human factors. Due to land-use changes, flooding in urban areas can happen very rapidly with large flow. The challenges of Urban Floods Disaster Management (UFDM) tend to be considerably different from that of flooding in other areas. In 2010, the NDMA published separate guidelines for UFDM. Problems associated with urban floods range from relatively localised incidents to major incidents, resulting in inundation of some or large parts urban areas for several hours to many days. The impact can vary from being limited to widespread. It may result in temporary relocation of people, dispersal of animals, damage to civic amenities, deterioration of water quality and risk of epidemics.

2.2.2.4 Earthquake

Nearly 59 percent of India's territory is vulnerable to earthquakes. The last three major earthquakes shook Gujarat in January 2001, Jammu and Kashmir in October 2005 and Sikkim in 2011. Many smaller- quakes have been occurring in various parts of India. Seven states in North East (Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), the Andaman and Nicobar Islands, parts of three states in the North/North-West (Jammu and Kashmir, Uttarakhand, Bihar, and Gujarat are in Seismic Zone V. Wide-spread human and material losses, collapse of

infrastructure and services may be the major consequences of the earthquake. Hundreds of thousands may be displaced, often in remote mountainous areas in the North and North-East.

2.2.2.5 Tsunami

Tsunamis (Japanese for "harbour wave"), also known as a seismic sea wave, are a series of very large waves with extremely long wavelength, in the deep ocean, the length from crest to crest may be 100 km and more. It is usually generated by sudden displacements in the sea floor caused by earthquake, landslides, or volcanic activity[9]. Most tsunamis, including the most destructive ones are generated by large and shallow earthquakes which usually occur near geological plate boundaries, or fault-lines, where geological plates collide. When the seafloor abruptly deforms the sudden vertical displacements over large areas disturb the ocean's surface, displace water, and generate tsunami waves. Since the wave height in deep ocean will be only a few decimetres or less (i.e., a few inches), tsunamis are not usually felt aboard ships. Nor are they visible from the air in the open ocean. The waves could travel away from the triggering source with speeds exceeding 800 km/h over very long distances. They could be extremely dangerous and damaging when they reach the coast, because when the tsunami enters shallow water in coastal areas, the wave velocity will decrease accompanied by increase in wave height. In shallow waters, a large tsunami crest height may rise rapidly by several metres even in excess of 30 m causing enormous destruction in a very short time[10].

As seen on Indian Ocean shores in December 2004, tsunami can cause massive death and destruction. They are particularly dangerous close to their sources, where the first waves in the tsunami train can arrive within a few to tens of minutes of the triggering event. The earthquake and resulting tsunami in Indian Ocean on 24 December 2004 had devastating effects on India. Many people died and millions were displaced. The hardest hit areas were on Southern coast and the Andaman and Nicobar Island. Tsunamis have the potential of causing significant casualties, widespread property damage, massive infrastructure loss and long-term negative economic impacts. People caught in the path of a tsunami often have little chance of survival. People die from drowning or debris crushing them.

2.2.2.6 Landslides and Snow Avalanches

Landslides

Landslides occur in the hilly regions of India such as the Himalaya, North-East India, the Nilgiris, Eastern Ghats and Western Ghats. It is estimated that 30 percent of the World's landslides occur in the Himalayan ranges. The Himalayan range, which constitutes the youngest and most dominating mountain system in the World, is not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3,400 kilometres. Landslides are also common in Western Ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about one hundred landslides which caused severe damage to communication lines, tea gardens and other cultivated crops. Scientific observations in north Sikkim and Garhwal regions in the Himalayas clearly reveal that there is an average of two landslides per sq. km. The mean rate of land loss is to the tune of 120 meter per km per year and annual soil loss is about 2500 tons per sq. km. Landslides have been a major and widely spread natural disaster that often affect life and property, leading to major concern.

[9] http://www.tsunami.noaa.gov/ (accessed 10-Apr-2016)
[10] http://www.unisdr.org/2006/ppew/tsunami/what-is-tsunami/backinfor-brief.htm (accessed 10-Apr-2016)

Snow Avalanches

Avalanches are block of snow or ice descending from the mountain tops at a river like speedy flow. They are extremely damaging and cause huge loss to life and property. In Himalaya, avalanches are common in Drass, Pir Panijal, Lahaul-Spiti and Badrinath areas. As per Snow and Avalanche Study Establishment (SASE), of Defence Research and Development Organisation (DRDO), on an average, around 30 people are killed every year, due to this disaster in various zones of the Himalayan range. Beside killing people, avalanches also damage the roads, properties, and settlements falling in its way. Traffic blockage, structural damages of roads, and retaining wall damages occur most frequently due to avalanches. Snow avalanches occur in several stretches of the Himalayan range with the following areas being more vulnerable:

- Western Himalaya – the snowy regions of Jammu and Kashmir, Himachal Pradesh and Uttarakhand, especially Tehri Garhwal and Chamoli districts
- Jammu and Kashmir – Higher reaches of Kashmir and Gurez valleys, Kargil and Ladakh and along some of the major roads
- Himachal Pradesh – Chamba, Kullu-Spiti and Kinnaur

2.2.2.7 Drought

There is no globally adopted operational definition for drought applicable to all contexts. This is the primary reason why policy makers, resource planners, and other decision-makers as well as administrators have considerable difficulty recognizing and planning for drought than they do for other disasters. Global Assessment Report (GAR) 2015 notes that agricultural drought is probably the most “socially constructed” of all disaster risks (UNISDR 2015c) and warns that due to global climate change, its frequency is expected to vary much. To determine the beginning of drought, operational definitions specify the degree of departure from the long-term (usually at least 30 years) average of precipitation or some other climatic variable.

Droughts affect vast areas of the country, transcending State boundaries. A third of the country is drought prone. Recurrent drought results in widespread adverse impact on people’s livelihoods and young children’s nutrition status. It affects parts of Rajasthan (chronically), Gujarat, Maharashtra, MP, UP, Chhattisgarh, Jharkhand, and Andhra Pradesh. Drought is not uncommon in certain districts. Droughts cause severe distress in the affected areas.

Drought is a phenomenon that is widely considered as a ‘creeping disaster’ whose onset, end, and severity are difficult to determine. Unlike the suddenly occurring disasters, a drought may develop very slowly over several months affecting very large geographical area without causing little or no structural damage. The impacts depend on natural conditions, socio-economic situation, and the kind of land and water resources as well as the use patterns in the affected region.

Mostly, the occurrence of droughts is a result of natural climate variability in all the drought-prone regions and it usually exhibits a certain pattern of occurrence. While droughts are quite frequent in arid and semi-arid regions, it can occur even in humid regions blessed with abundant rainfall with lower frequency. The capacity to cope depends largely on the technical, institutional, political, and social mechanisms to manage the water resources anticipating the severity of the drought. Effective mitigation measures must prevent a drought turning into a famine due to water and food shortages.

Drought results from long period of dry weather and insufficient precipitation, which causes acute dry conditions. The National Commission on Agriculture in India defines three types of droughts:

- Meteorological drought, defined as a situation when there is significant decrease from normal precipitation over an area (i.e. more than 10 %)
- Agricultural drought, signifying the situation when soil moisture and rainfall are inadequate to support healthy crop growth
- Hydrological drought resulting from prolonged meteorological drought manifested in depletion of surface and sub-surface water resources, which could occur even when the rainfall is normal, if there has been a substantial reduction in surface water holding capacity

Most classifications emphasize physical aspects of drought, particularly in the context of agriculture (including livestock rearing), although its impacts will be felt in the non-farm sector. The impact, response, and interventions would vary depending on at what point of time in a crop calendar there is acute water or soil moisture deficit. Generally, three situations are recognised:

- Early season: delayed rainfall (delayed onset of monsoon), prolonged dry spells after onset
- Mid-season: inadequate soil moisture between two rain events, and
- Late season: early cessation of rains or insufficient rains

The IMD recognizes five drought situations:

- 'Drought Week' when the weekly rainfall is less than half of the normal
- 'Agricultural Drought' when four drought weeks occur consecutively during mid-June to September
- 'Seasonal Drought' when seasonal rainfall is deficient by more than the standard deviation from the normal
- 'Drought Year' when annual rainfall is deficient by 20 percent of normal or more, and
- 'Severe Drought Year' when annual rainfall is deficient by 25 to 40 percent of normal or more

In the absence of an unambiguous criterion, the NDMA Guideline on 'Management of Drought' notes that there is a need to develop a multi-criteria index to classify droughts based on several factors such as the following:

- Meteorological (rainfall, temperature, etc.)
- Soil conditions (depth, type, available water content, etc.)
- Surface water use (proportion of irrigated area, surface water supplies, etc.)
- Ground water (availability, utilization, etc.)
- Crop (cropping pattern changes, land use, crop conditions, anomalies in crop condition, etc.)
- Socio-economic (proportion of weaker sections, poverty, size class of farm holdings, etc.)

Increasing severity of drought can lead to a major livelihood crisis with crop losses and widespread unemployment. While drought-proofing measures can significantly improve the coping capacity and dampen the impact of drought, if drought conditions worsen, many agencies of the state and centre will have to work in concert to prevent acute rural distress. Since progression of drought is slow, agencies can respond by closely monitoring the situation using various technical capabilities available.

2.2.2.8 Cold Wave and Frost

Cold wave and frost is a seasonal and localized hazard that occurs in parts of the country, which experience severe winter. Prolonged frost conditions and cold wave can damage certain frost-

sensitive plants causing crops loss. The susceptibility to frost varies widely across crops. The extent of damage caused by cold wave depends on temperature, length of exposure, humidity levels, and the speed at which freezing temperature is reached. It is difficult to predict a definite temperature level up to which crops can tolerate cold wave/frost because many other factors also affect it. Cold wave can cause death and injury to human beings, livestock and wildlife. Higher caloric intake is needed for all animals, including humans to withstand exposure to cold and poor nutritional status can prove deadly in extreme cold conditions. If a cold wave is accompanied by heavy and persistent snow, grazing animals may be unable to get the requisite food. They may die of hypothermia from prolonged exposure or starvation.

2.2.3 Human-induced Disasters

2.2.3.1 Chemical (Industrial) Disaster

With rapid economic development, there has been spread of chemical industries – small, medium and large – across the country. However, there is a relatively higher presence along the west coast, largely due to the proximity to raw materials and ports. Gujarat alone is estimated to contribute around 53 percent to the total production in the country, followed by Maharashtra, which contributes nine percent. The other major producing states include Uttar Pradesh (UP), Tamil Nadu (TN), Madhya Pradesh (MP), and Punjab. On the other hand, in the case of heavy chemicals segment, especially inorganic chemicals, fuel availability is a determining factor, and hence there is a concentration of these companies around power plants. Due to the regional concentration of chemical companies in certain pockets, the chemical hazard has increased many folds. The growth of chemical industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM). These events occur due to mishaps or failures in industry and affect the industrial functions, property and productivity. While the common causes for chemical accidents are deficiencies in safety management systems or human errors, or natural calamities or sabotage may also trigger such accidents. Chemical/ industrial accidents are significant and have long term impact on the community and environment. It leads to injuries, pain, suffering, loss of lives, damage to property and environment. Hence, a robust plan and mitigation measure needs to be adapted to overcome the hazard.

2.2.3.2 Nuclear and Radiological Emergency (NRE)

A nuclear disaster is caused due to an extraordinary release of radioactive material or radiation either in the operation of nuclear reactors or other nuclear events like explosion of a Radiological Dispersal Device (RDD) or Improvised Nuclear Device (IND) or explosion of a nuclear weapon. It is accompanied with a sudden release of harmful radiations or radioactive materials or both together into the environment. Nuclear weapons, a major accident in a nuclear power plant or an accidental exposure of radiation, due to accident with the radioactive material during transportation, faulty practices, and mechanical failure in a radiation facility can lead to nuclear or radiological emergency. Even though such situations may not arise easily, everyone needs to be prepared to face such emergencies. All organizations dealing with nuclear and radiological material have an inherent culture of safety, follow best safety practices in the sector, and they apply high standards to ensure minimum risk. However, nuclear emergencies can still arise due to factors beyond the control of the operating agencies from human error, system failure, sabotage, extreme natural events like earthquake, cyclone, flood, tsunami or a combination of these. Such failures, even though of very low probability, may lead to on-site or off-site emergencies. To counter this, proper emergency preparedness plans must be in place so that there is minimum loss of life, livelihood, property, and impact on the environment.

A Nuclear and/or Radiological Emergency (NRE) is an incident resulting in, or having a potential to result in, exposure to and/or contamination of the workers or the public, in excess of the respective permissible limits (see NDMA's guidelines for NRE[11]). These emergencies are classified into five broad groups as follows:

- An accident taking place in any nuclear facility of the nuclear fuel cycle including the nuclear reactor, or in a facility using radioactive sources, leading to a large-scale release of radioactivity in the environment
- A 'criticality' accident in a nuclear fuel cycle facility where an uncontrolled nuclear chain reaction takes place inadvertently leading to bursts of neutrons and gamma radiation (as had happened at Tokaimura, Japan)
- An accident during the transportation of radioactive material
- The malevolent use of RDD or IND by terrorists
- A large-scale nuclear disaster resulting from a nuclear weapon attack, which would lead to mass casualties and destruction of large areas and properties. Unlike a nuclear emergency, the impact of a nuclear disaster is beyond the coping capability of local authorities and calls for handling at the national level

In this context, it may be mentioned that the International Atomic Energy Agency (IAEA) classifies the above emergency scenarios under two broad categories – a) nuclear and b) radiological:

- A nuclear emergency refers to an emergency situation in which there is, or is presumed to be, a hazard due to the release of energy along with radiation from a nuclear chain reaction (or from the decay of the products of a chain reaction). This covers accidents in nuclear reactors, 'criticality' situations in fuel cycle facilities, nuclear explosions, etc.
- All other emergency situations which have the potential hazard of radiation exposure due to decay of radioisotopes, are classified as radiological emergencies. Examples of such emergencies are the accidents that took place at Goiania in Brazil, San Salvador, Istanbul in Turkey, Panama, etc.

The overall objective is to prevent NRE, there is also need to adequately prepare for such emergencies. A NRE must be managed through very well planned and established mechanisms – structural and non-structural – in a manner that will minimize risks to health, life and the environment. Eight nuclear/ radiological emergency scenarios envisaged in the disaster planning are listed below (see NDMA's guidelines on NRE[12] for a brief description of each):

- Accidents in Nuclear Power Plants and other facilities in the Nuclear Fuel Cycle
- 'Criticality' Accidents
- Accidents during Transportation of Radioactive Materials
- Accidents at facilities using Radioactive Sources
- Disintegration of Satellites during Re-Entry
- Nuclear/Radiological Terrorism and Sabotage at Nuclear Facilities
- State-Sponsored Nuclear Terrorism
- Explosion of Nuclear Weapons

[11] Guidelines on Management of Nuclear and Radiological Emergencies (listed in Annexure-I)
[12] ibid

2.2.4 Fire Risk

Fires can start due to human activities or from natural causes. Forest fires can start from either natural causes or human activity or from a combination of both. The most common fires are the residential and non-residential structural fires caused usually by human activities. Most industrial and chemical fires are triggered by human activity. They are sometimes caused by human errors, faulty designs, or mechanical failures. Fire can also be the secondary effect of a disaster like earthquake. Secondary fires after a disaster like earthquakes constitute a substantial and heavy risk. Damage to natural gas systems during an earthquake can lead to major fires and explosions. Damages to electrical systems during a disaster can ignite major fires. The growth of fire-services in the country has been on an ad-hoc basis and needs to be professionalized. Varying risk scenarios need different types of equipment. The risk varies with geographical location such as hilly area, coastal-area, desert–area, and with different types of residential (medium/ low-rise/ high-rise) buildings, industrial, commercial area or a combination of these. There is considerable need for skill upgrade of the staff and modernization of the entire fire service system. The NDMA guideline[13] on fire services notes that the Standing Fire and Advisory Council (SFAC) has stressed the urgent need to strengthen the Fire and Emergency Services (FES) and overcome major shortcomings in the response and its capabilities (SFAC 2016)[14].

2.2.5 Regions / areas involving multiple states requiring special attention

While suggesting a holistic approach to DM, the High Power Committee[15] discussed three cases that merit special consideration on the geo-physical considerations: a) Himalayan region b) Coastal tracts, and c) Riverine areas. From the point of view of administrative and logistical perspectives, the North East Region also requires specialized approach. Similarly, the Union Territories, remote Islands and offshore marine assets need to be treated differently given the specific administrative and logistical challenges. Therefore, there are six special categories:

- Himalayan Region spanning more than one State
- Coastal Tracts covering more than one State and UTs
- Riverine Areas spread over one or more States
- North East Region consisting of all eight States
- Union Territories, Islands and Marine Assets located in one or more State and UTs
- Arid and Semi-Arid Regions

2.2.5.1 Himalayan Region

The Himalayan region of India, characterized by a wide variation in topography, geology, soil, climate, flora, and fauna, and various ethnic groups with varied socio-cultural traditions, is a unique geographical entity of our country. Human activities in this region are the prime cause of environmental degradation within this region. The effects of human activities on environment may be direct or indirect, small or big, slow or fast, predictable or unpredictable depending on the nature, intensity, and frequency of the disturbance to natural ecosystem.

[13]NDMA Guideline on Scaling, Type of Equipment and Training of Fire Services
[14]Compendium of recommendations of the SFAC Standing Fire Advisory Council available on the website of NDRF. http://ndrfandcd.gov.in/CMS/FIRECompendium.aspx (accessed 20 April 2016)
[15]See footnote 5

2.2.5.2 Coastal Areas

Natural disasters, primarily cyclones, accompanying storm surges and coastal erosion, affect coastal communities regularly, inflicting widespread miseries. As per historical records, the risk of tsunami is very low in most parts of the coast. However, some coastal tracts are likely to experience it, as was the case in 2004. The damages resulting from such disasters have increased significantly in recent past. One of the main reasons for this is the growing population pressure in the coastal regions. Along with rising urbanization in coastal areas, there is increasing human habitation in risky stretches of the coast. The risks from global climate change, especially the higher frequency and intensity of extreme weather events including cyclones and the sea level rise, increase the risk profile of the coastal areas. The hazards in coastal areas include 1) Geological and shoreline changes 2) Rip currents 3) Cyclones 4) Sea level rise 5) Coastal flooding 6) Storm surges and flooding 7) Flooding from heavy rainfall events, 8) Saline ingress and 9) Tsunamis.

2.2.5.3 Riverine Regions

The communities settled in river basins and are predominantly dependent on agriculture. They are subjected to extremes of rainfall - very high rainfall and very low rainfall. They are therefore most vulnerable to riverine flooding and also to food shocks during droughts. These are two of the main problems i.e. floods and food insecurity. The major river systems in the country can be broadly classified into two groups viz. Rivers of the Himalayan Region and Rivers of Peninsular India. The Himalayan Rivers are fed by the melting snows and glaciers of the great Himalayan range during spring and summer as well as by rains during monsoons. They are often uncertain and capricious in their behaviour. The peninsular rivers that originate at lower altitudes, flow through more stable areas, and are more predictable in their behaviour. Their flows are characterized by heavy discharges during monsoons followed by very low discharges during the rain less months. From the point of view of the flooding, the riverine regions can be grouped into four as under:

- Brahmaputra region drained by Brahmaputra-Ganga system
- Ganga region drained by River Ganga
- North West drained by Indus and tributaries and
- Central India and Deccan region drained by river like Narmada and Tapi

2.2.5.4 North East Region (NER)

The North Eastern Region (NER) comprises eight states: 1) Arunachal Pradesh 2) Assam 3) Manipur 4) Meghalaya 5) Mizoram 6) Nagaland 7) Sikkim and 8) Tripura. Recognizing the special needs and context, the Government of India has categorized eight North Eastern states as Special Category states with the Ministry of Development of North Eastern Region (DONER) paying special attention to the region. Barring Assam, the other States are hilly. The seven States of the North Eastern Region barring Sikkim forming a compact region is linked to the rest of India through the 26 km long Siliguri Corridor commonly known as Chicken's Neck. About 98 percent of the NER's border is bounded by other countries and the infrastructure deficit in the region, particularly connectivity in all forms, is acute. For DM too, the region needs to be treated in an integrated manner for disaster management considering the special conditions.

2.2.5.5 Union Territories, Islands and Marine Assets

There are seven Union Territories (UT) governed almost directly by the Union Government, without

the administrative system characteristic of a full-fledged state in the Indian Union. They are:

- Andaman and Nicobar Islands
- Chandigarh
- Dadra and Nagar Haveli
- Daman and Diu
- Lakshadweep
- National Capital Territory of Delhi
- Puducherry

Out of the seven UT's, two - namely, Puducherry and the NCT of Delhi – having their own Legislative Assemblies are like quasi states without the same autonomy as of full-fledged states. The Central Government is directly responsible for all aspects of governance in the remaining five UTs without own legislatures. The Union Territory Division of the MHA is responsible for all the legislative and constitutional matters in the seven UTs.

There are more than 1,200 islands (including uninhabited) within the territorial limits of India of which some are very remote from the mainland. In addition, there are many offshore assets that are involved in scientific activities, prospecting for oil and gas, or linked to oil and gas production. While, some of disaster situation in many islands and marine assets can be managed by the respective state or Union Territory, in a few cases specialized approach will be needed considering the resources the islands or the offshore facilities have. They are all at risk from multiple hazards especially that of sea surges, high velocity wind, cyclones, earthquakes, and tsunami.

2.2.5.6 Arid / Semi-Arid and Drought-Prone Regions

A long stretch of land situated to the south of Tropic of Cancer and east of the Western Ghats and the Cardamom Hills experiences Tropical semi-arid climate. It includes Karnataka, interior and western Tamil Nadu, western Andhra Pradesh and central Maharashtra. Being situated in the rain-shadow area, the annual rainfall is low (40 to 75 cm) and drought-prone. Most of western Rajasthan has the arid (desert) climate characterized by scanty rainfall. Most of the drought-prone areas are found in arid and semi-arid regions of the country having low average annual rainfall. Broadly, the drought-affected areas in India can be divided into two tracts[16]. The first tract comprising the desert and the semi-arid regions covers an area of 0.6 million sq. km that includes parts of Gujarat, Rajasthan, Haryana, Punjab, UP, and MP. The second tract comprises the regions east of the Western Ghats up to a distance of about 300 km from coast falling in the rain shadow area of the Western Ghats. This thickly populated region experiences periodic droughts. Besides these two tracts, several parts of states such as TN, Gujarat, UP, Chhattisgarh, Jharkhand, West Bengal, and Odisha also experience drought. While Rajasthan is one of the most drought prone areas, drought is very frequent in large parts of Andhra Pradesh and Telangana. The agriculture in these regions is mostly rainfed. All these drought-prone, arid/semi-arid regions with low and uncertain rainfall need long-term water resource management strategies coupled with better management of dryland farming to effectively cope with recurring droughts. Special attention on comprehensive monitoring of the hydro-meteorological as well as agro-economic conditions is needed along with meaningful forecasting methods that can help local authorities in coping with the likelihood of drought.

[16] http://www.nih.ernet.in/rbis/india_information/draught.htm (Hydrology and Water Resources Information System for India, accessed: 15-Apr-2016)

3 Reducing Risk; Enhancing Resilience

3.1 Background

The Disaster Management Act, 2005 and the National Policy, 2009 marks the institutionalization of paradigm shift in disaster management in India, from a relief-centric approach to one of proactive prevention, mitigation and preparedness. The Policy notes that while it is not possible to avoid natural hazards, adequate mitigation and disaster risk reduction measures can prevent the hazards becoming major disasters. Disaster risk arises when hazards interact with physical, social, economic and environmental vulnerabilities. The National Policy suggests a multi-pronged approach for disaster risk reduction and mitigation consisting of the following:

- Integrating risk reduction measures into all development projects
- Initiating mitigation projects in identified high priority areas through joint efforts of the Central and State Governments
- Encouraging and assisting State level mitigation projects
- Paying attention to indigenous knowledge on disaster and coping mechanisms
- Giving due weightage to the protection of heritage structures

In the terminology adopted by the UNISDR, the concept and practice of reducing disaster risks involve systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. While both the terms “Disaster Reduction” and “Disaster Risk Reduction” are widely used, the latter provides a better recognition of the ongoing nature of disaster risks and the ongoing potential to reduce these risks. Mitigation consists of various measures required for lessening or limiting the adverse impacts of hazards and related disasters.

The disaster risk reduction and mitigation plan integrates the global targets into the national efforts and seeks to strengthen significantly India’s reliance to both natural and human-induced disasters. The DM Act 2005 defines "Mitigation" as measures aimed at reducing the risk, impact, or effects of a disaster or threatening disaster situation.”Goal of mitigation is to minimize risks from multiple hazards and the threats from individual hazards need not always occur in isolation. At times, a hazardous event can trigger secondary events. For example, an earthquake can produce a tsunami or may create flooding or landslides. Similarly, cyclones often lead to flooding and various other cascaded events spread over an area wider than the primary event. In addition, demographics, nature of human settlements, and effects of global climate change can magnify the vulnerability of the communities at risk. The DM Plan, therefore, focuses on enhancing the mitigation capabilities for multiple hazards, their likely cascading effects.

The guiding principles of Sendai Framework states that disaster risk reduction requires responsibilities to be shared by different divisions of governments and various agencies. The effectiveness in disaster risk reduction will depend on coordination mechanisms within and across sectors and with relevant stakeholders at all levels. For each hazard, the approach used in this national plan incorporates the four priorities enunciated in the Sendai Framework into the planning framework for Disaster Risk Reduction under the five thematic areas for action:

1. Understanding Risk

2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development

For each of these thematic areas for action, a set of major themes have been identified for inclusion in the planning framework.

3.1.1 Understanding Risk

This thematic area for action focuses on understanding disaster risk, the Priority-1 in the Sendai Framework integrates into it numerous actions needed for strengthening disaster resilience. The major themes for action are: a) Observation Networks, Information Systems, Research, Forecasting, b) Zoning / Mapping, c) Monitoring and Warning Systems, d) Hazard Risk and Vulnerability Assessment (HRVA), and e) Dissemination of Warnings, Data, and Information. Having adequate systems to provide warnings, disseminate information, and carry out meaningful monitoring of hazards are crucial to disaster risk reduction, and improving resilience. They are also an integral part of improving the understanding of risk.

3.1.2 Inter-Agency Coordination

Inter-agency coordination is a key component of strengthening the disaster risk governance - Priority-2 of the Sendai Framework. The major themes for action required for improving the top-level interagency coordination are a) Overall disaster governance b) Response c) Providing warnings, information, and data and d) Non-structural measures. The central ministries and agencies mentioned are those vested with hazard-specific responsibilities by the Govt. of India or those expected to play major roles in the thematic areas given in the matrix.

3.1.3 Investing in DRR – Structural Measures

Undertaking necessary structural measures is one of the major thematic areas for action for disaster risk reduction and enhancing resilience. These consist of various physical infrastructure and facilities required to help communities cope with disasters. The implementation of these measures is essential to enhance disaster preparedness, a component of Priority-4 of the Sendai Framework. It is also an important component of investing in disaster risk reduction for resilience, which is Priority-3 of Sendai Framework.

3.1.4 Investing in DRR – Non-Structural Measures

Sets of appropriate laws, mechanisms, and techno-legal regimes are crucial components in strengthening the disaster risk governance to manage disaster risk, which is Priority-2 of the Sendai Framework. These non-structural measures comprising of laws, norms, rules, guidelines, and techno-legal regime (e.g., building codes) framework and empowers the authorities to mainstream disaster risk reduction and disaster resilience into development activities. The central and state governments will have to set up necessary institutional support for enforcement, monitoring, and compliance.

3.1.5 Capacity Development

Capacity development is a theme in all the thematic areas for action. The Sendai Priority-2 (Strengthening DRR governance to manage DR) and Priority-3 (Investing in DRR for resilience) are

central to capacity development. The capacity development includes training programs, curriculum development, large-scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises. The capability to implement, enforce, and monitor various disaster mitigation measures has to be improved at all levels from the local to the higher levels of governance. It is also strengthening the DRR governance at all levels to better manage risk and to make the governance systems more responsive.

3.1.6 Hazard-wise Responsibility Matrices for Disaster Risk Mitigation

For the DM plans to succeed, it is necessary to identify various stakeholders/agencies and clearly specify their roles and responsibilities. At all levels - from local to the centre - the relevant authorities must institutionalise programmes and activities at the ministry/department levels, and increase inter-ministerial and inter-agency coordination and networking. They must also rationalise and augment the existing regulatory framework and infrastructure. For each hazard, in the sub-sections that follow, themes for action are presented in a separate responsibility matrix for each of the five thematic areas for action. It must be noted that the role of the central agencies is to support the disaster-affected State or the UT in response to requests for assistance. However, the central agencies will play a pro-active role in disaster situations. In the domains of DM planning, preparedness, and capacity building, the central agencies will constantly work to upgrade Indian DM systems and practices as per global trends. This section covers the hazards listed below:

1) Cyclone and Wind
2) Floods
3) Urban Flooding
4) Seismic
5) Tsunami
6) Landslides and Snow Avalanches
7) Drought
8) Cold Wave and Frost
9) Chemical (Industrial) Disasters
10) Nuclear and Radiological Emergencies
11) Fires

3.2 Cyclone and Wind Risk Mitigation

3.2.1 Understanding Risk

Cyclone and Wind					*Understanding Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Observation Networks, Information Systems, Research, Forecasting	IMD, MoES	• Modernization of Observation Network, equipment, systems, technology • Land- and Ocean-based observation systems • Cyclone database and forecasting • Research and studies to improve forecasts	State/UT,SDMA, CoR,Revenue Dept.,State-level research and technical institutions	Support and coordination
		DoS, IMD	Space- and sea-based Observations		
		MoES, IMD,NRSC, ISRO	Aircraft-based and Unmanned Aerial Vehicle		
		IMD, DoS	Satellite-based Communication Systems		
		MoES, DoS, IMD, MoST, CSIR, DST	Promote research and studies – both in-house and extra-mural by providing research grants to researchers and institutions		
2	Zoning/ Mapping	DoS, MoEFCC,NRSC, SAC, ISRO, MoST	Support the preparation of detailed maps to delineate coastal wetlands, mangroves and shelterbelts and tracts for coastal bio-shields using best tools, field studies, and satellite data	State/UT, State-level research and technical institutions	Carry out the mapping and related studies
3	Monitoring cyclone-prone coastal areas	MoEFCC, MoES,MoST, DoS, MoWR, CSIR	Promote studies on: • Ecosystem and shoreline changes • Socio-economic impacts of cyclone and wind hazards • Enhanced risks from climate change and adaptations to change	State/UT, SDMA, DDMA, Panchayats, ULBs	• Constitute State Level Coastal Advisory Committees • Sponsor studies, research and documentation • Promote studies on socio-economic impacts of cyclone and wind hazards

Cyclone and Wind					*Understanding Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Hazard Risk Vulnerability Assessment	NDMA, NIDM, MoST, DST, CSIR	• Promote studies, provide guidelines • Studies on vulnerability covering social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk under climate change scenarios	State/UT,SDMA, CoR,Revenue Dept.,DDMA, Panchayats, ULBs	Undertake HRVA as part of preparing and periodic revision of DM plans, and for development planning
5	Dissemination of warnings, data, and information	IMD	Quick, clear, effective dissemination among central and state agencies	State/UT,SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all (including fishermen), down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
		MoIB, MoES	• Deployment of communication equipment • Warnings using all types of options, types of technologies, and media	State/UT, SDMA, CoR , Revenue Dept.,Information Dept., DDMA, Panchayats, ULBs	• Deployment of communication equipment • Warnings using all types of options, types of technologies, and media
		DST, DeitY, DoT, MoCIT, MoIB	Facilitating last-mile connectivity and access to disaster risk information	State/UT,SDMA, CoR, Revenue Dept.,DDMA, Panchayats, ULBs	Ensure facilities and infrastructure for the implementation of adequate access of information to communities at risk
			State Wide Area Networks (SWAN)	State/UT, Dept. of Science and Technology	Establishing seamless interface between national and state networks
		IMD	Providing weather information online and offline and interface with mobile network service providers for warnings on radio, TV, and cell phones	State/UT,SDMA, CoR, Revenue Dept., Information Dept.	Monitoring compliance by various network operators and service providers

3.2.2 Inter-Agency Coordination

Cyclone and Wind					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoES	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MHA	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	IMD, Cyclone Warning Centre, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MHA, NDMA, BIS	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.2.3 Investing in DRR–Structural Measures

Cyclone and Wind					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Multi-Purpose Cyclone Shelters	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Technical support	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk • Construction of multi-purpose shelters in coastal villages/habitations prone to frequent cyclones • Proper maintenance of drainage systems and flood embankments • Ensure compliance with relevant building codes
2	Social Housing Schemes	MoRD, MoUD, Relevant Central Government Ministries/ Departments	Ensure that cyclone-resistant features are incorporated in planning and execution of social housing schemes	State/UT, DDMA, Panchayats, ULBs, DRD, UDD, PRD	• Ensure that cyclone-resistant features are incorporated in planning and execution of social housing schemes • Ensure compliance with relevant building codes
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all relevant Ministries/ Departments	Guidance and implementation	State/UT, SDMA, DDMA, Panchayats, ULBs, all relevant Departments/ Agencies	Collaboration with technical agencies and implementation

3.2.4 Investing in DRR–Non-Structural Measures

Cyclone and Wind					*Non-Structural Measures*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Laws Regulations Enforcement mechanisms	MoES; MoEFCC, DoS, BIS	• Evolving codes • Guidance and Support • Oversight and monitoring of compliance with coastal	State/UT, CoR, Revenue Dept., Environment/ Forest Dept.	Ecologically sound land-use zonation; regulating aquaculture, and groundwater extraction
				CADA, CZMA, DDMA, Panchayats, ULBs	Take into account shoreline erosion, risk to structures, monitoring shoreline changes with regard to the

Cyclone and Wind					*Non-Structural Measures*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
	Techno-Legal regimes Institutional Arrangements Codes for disaster risk reduction Compliance monitoring		zone laws		preservation of natural barriers
				Forest Dept., UDD, DRD, CZMA, DDMA, Panchayats, ULBs	Notification of coastal zones for different purposes as per CRZ guidelines and techno-legal framework of town and country planning rules; enforcement and monitoring
		MoES; MoRD, MoEFCC	Coastal shelterbelts as a mandatory component under national afforestation programme	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, Environment/ Forest Dept.	All coastal states and UTs will complete the spread, preservation and restoration/regeneration of bio-shields
		CWC	Formulating a regulatory framework for flood plain zoning and flood inundation management in cyclone-prone coastal areas	State/UT, SDMA, CoR, Revenue Dept., DDMA, Irrigation Dept., Panchayats, ULBs	Constitute task teams jointly with central agencies for implementing land-use regulation as per zoning guidelines
2	Public Private Partnerships	MoES, NDMA	Guidance	State/UT, SDMA, CoR, Revenue Dept., DDMA	Promote private participation

3.2.5 Capacity Development

Cyclone and Wind					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	NIDM, LBSNAA, NIRM, NDMA, NISA, NIC, and other training institutions for Indian Civil Services	Training and orientation programs for central govt. staff, and other direct stakeholders	State/UT, SDMA, CoR, Revenue Dept., SIDM, ATI, Engineering Training Institutes, SIRD, Police Training Academies	Training and orientation programs for state govt. staff, and other direct stakeholders such as: civil society, media-persons, elected representatives, professionals for veterinary care and support to disaster-affected animals
		NDMA, NIDM, NDRF, MoYAS, MoD	Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS	State/UT, SDMA, CoR, Revenue Dept., SIDM, ATI	Incorporating disaster response, search and rescue in the training programs of youth, such as village volunteers, protection of disaster-affected animals

Cyclone and Wind					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
2	Curriculum Development	MoHRD, AICTE, IITs, UGC, NIDM	Update curriculum for undergraduate engineering courses to include topics relevant for cyclone hazard mitigation	State/UT, Education Dept., Professional Bodies and Councils in States	Update curriculum for undergraduate engineering courses to include topics relevant for cyclone hazard mitigation
		MoHFW, IMA	Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals	State/UT, Health Dept., Education Dept.	Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals
		CBSE	Introducing basic DM concepts in curriculum	State Education Boards	Introducing basic DM concepts in curriculum
3	Awareness Generation	NDMA,NDRF, CAPF, NIDM, MoES	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	State/ UT, SDMA, CoR, Revenue Dept., DDMA,SDRF, Fire and Emergency Services, Civil Defence, Police	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
4	Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs		Joint planning and execution of emergency drills
5	Vocational Training/ Skill development	NDMA, NIDM, MoSDE, NSDA, NSDC, IIE, NIESBUD, MoMSME	Promoting skill development for multi-hazard resistant construction in cyclone-prone areas for different types of housing and infrastructure	State/UT, SDMA, CoR, Revenue Dept., state level skill development agencies	•Conduct training programmes •Creating ToT teams for different trades relevant to cyclone-resistant construction

Cyclone and Wind					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
6	Empowering women, marginalised communities, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA, CoR, Revenue Dept., SIDM, ATI, DDMA, Panchayats, ULBs	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7	Community-Based Disaster Management	NDMA, NIDM,NDRF, CAPF, MoRD, MoUD	Promotion,Guidance, and Support	States/UTs, CoR, Revenue Dept., SDMA, DDMA, SIDM, ATI, Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, youth, local community organizations

3.3 Flood Risk Mitigation

3.3.1 Understanding Disaster Risk

Flood					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Observation Networks, Information Systems, Monitoring, and Forecasting	CWC, IMD, MoWR,MoAFW, NRSC	Modernization of Observation Network; Assessment, Monitoring and Scientific studies	Irrigation Dept., WRD, SDMA, DDMA, Panchayats, ULBs	• Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts
2	Zoning, mapping, and classification flood prone areas	MoWR,NRSC, SoI	Preparation of large-scale hazard maps of flood prone areas of high vulnerability	Irrigation Dept., WRD, SDMA, DDMA, Panchayats, ULBs	• Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts
3	Studies and monitoring of rivers flowing from neighbouring countries	MoWR, MEA, CWC, IMD,NRSC	International cooperation for studies and forecasting	Irrigation Dept., WRD, SDMA	• Support and cooperate with central agencies • Carry out state-specific efforts • Support local efforts
4	Research and Development	• Research and educational institutions (IITs, Univ.) • MoWR, CWC, Brahmaputra Board, Ganga Flood Control Commission, Central Building Research Institute (CBRI) • NRSC, SoI,MoST,CSIR, DST	• River basin studies • Studies on flood related problems such as soil losses caused by flooding of rivers, sediment transport, river course changes, and appropriate use of embankments • Studies on support systems for people living in flood prone areas • Promote research and studies – both in-house and extra-mural by providing research grants to researchers and institutions	Irrigation Dept., WRD, SDMA, relevant state-level technical institutions	• Support and cooperate with central agencies • Sponsor/ carry out state-specific efforts in all these areas; support local efforts

Flood					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Hydrological and morphological studies before undertaking major flood control or prevention measures • Evolving designs of shelters in flood prone areas • Socio-economic impacts of cyclone and wind hazards • Enhanced risks from climate change and adaptations to change		
5	Hazard Risk Vulnerability Assessment	NDMA, NIDM, CWC, MoST, DST, CSIR	•Promote studies, provide guidelines •Studies on vulnerability covering social, economic, ecological, gender, and equity aspects •Change in vulnerability and risk due under climate change scenarios	SDMA, CoR, Revenue Dept., Irrigation Dept.	Undertake HRVA as part of preparing and periodic revision of DM plans
6	Monitoring, Forecasting and Warning Systems	CWC,IMD,NRSC	• Specialized efforts for different types of floods and causes of flooding, including cloudburst • Developing forecasting models for discharge from dams	SDMA, Irrigation Dept., WRD, relevant state-level technical institutions	Support, cooperation for data collection and updates
7	Dissemination of warnings, data, and information	IMD, CWC, MoWR	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., Irrigation Dept., WRD, Information Dept., DDMA, Panchayats, ULBs	• Inter-state data and information sharing where applicable • Coordination and cooperation with the central agencies • Ensure facilities and infrastructure for the implementation of adequate access to communities at risk • Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
		DeitY, DoT, MoCIT, MoIB	Facilitate the distribution of necessary communication equipment, last-mile connectivity and access to disaster risk information		
		MoWR, MEA	International cooperation to share warnings about rivers flowing from neighbouring countries		
		NDMA, MoWR, DeitY	Promoting reliable networking systems for data and information sharing among central and state agencies		

Flood					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		CWC,NRSC	• Monitoring of landslides and blockages in rivers • Warning systems		• Warnings using all types of options, types of technologies, and media • Monitoring compliance by various network operators and service providers
		MoWR, CWC, NDMA	• Providing information in all possible ways and using all types of media • Interface with mobile network service providers for warnings		

3.3.2 Inter-Agency Coordination

Flood					*Inter-Agency Coordination*
	Major Themes	**Central/State Agenciesand their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoWR	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., Irrigation Dept.,DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MHA	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., Irrigation Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	CWC, IMD, NRSC, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MHA, BIS, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.3.3 Investing in DRR–Structural Measures

Flood					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Flood control measures such as construction of embankments and levees	CWC, NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Technical support and studies	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Identification safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk • Construction of multi-purpose shelters in Coastal villages/habitations prone to frequent cyclone • Proper maintenance of drainage systems and flood embankments
2	Social Housing Schemes	Relevant Central Government Ministries,MoRD, MoUD	Ensure that flood-resistant features are incorporated in planning and execution of social housing schemes	State/UT, SDMA, CoR, Revenue Dept., DRD, UDD, PRD,DDMA, Panchayats, ULBs	Ensure that flood -resistant features are incorporated in the planning and execution of social housing schemes in flood prone areas
3	Multi-purpose Flood Shelters	NDMA, MoWR, CWC, NBCC, BMTPC, CBRI, SERC, IE(I)	Advisory	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Ensure availability of shelters, undertake proper maintenance, and make arrangements to support the people shifted to temporary shelters
4	Waterways and drainage systems for roads, highways, and expressways	MoRTH, MoD, NHAI, BRO	Proper alignment and design	State/UT, SDMA, CoR, Revenue Dept., PWD, DDMA, Panchayats, ULBs	Coordination and cooperation with the central agencies and ensure proper alignment and design in all state projects
5	Enhancing the safety of dams and reservoirs	CWC, MoWR	Advisories and guidance	SDMA, CoR, Revenue Dept., Irrigation Dept., WRD	• Carry out measures to increase safety, reduce risks from flooding • Undertake pre- and post-monsoon inspections of dams and reservoirs • Monitor the implementation of safety enhancements in accordance with norms
6	Desilting/ dredging of rivers to improve flow; drainage	MoWR, CWC	Advisories and guidance	Irrigation Dept., WRD, SDMA, DDMA, Panchayats,	Implementation as per norms

Flood					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
	improvement; floodwater diversion through existing or new channels			ULBs	
7	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all relevant Ministries/ Departments	Guidance and implementation	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, all relevant Departments/ Agencies	Collaboration with technical agencies and implementation

3.3.4 Investing in DRR–Non-Structural Measures

Flood					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	• Regulation and enforcement of laws, norms, regulations, guidelines • Regulation of Reservoirs • Integrated Water Resources Management (IWRM)	IMD, CWC,NRSC, MoWR, NWDA, NRSC	• Guidance and Support • Oversight and monitoring of compliance with coastal zone laws • Promote institutional mechanisms for sharing forecasts, warnings, data, and information • Regulatory framework for flood plain zoning and flood inundation management • Implement IWRM in major river basins and their sub-basins • Scheme of incentives and disincentives with respect to the central assistance to encourage the states for implementing flood plain zoning regulations	Irrigation Dept., WRD, SDMA, CoR, Revenue Dept.	• Implementing land-use regulation for low lying areas as per flood control norms • Regulation of inhabitation of low-lying areas along the rivers, nallas and drains • Implementing flood management action plan • Review and modification of operation manuals for all major dams/ reservoirs • Support and cooperate with central agencies; Sponsor state-specific efforts; support local efforts; Cooperate with central efforts • Prevention and removal of encroachment into the waterways and natural drainage systems
2	Regulations to promote flood resilient buildings and infrastructure	NDMA, MoWR, MoUD, CWC, BIS	Guidance and Support	State/UT, SDMA, CoR, Revenue Dept., Local bodies	• Revise and implement the relevant rules in flood prone areas

Flood					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
3	• Wetland conservation and restoration • Catchment Area Treatment/Afforestation	MoEFCC	Guidance and Support	State/UT, SDMA, CoR, Revenue Dept., Local bodies	• Discourage reclamation of wetlands, natural depressions • Action plan managing wetlands and natural drainage systems for flood moderation • Implementation of watershed management including catchment area treatment and afforestation programmes
4	Public Private Partnerships	NDMA, MoWR	Guidance	State/UT, SDMA, CoR, Revenue Dept., DDMA	Promote private participation in disaster management facilities

3.3.5 Capacity Development

Flood					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	NIDM, LBSNAA, NIRM, NDMA, NISA, NIC and other training institutions for Indian Civil Services	Training and orientation programs for central govt. staff	SDMA, ATIs, Engineering Training Institutes, SIRD, Police Training Academies	Training and orientation programs for state govt. staff, , professionals for veterinary care and support to disaster-affected animals
		NDRF, CAPF, MoYAS, MoD	Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS	SDMA,SIDM, ATI DDMA, Panchayats, ULBs	Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, and for protection of disaster-affected animals
2	Curriculum Development	MoHRD, AICTE, IITs, UGC, NIDM, Professional Bodies/Councils	Strengthen coverage of flood damage mitigation, flood tolerant designs/ crops, and construction techniques	Professional Bodies/ Councils	Update curriculum for undergraduate engineering courses to include topics relevant for flood hazard mitigation
		MoHFW	Improve coverage of community health and epidemic management	Health Department of State Governments/UTs	Introduction of Crisis Management, emergency medical response/recovery

Flood					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			medical curriculum		and trauma management at Diploma /UG/ PG levels for Health Professionals
		CBSE	Include awareness about flood and some aspects of flood management in school and college teaching while reviewing the curriculum	State Boards of Education	Improving curriculum periodically using new technologies
3	Awareness Generation	NDMA,NDRF, CAPF, NIDM, MoWR	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	State/UT, SDMA, CoR , Revenue Dept., WRD, Irrigation Dept., SDRF, Fire and Emergency Services, Civil defence, Police, DDMA, Panchayats, ULBs	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
4	Mock Drills/ Exercises	NDMA, NIDM, MoWR, Line Ministries, Govt. Agencies, NDRF, Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs		Joint planning and execution of emergency drills
5	Vocational Training/ Skill development	NDMA, NIDM, MoSDE, NSDA, NSDC, IIE, NIESBUD, MoMSME	Promoting skill development for multi-hazard resistant construction in flood-prone areas for different types of housing and infrastructure	State/UT, SDMA, CoR, Revenue Dept., state level skill development agencies	• Conduct training programmes • Develop a team of Trainer-of-Trainers for different trades relevant to flood-resistant construction

Flood					*Capacity Development*
	Major Theme	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
6	Empowering women, marginalised, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA, CoR, Revenue Dept., SIDM, ATI and other state-level institutions, DDMA, Panchayats, ULBs	Incorporating gender sensitive and equitable approaches in capacity development, covering all aspects of disaster management at the state, district, and local levels
7	Community-Based Disaster Management	NDMA, NIDM, MoRD, MoUD	Promotion,Guidance and Support	States/UTs, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

3.4 Urban Flooding Risk Mitigation

3.4.1 Understanding Disaster Risk

Urban Flooding					*Understanding Disaster Risk*
	Activities	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Mapping/ Zoning	CWC, SoI, NRSC, MoUD	• Risk assessment will be carried out with a multi-hazard concept leading to fool proof land use planning • State Urban Flood Disaster Management Information System	States/UTs, SDMA, CoR, Revenue Dept., SRSAC,DDMA,Panchayats, ULBs	•Undertake adequate studies, evaluations, and planning •Coordinate with the central agencies and implement recommendations
2	Estimation of Possible Inundation levels	MoUD, CWC, NRSC	The magnitudes of inundation levels due to various scenarios and causes will be simulated on GIS-based inundation model		
3	Estimation of Flood Damages	MoUD,CWC, IMD, SoI, NRSC	Assessment of potential and actual damages to be done separately		
4	Ward level Risk Reduction and Vulnerability Assessment	MoUD,SoI, NRSC	Ward Level Information System to be developed using high resolution satellite images / aerial photos integrated with socioeconomic data covering natural resources and infrastructure facilities on appropriate scale at community level	States/ UTs, SDMA, CoR, Revenue Dept., SRSACs and ULBs	
5	Maximize real-time hydro-meteorological network to cover all urban centres	CWC, MoUD	• Prepare a plan and implementation strategy • Seek the support of the Government for commissioning such networks		
6	Establish satellite-linked Automatic Rain GaugeStations, Automatic Weather Stations for 24X7 weather monitoring	IMD, MoUD	IMD to prioritize the establishment in consultation with State Governments		Set up EOCs by the ULBs connected to the ARG network
7	Establishment of local networks for real-time rainfall data	IMD, MoUD	IMD to set up a 'Local Network Cell' at its headquarters for this activity		Coordinate with IMD in setting up of local networks at identified places
8	Expansion of DWR network	IMD, MoUD	IMD and MoUD to work out a strategic expansion of DWR network across the country to		Coordinate with the central agencies

Urban Flooding					*Understanding Disaster Risk*
	Activities	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			cover all urban centres		
9	Flood EWS	IMD, CWC	Responsibility for O&M of all equipment to remain with IMD/ CWC		Facilities, exclusively setup by the ULBs, will be operated and maintained by them
10	Marking of HFL and documentation	MoUD	Provide guidance and support		Implement and document
11	Hazard Risk Vulnerability Assessment	NDMA, NIDM, MoST, DST, CSIR	• Promote studies, provide guidelines • Studies on vulnerability covering social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk due under climate change scenarios	SDMA,States/UTs, CoR, Revenue Dept., SDMA, DDMA,Panchayats, ULBs	Undertake HRVA as part of preparing and periodic revision of DM plans

3.4.2 Inter-Agency Coordination

Urban Flooding					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoUD	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Promote integrated UFDM • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • Guidance, monitoring and approval mechanism for UFDM
2	Response	MoUD	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	CWC, IMD, MoWR, MoES, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk

Urban Flooding					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Non-structural measures	MoUD, BIS, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.4.3 Investing in DRR–Structural Measures

Urban Flooding					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Urban Design	MoUD,MoCA,NBCC, BMTPC, CBRI, SERC, IE(I), CRRI	• Airports to be made flood-proof by providing efficient drainage for a much higher rainfall intensity • City Bridge Design Considerations • City Road Level Design • Managing drainage systems • Protection of Water Bodies	State/UT, UDD, ULBs	• Airports to be made flood-proof by providing efficient drainage for a much higher rainfall intensity • All future road and rail bridges in cities crossing drains to be designed such that they do not block the flows resulting in backwater effect • All road re-levelling works or strengthening/ overlay works to be carried out by milling the existing layers of the road so that the road levels will not be allowed to increase • Ensure protection of Water Bodies and its restoration/ revival • Remove encroachments and take strict action against the encroachers as per the byelaws/ regulations
2	Establishment of Emergency Operation Centres	NDMA, relevant Central Ministries	Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources	States/UTs and ULBs	Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources to respond to urban flood

Urban Flooding					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Guidance and implementation	State/UT, SDMA, all relevant Departments/ Agencies	Collaboration with technical agencies and implementation

3.4.4 Investing in DRR–Non-Structural Measures

Urban Flooding					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Preparation of comprehensive Urban Storm Drainage Design Manual (USDDM)	MoUD	MoUD will consider current international practices, specific locations and rainfall pattern of the cities and future needs for preparing USDDM	States/UTs, SDMA, UDD	Take initiatives and collaborate with central agencies
2	Preparation of Storm Water Drainage System Inventory	MoUD	MoUD, in consultation with States/UTs and ULBs will prepare inventory on a GIS Platform	States/UTs and ULBs	Coordinate with MoUD in preparing the inventory through ULBs
3	Operation and Maintenance of Drainage Systems	MoUD	Provide guidelines, and carry out monitoring	States/UTs and ULBs	Adequate budget to be provided to take care of the men, material, equipment and machinery for O & Mof drainage systems on a periodic basis
4	Environmental Impact Assessment	MoEFCC, MoUD	To issue guidelines to State/UT for making stormwater drainage concerns a part of all EIA norms	States/UTs and ULBs	To ensure strict compliance with the guidelines
5	Compliance of Techno-Legal Regime	MoUD	Coordinate the efforts of the States for compliance with Techno-Legal Regime by all the ULBs in their respective States	States/UTs and ULBs	To ensure strict compliance of Techno-Legal Regime through ULBs
6	Constitution of Urban Flooding Cell for Integrated UFDM	MoUD	To play a lead role in the establishment of the Technical Umbrella at the national level	States/UTs, UDD	Nodal Department to constitute Urban Flooding Cell at State level and a DM Cell to be constituted at the ULB level for managing urban flooding at local level
7	Public Private Partnerships	NDMA, MoUD	Guidance	State/UT, UDD, SDMA, DDMA	Promote private participation in disaster management facilities

3.4.5 Capacity Development

Urban Flooding					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Urban Flood Education and Training	MoUD, MoHRD, MoHFW, CBSE	Introduce UFDM modules in school curricula through CBSE	State/UT, ULB	• Trainings for urban flood rescue and management • Upgrade equipment and skills of FES for UFDM • Enlist professionals for veterinary care and support to disaster-affected animals • State Governments will encourage their school boards to develop similar content in their school curriculum
2	Awareness Generation	MoUD, NDMA,NDRF, CAPF, NIDM	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	State/UT, SDMA, CoR, Revenue Dept., DDMA,SDRF, Fire and Emergency Services, Civil Defence, Police, ULB	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
3	Documentation	NIDM	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and mitigation planning	State/UT, SDMA, CoR, Revenue Dept., DDMA, ULB, State ATI	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and mitigation planning
4	Empowering women, marginalised, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA, CoR, Revenue Dept., SIDM, ATI and other state-level institutions	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district and local levels

Urban Flooding					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
5	Community-Based Disaster Management	NDMA, NIDM, MoRD, MoUD	Promotion,Guidance, and Support	States/UTs, SDMA, CoR, Revenue Dept., DDMA, ULB,SIDM	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations
6	Mock Drills/ Exercises	MoUD, NDMA, All Govt. Ministries/ Agencies, NDRF, Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs	States/UTs, SDMA, CoR, Revenue Dept., DDMA, ULB,SDRF, Fire and Emergency Services, Civil Defence, Police	Joint planning and execution of emergency drills

3.5 Seismic Risk Mitigation

3.5.1 Understanding Disaster Risk

Seismic					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	• Earthquake Monitoring Services • National Seismological Network • Real Time Seismic Monitoring Network (RTSMN)	IMD	• Estimate the earthquake parameters quickly after detection • Disseminate information • Share information relating to under-sea earthquakes capable of generating tsunamis in the Indian coastal regions with INCOIS to issue tsunami related messages and warnings • Share seismic activity data with national and international scientific, academic and R&D institutions	State/UT, SDMA, CoR, Revenue Dept.	Share information widely
2	Earthquake Hazard and Risk Assessment (EHRA)	IMD	• Seismic hazard assessment • Seismic zoning • Seismic micro-zoning		
3	Scientific Seismic Zonation	MoES, IMD, EREC, BIS, GSI, various national institutes, professional institutions, MoST, DST, CSIR	Inter-Agency Coordination and Collaboration for publishing the guidelines	State/UT, SDMA, CoR, Revenue Dept., UDD, PWD, ULB, DDMA	Ensuring implementation, enforcement, compliance and monitoring; awareness creation
4	Seismic Micro-zonation	EREC, Research Institutes	Develop a status paper based on a consensus among the professionals on the methodologies for micro-zonation studies	State/UT, SDMA, CoR, Revenue Dept., Technical organizations/agencies	Carry out needs assessment from end-users, conduct micro-zonation studies, prioritize important urban areas for micro-zonation, do professional review before adoption
5	Hazard Risk Vulnerability	NDMA, NIDM, MoST, DST, CSIR	• Promote studies, provide guidelines • Studies on vulnerability covering	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Undertake HRVA as part of preparing and periodic revision of DM plans

Seismic					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
	Assessment		social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk due under climate change scenarios		

3.5.2 Inter-Agency Coordination

Seismic					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoES	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MHA	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Non-structural measures	MHA, BIS, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.5.3 Investing in DRR–Structural Measures

Seismic					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Social Housing Schemes	Relevant Central Government Ministries, MoRD, MoUD	Ensure that multi-hazard resistant features are incorporated in planning and execution of social housing schemes (with special focus on earthquake)	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, DRD, UDD,PRD	• Ensure that earthquake resistant features are incorporated in planning and execution of social housing schemes • Ensure compliance with relevant building codes
2	Strengthening and seismic retrofitting of prioritized	Relevant Central Government	Implementation strengthening and seismic retrofitting as per	State/UT, SDMA, CoR, Revenue Dept., DDMA,	Implementation strengthening and seismic retrofitting as per

Seismic					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
	lifeline structures and buildings	Ministries	recommendations of safety audits	Panchayats, ULBs	recommendations of safety audits in all govt. departments, agencies, public utilities, schools, colleges, community halls, etc.
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all relevant Ministries/ Departments	Guidance and implementation	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, PWD, all relevant Departments/ Agencies	Collaboration with technical agencies and implementation

3.5.4 Investing in DRR–Non-Structural Measures

Seismic					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Regulations and model codes for town planning, civil works and public infrastructure	IRC,MoRTH, RDSO, MoR, AERB, DAE, BIS, MoRD, MoUD	• Periodic update of codes, rules, regulations • Work with all central ministries, agencies, and state governments to implement techno-legal regime by modifying/ developing necessary rules	State/UT, SDMA, CoR , Revenue Dept., UDD, DRD, PWD, All other relevant departments, DDMA, Panchayats, ULBs	• Adopt suitable byelaws for rural and urban areas, put model codes into practice and ensure proper compliance • Ensure strict compliance with code implementation through relevant Departments and agencies
2	Structural safety audit of lifeline structures and buildings Prioritization of lifeline structures and buildings for strengthening and seismic retrofitting	MoES,NDMA,IE(I), CIDC, CFI, NAC,relevant Ministries/ Departments	• Formulate standard procedures and guidelines • Periodically provide clarifications in line with the relevant national standards	SDMA, CoR, Revenue Dept., UDD,PWD,DDMA, Panchayats, ULBs	• Carry out safety audit of lifeline buildings and critical infrastructure • Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals

Seismic					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
3	Licensing and certification of professionals	MoHRD, NDMA, relevant Central Ministries /Departments, professional bodies of architects and engineers	May set up a Professional Civil Engineers Council established by an Act for certification of engineers and evolve a procedure for certification of engineers	Relevant Departments	Implement licensing of engineers through appropriate legal framework and institutional mechanism
4	Public Private Partnerships	NDMA, MoES	Guidance	State/UT, SDMA,COR, Revenue Dept., DDMA	Promote private participation in disaster management facilities

3.5.5 Capacity Development

Seismic					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	NDMA, MoES, MoHRD AICTE, CA, IE(I), NITTTR, NICMAR,CFI, BAI, and other professional institutions	Contribute to the national effort to build the requisite number of trained personnel to handle seismic safety in India.	SDMA, CoR, Revenue Dept., Education Dept., ATIs	Contribute to the national effort to build the requisite number of trained personnel to handle seismic safety in India Trainings in search and rescue
2	Curriculum Development	MoES, MCI, MoHRD, UGC, AICTE, IITs, NIDM and other related agencies	Facilitate the introduction of subjects related to DM, in the undergraduate and professional courses	SDMA, CoR, Revenue Dept., Health Dept., Education Dept.	DM related aspects to be included in undergraduate and professional courses
3	Awareness Generation	NDMA, NDRF, CAPF, NIDM	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio	State/ UT,SDMA,CoR, Revenue Dept., SIDM, ATI Relevant State Govt. Dept., SDRF, Fire and Emergency Services, Civil defence, Police,	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation

Seismic					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Strengthening network of civil society organizations for awareness generation about DRR and DM	DDMA, Panchayats, ULBs	about DRR and DM • Information on care and protection of disaster-affected animals
4	Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs		Joint planning and execution of emergency drills
5	Documentation and Dissemination	MoES, NIDM	Undertake documentation of major earthquakes and ensure wider dissemination	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, ATIs	Popularization and distribution of documentation in local languages
6	Empowering women, marginalised, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA, CoR, Revenue Dept., SIDM,ATI,and other state-level institutions, DDMA, Panchayats, ULBs	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7	Community-Based Disaster Management	NDMA, NIDM, MoRD, MoUD	Promotion,Guidance, and Support	States/UTs, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

3.6 Tsunami Risk Mitigation

3.6.1 Understanding Disaster Risk

Tsunami					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Research and Development Efforts	MoES, INCOIS, MoST, DST, CSIR	Encourage development of standardised methods for tsunami risk assessment and scenario development, support studies to collect the data and compile knowledge Develop suitable large-scale digital maps indicating the tsunami hazard on the basis of past tsunami disasters	State/ UT, SDMA, CoR, Revenue Dept.	Develop detailed computerized maps and databases of vulnerable areas along the coast for planning and coordination of DM activities
2	Zoning/ Mapping	MoES, in co-operation with other relevant Ministries and Departments and other specialized agencies	Database of Tsunami Risk and Vulnerability in the coastal areas with information on trends of storm surge, high tides, local bathymetry, etc.	State/ UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Ensure support to the Central Government agencies in zoning/ mapping and carry out at their level
3	Warning System Components and Instruments	MoES	Assess the status of existing important installations in coastal areas to withstand tsunami	State/UT, SDMA, CoR, Revenue Dept., State-level research and technical institutions	Support, cooperation for data collection and updates
		NRSC, Indian Air Force, Indian Navy, Coast Guard	Securing critical instrumentation to ensure fail-safe functioning of these critical instruments and their protection		
4	Dissemination of warnings, data, and information	INCOIS, IMD, MHA	Monitoring earthquake, provide warning based on seismic models and issue periodic bulletins	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
5	Hazard Risk Vulnerability Assessment	MoES, NDMA, NIDM, MoST, DST, CSIR	• Promote studies, provide guidelines • Studies on vulnerability covering social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk due under climate change scenarios	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Undertake HRVA as part of preparing and periodic revision of DM plans

3.6.2 Inter-Agency Coordination

Tsunami					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoES	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MHA	Nodal ministry for central assistance	SDMA, CoR, DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	INCOIS, MoES, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MHA, BIS, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.6.3 Investing in DRR–Structural Measures

Tsunami					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Strengthening of lifeline structures and high priority buildings	Relevant Central Government Ministries	Implementation as per recommendations of safety audit where applicable	State/UTs, SDMA, CoR, Revenue Dept., PWD, all relevant line departments, DDMA, Panchayats, ULBs	Implementation as per recommendations of safety audit
2	• Shelters from storm surges and tsunamis • Construction of large scale submerged sand barriers • Periodical dredging of the inlets and	MoES, NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Guidance to implementing agencies	State/UTs, PWD, DDMA, Panchayats, ULBs	Implementation in compliance with relevant building codes/ standards/ technical guidance

Tsunami					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
	associated water bodies so as to absorb the influx during tsunami • Construction of submerged dykes (one or two rows along the stretch of the coast) so as to decrease the impact due to the incoming tsunami and inland dykes to safeguard vital installations				
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), BIS, all relevant Ministries/ Departments	Guidance and implementation	State/UT, SDMA, CoR, Revenue Dept., PWD,DDMA, Panchayats, ULBs, all relevant Departments/ Agencies	Collaboration with technical agencies and implementation

3.6.4 Investing in DRR–Non-Structural Measures

Tsunami					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Mainstreaming DM into Development Planning	MoF, NDMA, Niti Ayog	Include DM concerns in plan schemes and non-plan proposals by various ministries as per norms	State/UT, SDMA, CoR, Revenue Dept., Finance Dept., DDMA, Panchayats, ULBs	Include DM concerns in plan schemes and non-plan proposals by various ministries as per norms
2	Regulationand enforcement of relevant laws	MoES; DoS	• Guidance and Support • Oversight and monitoring of compliance with coastal zone laws	State/ UT, SDMA, CoR, Revenue Dept., Forest/Environment Dept., DDMA, Panchayats, ULBs	• Ecologically sound land-use zonation • Regulating aquaculture, and groundwater extraction
3	Techno-Legal Regime	BIS	• Implementation and popularization of relevant Indian Standards • Support State Government in preparing bye-laws for rural areas (for both engineered and non-engineered buildings)	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Ensure implementation of standards through all departments/ institutions • Develop suitable bye-laws for rural areas (for both engineers and non-engineered buildings) considering local conditions

Tsunami					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Non-structural shore stabilization measures and bio-shields	NDMA, MOEFCC, MoES	Guidance and Support	State/UT, SDMA, CoR, Revenue Dept., State Forest Dep.	• Developing sand dunes along the coast with sea weeds or shrubs or casuarinas trees for stabilization of the sand dunes • Raising the ground level (above the design water level) with natural beach sand • Development of coastal forest (green belt) by planting casuarinas or coconut trees along the coastline to cover minimum of about 500m width of the beach • Establishment of bio-shields (e.g., mangrove plantations, as a natural defence) for communities residing along the estuaries
5	Safety audits and evaluation of all lifeline structures and important facilities	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all Ministries/ Departments	Guidance and Support	State/UT, SDMA, CoR, Revenue Dept., all relevant line departments, DDMA, Panchayats, ULBs	• Detailed assessment of tsunami hazard to the structure and foundation and the benefits of strengthening • Carry out structural safety audit of all lifeline structures and important facilities
6	Public Private Partnerships	NDMA, MoES	Guidance	State/UT, SDMA, CoR, Revenue Dept., DDMA	Promote private participation in disaster management facilities

3.6.5 Capacity Development

Tsunami					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training and Capacity Development of Professionals	NIDM	Technical capabilities in safety audit Conduct training programmes for State and Local Administration personnel including Fire and Rescue and Police personnel in disaster management	SDMA, CoR, Revenue Dept., State ATI	Training and orientation programs for State Govt. staff/ emergency response officials and other volunteer groups
		NIDM	Evolve an action plan to offer a comprehensive curriculum related to tsunami management in the form of training modules for the various target groups	State ATIs, State Governments with the help of other research organisations	Training of the Trainers to impart knowledge related to tsunami mitigation measures to various target groups
2	Curriculum Development	MoHRD, UGC, AICTE, MCI, ICAR, etc.	Include DM in the educational curricula including Tsunami hazard	State/UT, SDMA, CoR , Revenue Dept., Education Dept.	Include DM in the educational curricula and develop adequate technical expertise on various subjects related to DM including Tsunami
3	Awareness Generation	NDMA,NDRF, CAPF, NIDM	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	State/UT, SDMA, CoR, Revenue Dept., DDMA,SDRF, Fire and Emergency Services, Civil Defence, Police	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Inform people about care and protection of disaster-affected animals

Tsunami					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	Joint planning and execution of emergency drills	State/ UT, SDMA, CoR, Revenue Dept., DDMA,SDRF, Fire and Emergency Services, Civil Defence, Police	Joint planning and execution of emergency drills
5	Documentation	NIDM, MoES, through its nodal institutions	• Prepare and distribute manuals and tsunami hazard zonation maps to the public through SDMAs/ relevant Ministries and Departments • Documentation of lessons learnt, best practices, success stories	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Create awareness on tsunami risk and vulnerability among the coastal communities by distributing the hazard zonation maps • Documentation of lessons learnt, best practices, success stories
6	Community-Based Disaster Management	NDMA, NIDM	Promotion,Guidance, and Support	State/UT, SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations, volunteers

3.7 Landslides and Snow Avalanches Risk Mitigation

3.7.1 Understanding Disaster Risk

Landslides and Snow Avalanches					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Hazard Zoning, mapping, geological, and geotechnical Investigations in regions prone to landslides and snow avalanches	GSI/MoM, Wadia Inst. of Himalayan Geology, NIDM, NRSC,BRO, SASE	• Preparation of comprehensive and user-friendly inventory of landslides and avalanche prone areas and its updation as per widely accepted standards • Studies and monitoring of risk prone areas on site and using satellites • Studies to classify vulnerable areas as per likelihood of hazard	State/UT, SDMA, CoR, Revenue Dept., State DGM, SRSC	Support to and cooperation with central agencies
2	Research and Development	NIDM, SASE, MoM, DST, IMD, IITs, MoST, DST, CSIR, Research, and academic institutions	• Scientific assessment for predicting likelihood of landslides, and better understanding of driving forces • Impacts of climate change on landslides and snow avalanches risks • R&D for methods to reduce factors driving landslide	State/UT, SDMA, CoR , Revenue Dept., DGM, SRSC	Support to and cooperation with central agencies
3	Hazard Risk Vulnerability Assessment	GSI, MoM, SASE,NDMA, NIDM,MoST, DST, CSIR	• Promote studies, provide guidelines • Studies on vulnerability covering social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk due under climate change scenarios	State/UT,SDMA, CoR, Revenue Dept., DDMA,Panchayats, ULBs	Undertake HRVA as part of preparing and periodic revision of DM plans

Landslides and Snow Avalanches					*Understanding Disaster Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Dissemination of warnings	CWC, NRSC, IMD, BRO	Quick, clear, effective dissemination among central and state agencies	State/UT, CoR, Revenue Dept., SDMA,PWD, DDMA,Panchayats, ULBs	• Ensure facilities and infrastructure for the implementation of adequate access to communities at risk • Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
5	Monitoring, Warning Systems, and Dissemination	MoM,SASE,GSI, CWC, NRSC, IMD, BRO	Support the deployment of reliable monitoring and warning systems	State/UT,SDMA, CoR, Revenue Dept., DDMA,Panchayats, ULBs	Support and collaboration in implementation

3.7.2 Inter-Agency Coordination

Landslides and Snow Avalanches					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoM, MoD	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MHA	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	GSI, SASE, IMD, MoM, BRO, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MHA, BIS, MoD, BRO, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.7.3 Investing in DRR–Structural Measures

Landslides and Snow Avalanches					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Protection of Human Settlements	MoM, BRO, SASE	Technical inputs and guidance	State/UT, State DGM,PWD	Improving infrastructure, roads, and land stabilization work
2	Protection of Heritage Structures	ASI	Prepare lists of structures/sites at risk due to landslides/slope stability problems and prioritise them for hazard mitigation	State/UT, SDMA, State DGM, SRSC, DDMA, Panchayats, ULBs	Support and collaboration
3	Multi-Hazard Shelters	NDMA, NIDM	Technical support	State/UT, SDMA, DDMA, Panchayats, ULBs	• Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk • Construction of multi-purpose shelters in high risk areas at safe sites away from hazard-prone locations • Proper maintenance of roads in risk-prone areas

3.7.4 Investing in DRR–Non-Structural Measures

Landslides and Snow Avalanches					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Site selection for Human Settlements in Landslide and Snow Avalanche Prone Areas	MoM, GSI	Proper site selection for human settlements, amenities, and other infrastructure	State/UT, SDMA, State DGM, DDMA, Local Authorities	• Adopt suitable byelaws for rural and urban areas • Enforce model codes into practice • Ensure proper compliance
2	Regulations and building codes	MoM, BIS, NIDM	Codes and guidelines related to landslides published by BIS to be critically examined and reviewed by peers. BIS will revise/revalidate every five years or earlier, if necessary	State/UT, SDMA, UDD, DDMA, Local Authorities	Ensure implementation and adherence to codes and guidelines

Landslides and Snow Avalanches					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
3	Licensing and certification of professionals	MoHRD, NDMA, relevant Central Ministries /Departments, professional bodies of architects and engineers	May set up a Professional Civil Engineers Council established by an Act for certification of engineers and evolve a procedure for certification of engineers	Relevant Departments	Implement licensing of engineers through appropriate legal framework and institutional mechanism
4	Public Private Partnerships	NDMA, MoM	Guidance	State/UT, SDMA, DDMA	Promote private participation in disaster management facilities

3.7.5 Capacity Development

Landslides and Snow Avalanches					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	NIDM, MoM, CDMM, CoA	Train professionals on how to handle slope failures and their remediation and landslide emergencies by promoting observational method of design and construction with training on the development of contingency plans	State/UT, State DGM, SRSC, ATIs, SIDM	• Support and collaboration to national agencies • Training and skill upgrades for search and rescue • Conduct regular training programmes for professionals including those for care and protection of disaster affected animals
2	Curriculum Development	MoM, GSI,MoHRD, UGC, AICTE, CoA, NIDM	Review and revise curriculum	State/UT, SDMA, Education Dept.	Include information on landslides and snow avalanches in the curriculum
3	Awareness Generation	GSI, NIDM, NDMA,NDRF, CAPF, MoIB	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer	State/UT, SDMA,SDRF, Fire and Emergency Services, Information Dept., DDMA, Panchayats, ULBs, Civil Defence, Police	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC

Landslides and Snow Avalanches					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Promote Community Radio		• Promote use of insurance/ risk transfer • Promote Community Radio • Inform people about care and protection of disaster-affected animals
4	Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF,Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs	State/UT, SDMA,SDRF, Fire and Emergency Services, Civil defence, Police, DDMA, Panchayats, ULBs	Joint planning and execution of emergency drills
5	Documentation	Nodal Agency: MoM-GSI in collaboration with the NIDM; CBRI; CRRI; DST; BRO; IITs, universities, and other academic institutions	Documenting the history of landslide studies and other related activities in India	State/UT, SDMA,SIDM, ATI,other academic institutions, DDMA, Panchayats, ULBs	Constitute multi-institutional and multi-disciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate
6	Empowering women, marginalised, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA,SIDM, ATI, and other state-level institutions, DDMA, Panchayats, ULBs	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7	Community-Based Disaster Management	NDMA, NIDM, MoRD, MoUD	Promotion,Guidance, and Support	States/UTs, SDMA, DDMA, Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

3.8 Drought Risk Mitigation

Note: In addition to the guidelines published by NDMA on drought management (listed in Annexure-I), this section also relies on the manual prepared by Department of Agriculture and Cooperation (MoAFW 2009).

3.8.1 Understanding Risk

Drought					*Understanding Risk*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Vulnerability Maps	NCFC, MoAFW, NRSC, NATMO, IMD, and ICAR	• Block-wise rainfall deficit maps for the blocks with deficient rainfall – at crucial stages of the SW monsoon (early, middle, and end) separately for NE monsoon[17] • Comprehensive assessment of water deficit in dryland farming, rainfed, and drought-prone areas every year, at the end of the SW and NE monsoons • Agro-climatic region wise water deficit assessment reports for relevant regions separately at the end of SW and NE monsoon • Provide technical assistance to the State Govt./SDMC to prepare vulnerability maps • Analysis of satellite imageries, use of appropriate indicators (vegetation, NDVI, SAVI, soil moisture, MAI, etc.)	State/UT,SDMA, CoR, Revenue Dept., SDMC, SAUs in collaboration with central agencies	• Annually, after the end of the South-West monsoon, carry out comprehensive assessment of water availability for drinking and irrigation in all the dryland farming/drought-prone areas in the state to demarcate blocks and preferably villages • Prepare maps of areas likely to face water deficit before onset of next monsoon (demarcate blocks and preferably villages) • Undertake village-wise assessment of water storage in the vulnerable blocks

[17] Most of India receives rainfall from the South-West (SW) monsoon, while Tamil Nadu, Pondicherry, and coastal Andhra Pradesh get much rainfall from the North East (NE) monsoon. For Tamil Nadu NE monsoon is the main rainy season.

Drought					*Understanding Risk*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
2	Assessment, Monitoring, and Early Warning	MoAFW, NCFC, IMD, NRSC, CWC, NRAA, CRIDA, DST, NCMRWF, ICAR, CAZRI, MoES, MoST, DST, CSIR	• Improve the drought forecast, and assessment of water deficit (likely mismatch between estimates of requirements and availability) in the arid/semi-arid, drought-prone, and dryland farming areas • Prepare detailed advisories on water conservation and crop management measures based on drought and water deficit in consultation with experts for each State/UT which is likely to face acute water deficit • Monitoring key drought indices at National and State levels • Developing composite index of various drought indicators relevant to each agro-climatic zone • Develop a multi-criteria method based on various indices (vegetation, soil, water availability, etc.) as standardized framework for drought forecasting taking into account agro-climatic zones	State/UT, SDMC,SDMA, CoR, Revenue Dept., Agricultural Dept., Irrigation Dept., Water Supply Dept., SAUs in collaboration with central agencies	• Coordinate with central agencies in the compilation, for refining forecast accuracy for the region, and analysis of all the drought, water deficit, and crop related data • Ensure functioning of DMC under control of SDMA/ CoR with requisite facilities and staff • Separately, at the end of SW and NE monsoon, as applicable, prepare and update a robust database of micro-level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio-economic factors • Separately, at the end of SW and NE monsoon, prepare crop advisory for blocks that are likely to face water deficit • Separately, at the end of SW and NE monsoons, prepare comprehensive water conservation, re-distribution, and management plan for the areas in the state that are likely to experience water deficit
3	Drought Declaration	IMD, MoAFW, DMC, NCFC, ICAR	• Improve the criteria and method used for assessment of drought condition and key indicators for declaring drought • Collaborate with State Government and its agencies for monitoring/ declaration of drought • Separately, after end of SW and NE monsoon, if applicable, initiate consultations to provide drought advisory to states by end of October for	State/ UT, SDMA, Revenue Dept., CoR, SDMC, SAU, Agricultural Dept., Irrigation Dept., WRD., Rev. Dep., DDMA, District Collector	• Monitor key indicators for drought declaration with the support of relevant Central/ State agencies/ Departments • State Govt. to issue a formal declaration of drought affected areas after which Collector will notify the district and talukas affected and initiate drought response measures

Drought					*Understanding Risk*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			regions covered by SW monsoon and by end of March for regions relevant to NE monsoon		
4	Hazard Risk Vulnerability Assessment	MoAFW, NDMA, NIDM,MoST, DST, CSIR	• Promote studies/provide guidelines on vulnerability assessment covering social, economic, ecological, gender, and equity aspects • Study change in vulnerability and risk under climate change scenarios	State/ UT, SDMA, DDMA, SAU, Agriculture Dept., Panchayats, ULBs	• Undertake HRVA as part of preparation/ revision of DM plans including change in vulnerability and risk considering climate change scenarios • Estimate vulnerability of crops to rainfall uncertainties
5	Research	MoAFW, IMD, NRSC, CWC, NRAA, CRIDA, NIDM,MoST, DST, CSIR,and other agencies related to research	• Agricultural research focussed on drought-prone areas, arid/semi-arid tracts, and dryland farming areas • Research related to water conservation and management	State/ UT, SAUs in collaboration with CRIDA, NRAA	Conduct research through the university system to cope with water deficit, to manage crops with less water, improve water conservation programs, enhance the productivity of dryland/ rainfed farming

3.8.2 Inter-Agency Coordination

Drought					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoAFW	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., Agriculture Dept., DRD, PRD, DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MoAFW	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	IMD, CWC, NCMRWF, NRSC, NRAA, IDMC, CRIDA, DST, DACFW, NCFC, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMC,SDMA, CoR, Revenue Dept., Agriculture Dept., Irrigation Dept., WRD, DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk

Drought					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Non-structural measures	MoAFW, MHA, BIS, NDMA	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.8.3 Investing in DRR - Structural Measures

Drought					*Structural Measures*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Storage Facilities	MoAFW, MoRD	• Technical support for water conservation structures, integrated water resources management infrastructure needs (surface and ground water) • Guidelines • Projects/ Grants	State/UT,SDMA, CoR, Revenue Dept., DDMA, Forest Dept., Water Supply Dept., Panchayats, ULBs, WRD, DRD, PRD, Revenue Dept., other relevant departments	• Drinking water storage and distribution facilities • Fodder storage facilities to maintain fodder banks • Rain water harvesting systems – individual and community
2	Water Conservation Structures	MoAFW, MoRD, CGWB	• Technical support • Guidelines • Projects/ Grants	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, WRD, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., other relevant departments.	• Water harvesting and storage structures • Check dams, reservoirs with excess capacity • Groundwater recharge augmentation systems
3	Social Housing Schemes	MoRD, MoUD, relevant Central Government Ministries	Ensure rainwater harvesting and storage in the social housing schemes in drought-prone areas	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, WRD, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., other relevant departments.	Ensure rainwater harvesting and storage in the social housing schemes especially in drought-prone areas

3.8.4 Investing in DRR–Non-Structural Measures

Drought					*Non-Structural Measures*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Mitigation Measures	IITM, ICAR, CRIDA, MoAFW	• Conduct pilot studies in drought prone areas for suggesting long term mitigation measures • Convergence of lessons learnt from studies carried out by CRIDA, ICRISAT, IMD, NRSC, ICAR, and other institutions. • Promote watershed development projects • Technical inputs on better crop management (especially for dryland/ rainfed farming) • Public Private Partnerships	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, WRD, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., SAU, Forest/ Environment Dept., Other relevant departments	• Coordinate the efforts of the central agencies in implementing mitigation measures • Promote private participation in disaster management facilities • Improve the implementation of watershed development programmes • Risk management for dryland/ rainfed farmers through agricultural extension, and financial institutions based on assessments at the end of monsoon (SW or NE as applicable) • Drought-Proofing
2	Promote water conservation, harvesting, efficient irrigation, afforestation	MoAFW, ICAR, Agricultural Research Institutions, ISRO, NIDM	• Support training programmes • IEC efforts • Judicious use of surface and groundwater • Technical and training inputs • Research, guidance, and documentation support	State/UT,SDMA, COR, Revenue Dept., DDMA, Panchayats, ULBs, WRD, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., SAU, Forest Dept.	• Promote water efficient irrigation systems (sprinklers, drip, etc.) • Promote protective irrigation through micro irrigation systems • Provide advice to farmers to cope with drought, crop management under drought conditions, and efficient water management • Training in water and soil moisture conservation • Promote village-level information systems for natural resource management • Afforestation and other options using economically useful vegetation

Drought					*Non-Structural Measures*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
3	Agricultural credit, agricultural inputs, finance, marketing, and crop insurance	MoAFW, RBI, IRDA, NABARD, Banks, ICAR	• Provide credit and financing products relevant to the drought-prone areas • Promote agricultural insurance programmes and ensure that farmers are informed about the availability of insurance products • Ensure risk cover for dryland / rainfed farmers who face very high rainfall uncertainty and dependent agricultural labor	State/UT, DMC, Agriculture Dept., State Rural Coop. Banks, Rural Banks, NABARD, SLBC, DDMA	• Need-based credit • Promote financial inclusion • Monitor the availability of credit and other financial support from banks and other financial institutions to farmers in drought-prone areas • Ensure the insurance programmes reach the target audiences (especially dryland/ rainfed farmers) and dependent agricultural labor • Marketing support • Ensuring availability of quality agricultural inputs
4	Reducing climate change impact	MoEFCC, MoAFW, ICAR, Agricultural Research Institutes, ISRO	Initiate measures for reducing the impact of climate change on drought	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, WRD, DRD, PRD, Revenue Dept., Irrigation Dept., SAU, Forest Dept.	Implement various water and soil conservation programmes taking into account climate change impacts

3.8.5 Capacity Development

Drought					*Capacity Development*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training and Capacity Building	NIDM, MANAGE, NIRD, DMC	• Formulate and implement national training and capacity building programme for drought management through better water conservation, integrated water management (surface and ground water), and cropping systems	State/UT, SDMA, ATI, SIDM, SDMC, DDMA, Panchayats, ULBs	• Formulate and implement national training and capacity building programme for drought management, especially, better water conservation, integrated water management (surface and ground water), and cropping systems

Drought					*Capacity Development*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques		• Implement different training programmes for officials at various levels, elected representatives, community leaders, civil society organizations, animal welfare organizations • Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques (crop, animal care, integrated water resources – surface and ground water) • Professionals for veterinary care and support to drought-affected animals
2	Curriculum Development	ICAR, Agriculture Universities, MoHRD, NIDM, NDMA	Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture offered by central institutions	State/ UT, SAU, Education Dept.	Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture and veterinary courses offered by state institutions
		MoHRD, NCERT, CBSE	Include drought mitigation in secondary and higher secondary school curriculum	State/ UT, SBSE	Include drought mitigation in secondary and higher secondary school curriculum
3	Awareness Generation	NDMA, NDRF, NIDM	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio	State/UT,SDMA, CoR, Revenue Dept., all other relevant line departments, DDMA, Panchayats, ULBs, SAU	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management covering crop and water management (including conservation of surface and ground water) • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer

Drought					*Capacity Development*
	Major Themes	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
					• Promote Community Radio • Inform people about care and protection of disaster-affected animals
4	Empowering women, marginalised communities, and differently abled persons	NDMA, NIDM, MoWCD, MoSJE	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, Agriculture Dept., AHD, WRD, DRD, PRD, Irrigation Dept., SAU, Forest/ Environment Dept., DSJE, other departments	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
5	Drought Management Plans	MoAFW	Preparing the drought management plans based on detailed projections of water deficit in the drought-prone areas taking into account agro-climatic zones Provide advisory to the states having large areas that may face drought/ acute water deficit	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, Agriculture Dept., AHD, WRD, DRD, PRD, Irrigation Dept., SAU, Forest/ Environment Dept.	Ensure development of state, district, block, taluka and village drought management plans
6	Mainstreaming drought management in developmental plans	Relevant Central Ministries in collaboration with State Governments	All ministries/ departments will mainstream disaster management efforts in their developmental plans	State/UT,SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs, Agriculture Dept., AHD, WRD, DRD, PRD, Irrigation Dept.	All state govt. departments/ agencies will mainstream disaster management efforts in their developmental plans

3.9 Cold Wave and Frost

As Cold Wave/Frost is a localized phenomenon, the relevant State Governments must draw up location specific mitigation plans involving respective DDMAs and local authorities (Panchayats and ULBs).

3.9.1 Mitigation Measures for People

The State Governments must maintain close coordination with India Meteorological Department (IMD) and closely monitor cold wave situation. Warnings should be disseminated to the public through appropriate forums (including local newspapers and radio stations) on a regular basis. Some of the mitigation measures to be followed are shown below:

- Stay indoors as much as possible
- Listen to local radio stations for weather updates
- Eat healthy food to supply heat to the body and drink non-alcoholic beverages to avoid dehydration
- Wear several layers of lightweight and warm clothes; rather than one layer of heavy clothing. The outer garments should be tightly woven and water-repellent.
- Keep dry. Change wet clothing frequently to prevent loss of body heat.
- Maintain proper ventilation when using kerosene, heater or coal oven to avoid toxic fumes.
- In case of non-availability of heating arrangement, go to public places where heating arrangements are made by administration.
- Cover your head, as most body heat is lost through the top of the head and cover your mouth to protect your lungs.
- Avoid over work. Over exertion can cause heart attack.
- Watch for signs of frostbite: loss of feeling and white or pale appearance on fingers, toes, ear lobes and the tip of the nose.
- Watch for signs of hypothermia (subnormal body temperature): uncontrolled shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and apparent exhaustion. Immediately rush to the nearest hospital for medical treatment.
- Stock up on food, water, and other necessities before a cold wave.
- Stock suitable forage before cold waves for livestock
- Keep hospitals in a state of readiness for the admission of victims of frostbite and hypothermia

3.9.2 Mitigation Measures for Crops and Animals

The MoAFW closely monitors cold wave situation in consultation with IMD and State Governments. In case of cold wave/frost situation, States need to initiate location specific measures as outlined in District Crop Contingency Plans and in consultation with respective State Agricultural Universities to minimize its impact. Farmers are to provide light irrigation as per need, immediately prune damaged tips of branches or shoot, burn leave/waste material in the orchard to create smoke and manage rejuvenation of damaged crops through pruning of dead material, application of extra doses of fertilizer through foliar sprays. Vulnerable crops may be sprayed with water that will paradoxically protect the plants by freezing and absorbing the cold from surrounding air. Agencies specializing in animal care should provide necessary advisory and support for the care and protection of animals. In cold wave conditions, animal and livestock owners must feed adequately with appropriate feed to avoid animal deaths. They must stock suitable feed or forage before cold wave to feed the livestock.

They must avoid exposure of animals to extreme cold. Illustrative crop protection measures during different vegetative stages are given in Table 3-1.

Table 3-1: Snow and frost – Illustrative Crop Protection Measures

	Stages of Plant Growth	Measures to be taken by Farmers
1	Seedling/ Nursery Stage	Change of micro climate by smoking around the field especially during night
2	Vegetative/ Reproductive Stage	Irrigating the field, smoking the field during night
3	Harvesting State	Harvest the crop at physiological maturity stage

Crops: Soybean, maize, jowar, arhar, cotton, chick pea, and wheat

Source: Safety tips for Cold Wave, available at www.nidm.gov.in

3.10 Chemical (Industrial) Disasters Risk Mitigation

3.10.1 Understanding Risk

Chemical (Industrial) Disasters					*Understanding Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Information Systems and Research	MOEFCC	• Online information system on HAZCHEM conforming to international standards • Chemical Accident Information Reporting System • Information on dealing with HAZCHEM • Research on effective management of HAZCHEM • National Hazardous Waste Information System (NHWIS) • Promote research and studies – both in-house and extra-mural by providing research grants to researchers and institutions • Promote R&D for indigenous manufacture of high quality personal protection equipment (PPFs) • Studies on improving occupational safety	State/UT, SDMA,Industries Dept., SPCB and other relevant departments	Support and coordination
2	Zoning/ Mapping	MoEFCC	Guidance	State/UT, SDMA,Industries Dept., SPCB and other relevant departments	Industrial zones on basis of hazard potential and effective disaster management for worst case scenarios Carry out the mapping and related studies in collaboration with

Chemical (Industrial) Disasters					*Understanding Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
					central agencies/ technical organizations
3	Monitoring	MoEFCC, CPCB	Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste	State/UT, SDMA,Industries Dept., SPCB and other relevant departments	Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste
4	Hazard Risk Vulnerability Assessment	MoEFCC,NDMA, NIDM,MoST, DST, CSIR, andother relevant Ministries	• Promote studies, provide guidelines • Studies on vulnerability covering social, economic, ecological, gender, and equity aspects • Change in vulnerability and risk due under climate change scenarios	State/UT,SDMA, DDMA,Panchayats, ULBs and other relevant departments	Undertake HRVA as part of preparing and periodic revision of DM plans

3.10.2 Inter-Agency Coordination

Chemical (Industrial) Disasters					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	MoEFCC	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	MoEFCC	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	MoEFCC, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MoEFCC, MHA, BIS, NDMA and other Ministries such as MoCI, MoHIPE, MoSME, MoPNG, MoCF	• Revised/ Updated rules, norms, and codes • New/Updated standards • Review and improve laws, regulations and policies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

3.10.3 Investing in DRR–Structural Measures

Chemical (Industrial) Disasters					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	• Shelters, evacuation, and support facilities • Multiple routes for reliable access and escape • Decontamination facilities	MoEFCC, NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Technical support	State/UT, SDMA,Industries Dept., DDMA, Panchayats, ULBs, Industries, Industrial Associations	• Identification of shelters with basic facilities like drinking water and first aid for chemical exposure • Ensuring water storage facilities and sources for water for accident containment and firefighting operations • Providing wide roads and multiple routes in the industrial area to allow quick access by first responders and to ensure escape pathways • Establish decontamination facilities for off-site emergencies of MAH units

3.10.4 Investing in DRR–Non-Structural Measures

Chemical (Industrial) Disasters					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	• Laws, Regulations, Techno-Legal regimes • Enforcement, Compliance and Monitoring • Institutional Arrangements	MoEFCC, CPCB, MoCI, MoMSME, MoLE	Review existing rules, regulations, laws	State/UT, SDMA, DDMA,SPCB, Forest/ Environment Dept., Industries Dept., other relevant departments, Panchayats, ULBs, Industries, Associations	• Formulate rules, norms, and laws such as factories rules consistent with that of ensuring greater safety in hazardous industries and to reduce likelihood of disasters • Empower factory inspectorates to take legal actions for noncompliance of MSIHC Rules • Review rules to grant compensation to chemical accident victims to improve them in favour of victims • Amend land use norms to ensure greater safety and to ensure buffer zones without human settlements in close proximity of hazardous industries • Strengthen the conduct of safety audits and enforcement of disaster prevention norms

Chemical (Industrial) Disasters					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
2	Public Private Partnerships	MoEFCC, NDMA, FICCI, ASSOCHAM, etc.	Guidance	State/UT, SDMA, DDMA, Industries, Associations	Promote private participation in off-site disaster management facilities Provide legal support for Mutual Assistance Groups among industries within clusters Encourage private participation in enhancing off-site disaster response and mitigation

3.10.5 Capacity Development

Chemical (Industrial) Disasters					*Capacity Development*
Major Themes		**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	MoEFCC, CPCB, NIDM, MoCI, MoMSME, MoLE	Training and orientation programs on management and disposal of HAZCHEM	SDMA, State ATIs, SPCB, Industries Dept., DDMA, Panchayats, ULBs, Industries, Associations	Training and orientation programs for state govt. staff, and other direct stakeholders
		NIDM,NDRF, CAPF, Min. of Sports and Youth Affairs, MoD	Incorporating disaster response, search and rescue in in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS	SDMA,SIDM, ATI DDMA, Panchayats, ULBs	Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, civil society, village/ward level leaders
2	Curriculum Development	MoHRD, AICTE, IITs, UGC, NIDM	Promote inclusion of more specializations and electives on HAZCHEM and chemical disaster management	Professional Bodies and Councils in States	Add more specializations and electives on HAZCHEM and chemical disaster management
		MoHFW, IMA	• Review and address gaps in medical education at different levels with respect to emergency medical response • Review the specialization needs in the area of dealing with victims of chemical disasters	State/UT, Health Dept.	Implement the recommendations of reviews in all educational institutions in the state/UT

Chemical (Industrial) Disasters					*Capacity Development*
Major Themes		**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Review and take steps to improve the facilities required to treat victims of chemical disasters		
		Central Boards of Education	Introducing basic DM concepts and precautions related to HAZCHEM	State Education Boards	Introducing basic DM concepts and precautions related to HAZCHEM
3	Awareness Generation	MoEFCC, NDMA,NDRF, CAPF,NIDM,MoCI, MoMSME, MoLE	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Focus on safety and compliance with SOP at workplace for workers	State/UT, SDMA,SDRF, Fire and Emergency Services,Industries Dept., Civil Defence, Police, DDMA, Panchayats, ULBs	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Strengthening network of civil society organizations for awareness generation about DRR and DM • Focus on safety and compliance with SOP at workplace for workers • Information on safety, care and protection of disaster-affected animals

Chemical (Industrial) Disasters					*Capacity Development*
Major Themes		**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Mock Drills/ Exercises	MoEFCC, NDMA,NDRF,All Government Ministries/Agencies,Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in the all States/UTs	State/UT, SDMA,Industries Dept., SDRF, Fire and Emergency Services, Civil Defence, Police,DDMA,Panchayats, ULBs, Industries, Associations	Joint planning and execution of emergency drills
5	Empowering women, marginalised, and persons with disabilities	NDMA, NIDM	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	State/UT, SDMA,SIDM,ATI,and other state-level institutions, DDMA,Panchayats, ULBs	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
6	Community-Based Disaster Management	NDMA, NIDM, MoRD, MoUD	Promotion,Guidance, and Support	States/UTs, SDMA, DDMA,Panchayats, ULBs	• Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

3.11 Nuclear and Radiological Emergencies Risk Mitigation

3.11.1 Understanding Risk

Nuclear and Radiological					*Understanding Risk*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Monitoring and warning network Strengthening Radiation Monitoring	DAE, MHA, MoD	Establish set ups for monitoring, warning including IERMON system network Strengthening radiation Monitoring and Detection Systems in the Public Domain	SDMA, DDMA	Follow and support the safety and regulatory requirements
2	Setting up reliable and dedicated communication network	NDMA	To set up reliable and dedicated communication network at the national level for the last mile connectivity	State/UT	To extend logistics
3	Establish monitoring mechanism to prevent illicit movement of radioisotopes	DAE, MHA, MoD, Port Authorities	Install radiation detectors at all identified locations at border posts, and ports.	State/UT	Coordination with and support to central agencies

3.11.2 Inter-Agency Coordination

Nuclear and Radiological					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Overall disaster governance	DAE	Nodal ministry – providing coordination, technical inputs, and support	SDMA, CoR, Revenue Dept., Health Dept., DDMA, Panchayats, ULBs	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
2	Response	DAE, MHA	Nodal ministry for central assistance	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Organising the immediate response and seeking assistance of central agencies
3	Warnings, Information, Data	DAE, MHA, NEC, NDMA	Quick, clear, effective dissemination among central and state agencies	SDMA, CoR, Revenue Dept., DDMA, Panchayats, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	AERB, BIS	• Revised/ Updated rules, norms, and codes	SDMA, CoR, Revenue Dept., DDMA, Panchayats,	Adapting the norms/ codes as per State's requirement, enforcement, monitoring

Nuclear and Radiological					*Inter-Agency Coordination*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• New/Updated standards • Review and improve laws, regulations and policies	ULBs	

3.11.3 Investing in DRR–Structural Measures

Nuclear and Radiological					*Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Shelters	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Technical support	State/UT, SDMA, DDMA, Panchayats, ULBs	• Identification of safe buildings and sites to serve as temporary shelters near nuclear installations • Construction of multi-purpose shelters near nuclear installations • Ensure compliance with relevant building codes
2	• Decontamination centres • Strengthen protection systems of nuclear facilities	DAE	Strengthen physical protection systems along with proper inventory and control procedures of the radiation sources	State/UT, SDMA, DDMA, Panchayats, ULBs	Coordination with and support to central agencies

3.11.4 Investing in DRR - Non-Structural Measures

Nuclear and Radiological					*Non-Structural Measures*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Setting of safety standards and other safety and regulatory documents	AERB DAE	Prepare safety and regulatory documents for all nuclear/ radiological applications, transport, safe custody, waste handling, personal safety, medical aspects etc.	State/ UT	To follow the requirements
2	Improve regulatory cover	AERB	To set up regional regulatory centres for better coverage of safety and regulatory aspects	State/ UT	To enforce compliance
3	Public Private Partnerships	NDMA, DAE	Guidance	State/UT, SDMA, DDMA	Promote private participation in disaster management facilities

3.11.5 Capacity Development

Nuclear and Radiological					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Training	MHA, DAE,NDRF, CAPF Users of nuclear/radiological facilities including industries, hospitals	Enhancing public awareness on nuclear/radiological application, safety. Training of first responders, staff	SDMA, DDMA, Civil Defence, Panchayats, ULBs,	Training of state police, civil defence
		MOH&FW, NDMA, MHA DAE	Training of medical and paramedics on various aspects of medical management of radiological events	State/UT, DDMA, Panchayats, ULBs,	To follow and comply
2	Curriculum Development	MoHRD	Relevant subjects should be included in the school/college syllabus throughout the country	State/UT, SDMA	To follow the same
3	Awareness Generation	DAE, NDMA, NDRF, CAPF, NIDM	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	State/UT, SDMA,SDRF, Fire and Emergency Services, Civil defence, Police, DDMA, Panchayats, ULBs	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on safety, care and protection of disaster-affected animals

Nuclear and Radiological					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Mock Drills/ Exercises	DAE, NDMA, NDRF, All Government Ministries/ Agencies, Armed Forces, CAPF	Promoting the planning and execution of emergency drills by all ministries and in all States/UTs		Joint planning and execution of emergency drills
5	Developing Capability for response	MHA, NCMC, DAE, MOD, AERB	Prepare a national plan for nuclear and radiological emergencies	SDMA	Develop State and district plans
		MHA, MOD, DAE	• Prepare nuclear/radiological emergency management plan for metros and other important cities • Surveillance at vulnerable locations and early detection capabilities	SDMA, DDMA, Panchayats, ULBs, State (Police)	Follow the MHA, DAE guidelines, Acquire detection capabilities.
		Ministries/ Departments	Prepare own plans in line with the national plan	State/ UT, SDMA	Prepare own plans in line with the national plan
6	Prepare comprehensive plan on medical management	MOH&FW, DAE, MoD	Prepare plan on nuclear/radiological emergency on site, off-site and public events	State/UT, SDMA, DDMA, Panchayats, ULBs	To follow and ensure compliance
		MoH&FW, DAE	Provide guidance	State/UT, SDMA, DDMA, Panchayats, ULBs	To establish tertiary care hospitals for treatment of radiation injuries Establish primary and secondary care hospitals of adequate capacity at select cities.
7	Preparedness	NDRF, CAPF, DAE, MoH&FW	Maintain adequate stock of radiation detection, monitoring instruments, safety kits, first aid medicines	SDMA, DDMA, Police	To equip the health and police dept. appropriately
		DAE, NDRF	Adequate number of ERCs should be set up across the country for covering of any event in reasonable time		
		MoUD	To identity the places/buildings such as community buildings/schools/hospitals for use as emergency shelters	SDMA DDMA	To help identify the locations and ensure that evacuation plans are in place

Nuclear and Radiological					*Capacity Development*
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		MoAFW, FCI, MoH&FW	Provision for food, water, medicines and other relief materials should be made at the shelters for the affected public	State/UT, DDMA, Panchayats, ULBs	Provision for same
		MoH&FW DAE DRDO	Setting up of at least one mobile radiological laboratory unit in each district and at least two such units in each metropolis	State/UT, DDMA, Panchayats, ULBs	To provide support for setting up of mobile radiological laboratories
		MoH&FW, AERB, MHA, NDMA	Appoint, and maintain area wise details of radiological safety officers, trained medical personnel, first responders, trained volunteers etc.	State/UT, SDMA, DDMA, Panchayats, ULBs	To maintain the data district wise

3.12 Fire Risk Mitigation

Note: Unlike other sub-sections, the focus of the matrix for fire risk mitigation is on Fire and Emergency Services and, therefore, it is in a different format.

Fire					
	Major Theme	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	Understanding Risk	MHA, MoEFCC, Other relevant Ministries/ Departments	Technical support	State/UT, SDMA and departments, ULBs, Environment/ Forest Dept., Panchayats	• Applying the classification system for hazardous industries in rural and urban areas on the basis of norms laid down by the SFAC for fire services • Vulnerability analysis of densely population clusters prone to high risk of fire • Mapping of hazardous sites that pose fire and explosion risks • Assess and fix the requirement of equipment and manpower • Identifying areas prone to forest fires and take preventive measures
2	Capacity Development	MHA, MoEFCC, Other relevant Ministries/ Departments	Technical support	State/UT,SDMA, CoR, Revenue Dept., and departments, ULBs	• Identify the gaps in existing capabilities, equipment, infrastructure, and human resources • Address the capability gaps – human, institutional, infrastructure, equipment, personal protective equipment • Action plan for modernization and meeting future needs • Strengthening and standardizing response mechanisms • Proper scaling of equipment • Procurement of equipment for firefighting, urban search and rescue as per the requirement • Establish fire stations/ posts up to the sub-divisional level to the block level • Enhance the multi hazard response capabilities taking into account local hazards and vulnerabilities
3	Enforcement of Fire Safety Rules and Regulation	MHA, MoEFCC Other relevant Ministries/ Departments	• Provide Support • Frame model rules, laws, guidelines	State/UT, line departments, ULBs	• Enactment of Fire Act and other legal measures as per recommendations of SFAC and other official bodies • Institutional reform and major changes in organizational set up • Legal regime for mandatory fire clearance from FES for different types of buildings, colonies, industries and other installations • Strict implementation of fire safety rules • Strict procedures for fire safety certification should be followed before issuing building use permissions • Ensure frequent inspection for fire safety system and equipment in public utilities

Fire					
	Major Theme	**Central/ State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Awareness Generation	MHA,NDMA, NIDM,MoEFCC, Other relevant Ministries/ Departments	Provide support	State/UT, SDMA, SIDM, ATI,Civil Defence, line departments, ULBs, Panchayats	• Promoting culture of awareness, alertness and preparedness • Awareness generation programs for public, utilities, ULBs, Panchayats, and industries • IEC materials and ensure wider disseminate to general public through all medium • Information on safety, care and protection of disaster-affected animals
5	Training	MHA,NDMA, NIDM, NDRF, Other relevant Ministries/ Departments	Basic training on disaster management Training of Trainers (ToT) programs on various aspects such as firefighting, managing collapsed structure, and search and rescue	State/UT, SDMA, SIDM, AIT, SDRF and line departments	• Basic training on disaster management • Training of Trainers (ToT) programs on various aspects such as firefighting, managing collapsed structure, and search and rescue
6	Risk Transfer	MHA, MoEFCC, MoF, Other relevant Ministries/ Departments	Encourage multi-hazard insurance for life and property of the people	State/UT,Finance Dept. and concerned line departments of the State	Encourage multi-hazard insurance for life and property of the people

4 Preparedness and Response

4.1 Background

Response measures are those taken immediately after receiving early warning from the relevant authority or in anticipation of an impending disaster, or immediately after the occurrence of an event without any warning. The primary goal of response to a disaster is saving lives, protecting property, environment, and meeting basic needs of human and other living beings after the disaster. Its focus is on rescuing those affected and those likely to be affected by the disaster. The UNISDR defines response as "the provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected."

Preparedness, as defined by UNISDR, consist of "the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions." Based on the preparedness, the response process begins as soon as it becomes apparent that a disastrous event is imminent and lasts until the disaster is declared to be over. It is conducted during periods of high stress in highly time-constrained situations with limited information and resources. It is considered as the most visible phase amongst various phases of disaster management. Response includes not only those activities that directly address the immediate needs, such as search and rescue, first aid and temporary shelters, but also rapid mobilization of various systems necessary to coordinate and support the efforts. For effective response, all the stakeholders need to have a clear vision about hazards, its consequences, clarity on plans of action and must be well versed with their roles and responsibilities.

Any emergency requires a quick response to save lives, contain the damage and prevent any secondary disasters. In most cases, first responders such as members of Incident Response Teams (IRT) of district, block, or other agencies (medical fire, police, civil supplies, municipalities) manage emergencies immediately at the local level. If an emergency escalates beyond their capabilities, the local administration must seek assistance from the district administration or the State Government. If State Government considers it necessary, it can seek central assistance.

The CCS deals with issues related to defence of the country, law and order, and internal security, policy matters concerning foreign affairs that have internal or external security implications, and economic and political issues impinging on national security. CCS will be involved in the decision-making if the disaster has serious security implications. The NEC will coordinate response in the event of any threatening disaster situation or disaster where central assistance is needed. The NEC may give directions to the relevant Ministries/Departments of the GoI, the State Governments, and the State Authorities regarding measures to be taken by them in response to any specific threatening disaster situation or disaster as per needs of the State.

The NDMA is mandated to deal with all types of disasters; natural or human-induced. The general superintendence, direction and control of the National Disaster Response Force (NDRF) is vested in and will be exercised by the NDMA. The NCMC will deal with major crises that have serious or national ramifications. These include incidents such as those requiring close involvement of the security forces and/or intelligence agencies such as terrorism (counter-insurgency), law and order situations, serial bomb blasts, hijacking, air accidents, CBRN, weapon systems, mine disasters, port and harbour emergencies, forest fires, oilfield fires, and oil spills.

The immediate response in the event of a disaster lies with the local authorities with the support of the State Government. The Union Government supplements their efforts through providing logistic and financial support, deploying NDRF, Armed Forces, CAPF, and other specialized agencies like in case of CBRN disaster. It will depute experts to assist the State Government in planning and its implementation, during severe natural or human-induced disasters as requested by the State Government.

4.2 Institutional Framework

Chapter-1 provided an overview of the institutional arrangements covering all aspects of disaster management. There are specific tasks, roles and responsibilities in the domain of response, which as mentioned before, is the most critical and time-sensitive aspect of disaster management. This section summarizes the function and responsibilities of Ministries and agencies that have a key role to play in disaster response as per current guidelines. The plan will be updated periodically to reflect any changes in the key roles envisaged to particular ministries or agencies.

No single agency or department can handle a disaster situation of any scale alone. Different departments have to work together to manage the disaster with an objective to reduce its impact. Section 37(a) of the DM Act, 2005 mandates that Departments / Ministries of Central Government prepare disaster management plans keeping mitigation, preparedness and response elements into consideration. Sections 22(2), 24, 30 and 34 of the DM Act, 2005 have clearly laid down various duties relating to DM to be performed by various agencies.

The institutional arrangements for the response system consist of the following elements:

a) Nodal Central Ministries with disaster-specific responsibilities for national-level coordination of the response and mobilization of all the necessary resources
b) Central agencies with disaster-specific responsibilities for Early Warning Systems and alerts
c) National Disaster Response Force (NDRF)
d) State Disaster Response Force (SDRF)

There will be National Emergency Operations Centre (NEOC) known as NEOC-1 under the MHA and NEOC-2 under the National Disaster Management Authority (NDMA). It will be connected to the following control rooms:

- All agencies designated to provide early warning information about hazard events
- State Emergency Operations Centre (SEOC)
- District Emergency Operations Centre (DEOC)
- NDRF
- Integrated Defence Staff (IDS)
- MEA
- CAPFs

4.3 National Early Warning System

4.3.1 Central Agencies Designated for Natural Hazard-Specific Early Warnings

The GoI has designated specific agencies (Table 4-1) to monitor the onset of different natural disasters, set up adequate Early Warning Systems (EWS), and disseminate necessary warnings/ alerts regarding any impending hazard, for all those hazards where early warning and monitoring is possible with the currently available technologies and methods. These agencies provide inputs to the MHA, which will issue alerts and warnings through various communication channels.The

agencies responsible for EWS will maintain equipment in proper functioning order and conduct simulation drills to test their efficacy.

Table 4-1: Central Agencies Designated for Natural Hazard-Specific Early Warnings

	Hazard	Agencies
1	Avalanches	Snow and Avalanche Study Establishment (SASE)
2	Cyclone	India Meteorological Department (IMD)
3	Drought	Ministry of Agriculture and Farmers Welfare (MoAFW)
4	Earthquake	India Meteorological Department (IMD)
5	Epidemics	Ministry of Health and Family Welfare (MoHFW)
6	Floods	Central Water Commission (CWC)
7	Landslides	Geological Survey of India (GSI)
8	Tsunami	India National Centre for Oceanic Information Services (INCOIS)

On their part, the relevant State Government and district administration shall disseminate such alerts and warnings on the ground through all possible methods of communications and public announcements.

4.3.2 Role of Central Agencies/ Departments

The National Emergency Operations Centre (NEOC) will act as the communication and coordination hub during this phase and it will maintain constant touch with early warning agencies for updated inputs. It will inform State Emergency Operations Centre (SEOC) and District Emergency Operations Centre (DEOC) through all the available communication channels and mechanisms. The DM Division of the MHA will communicate and coordinate with designated early warning agencies, various nodal Ministries, and State Governments. It will mobilise reinforcements from the NDRF, Armed Forces and the CAPFs and put together transportation plans for moving resources. The NDMA will support the overall coordination of response as per needs of MHA. The NDMA will be providing general guidance, and take decisions for the deployment of the NDRF. The NDRF will be deployed as required depending on the request from State Government. They will keep the force in operational readiness at all times.

4.4 Coordination of Response at National Level

At the national level, the Central Government has assigned nodal responsibilities to specific Ministries for coordinating disaster-specific responses (Table 4-2). As described in Chapter-1, the NEC will coordinate response in the event of any threatening disaster situation or disaster. The State Government will activate the IRTs at State, District, or block level and ensure coordination with the SEOC. The SDMA will provide the technical support needed to strengthen the response system.

It is essential that the first responders and relief reach the affected areas in the shortest possible time. Often, there are inordinate delays due to real constraints imposed by the location, nature of disaster and, most regrettably, due to inadequate preparedness. In many situations, even a delay of six to twelve hours will prove to be too late or unacceptable. To make matters worse, relief tends to arrive in a highly fragmented or uncoordinated form with multiple organisations acting independently of each other without a cohesive plan, without mechanisms to avoid overlaps and without proper prioritization of different aspects of relief such as shelter, clothing, food, or medicine. From an operational perspective, the challenges are similar across most hazards. The NDMA has formulated IRS Guidelines for the effective, efficient, and comprehensive management of disasters (listed in Annexure-I). The implementation of NDMA's IRS Guidelines by the States will help

in standardisation of operations, bring clarity to the roles of various departments and other agencies, which are common to most disaster response situations.

Table 4-2: Central Ministries for Coordination of Response at National level

	Disaster	Nodal Ministry/ Dept./ Agency	
1	Biological Disasters	Min. of Health and Family Welfare	(MoHFW)
2	Chemical Disasters and Industrial Accidents	Min. of Environment, Forests and Climate Change	(MoEFCC)
3	Civil Aviation Accidents	Min. of Civil Aviation	(MoCA)
4	Cyclone, Tornado, and Tsunami	Min. of Home Affairs	(MHA)
5	Disasters in Mines	Min. of Coal; Min. of Mines	(MoC, MoM)
6	Drought, Hailstorm, Cold Wave and Frost, Pest Attack	Min. of Agriculture and Farmers Welfare	(MoAFW)
7	Earthquake	Min. of Home Affairs	(MHA)
8	Flood	Min. of Home Affairs	(MHA)
9	Forest Fire	Min. of Environment, Forests and Climate Change	(MoEFCC)
10	Landslides and Avalanche	Min. of Home Affairs	(MHA)
11	Nuclear and Radiological Emergencies	Dept. of Atomic Energy, Min. of Home Affairs	(DAE,MHA)
12	Oil Spills	Min. of Defence/Indian Coast Guard	(MoD/ICG)
13	Rail Accidents	Min. of Railways	(MoR)
14	Road Accidents	Min. of Road Transport and Highways	(MoRTH)
15	Urban Floods	Min. of Urban Development	(MoUD)

The state and district administration shall identify sites for establishment of various facilities as mentioned in the IRS guidelines such as Incident Command Post, relief camp, base, staging area, camp, and helipad, for providing various services during the response. The state and local administration must widely disseminate and publicise information about these arrangements as mandated in the SDMP and DDMP. Since disaster response operations are multifaceted, time-sensitive, extremely fast-moving, and mostly unpredictable, it requires rapid assessment, close coordination among several departments, quick decision-making, fast deployment of human resources and machinery as well as close monitoring. In order to prevent delays and to eliminate ambiguities with regard to chain of command, the SDMP and DDMP must clearly spell out the response organisation as per IRS. These plans must clearly identify the personnel to be deputed for various responsibilities in the IRT at various levels of administration along with proper responsibility and accountability framework. Provision for implementation of unified command in case of involvement of multiple agencies such as Army, NDRF, CAPF, and International Urban Teams Search and Rescue must be spelt out in the SDMP. From time to time, the DM plan must be tested and rehearsed by carrying out mock exercises.

4.5 Fire and Emergency Services (FES)

The primary role of Fire and Emergency Service (FES) is of responding to fire incidents. However, besides fire fighting, FES attends to other emergencies such as building collapse, road traffic accidents, human and animal rescue, and several other emergency calls. FES also takes part in medical emergencies. The role of FES has become multi-dimensional. The role of FES extends to the domain of prevention, especially in urban areas. FES is an integral part of the group of agencies responding to disaster situations. FES is one of the first responders during the Golden Hour after a

disaster and plays a vital role in saving lives and property. Therefore, it is imperative to adequately equip and develop the capacities of FES. Further, continuous training should also be provided to the fire staff in using and maintaining the equipment.

FES is a key element in the emergency response system. It comes under the 12thschedule of the Constitution dealing with municipal functions. At present, States and UTs, and ULBs are managing the FES. The MHA and NDMA will render technical advice to the States, UTs, and Central Ministries on fire protection, prevention, and related legislation. While in several States, FES is under the jurisdiction of Municipal Corporations, in others it is under the respective Home Department. Only a few States have enacted their own Fire Act. As on today, there is no standardization with regard to the scaling of equipment, the type of equipment, or the training of their staff. In each State it has grown according to the initiatives taken by the States and the funds provided for the FES. Government of India has taken many initiatives to strengthen the techno-legal regime for fire safety. Apart from initiating major legal changes, Government is also reviewing many laws that have to be amended. Government of India has also taken steps for institutional reforms and organizational restructuring of FES. However, it is the responsibility of the State Governments to implement the major changes for the modernization of the FES to make them more effective.

4.6 Responding to Requests for Central Assistance from States

Catastrophic disasters like earthquakes, floods, cyclones and tsunami result in a large number of casualties and inflict tremendous damage on property and infrastructure. The Government of India has established a flexible response mechanism for a prompt and effective delivery of essential services as well as resources to assist a State Government or Union Territory severely hit by a disaster. Disaster management is considered as the responsibility of the State Governments, and hence the primary responsibility for undertaking rescue, relief and rehabilitation measures during a disaster lies with the State Governments. The Central Government supplements their efforts through logistic and financial support during severe disasters as requested by the State Governments. Responding to such emergencies stretches the resources of district and State administration to the utmost and they may require and seek the assistance of Central Ministries/ Departments and agencies like the NDRF, Armed Forces, CAPF, and Specialized Ministries/ Agencies.

4.7 Management of Disasters impacting more than one State

At times, the impact of disasters occurring in one State may spread over to the areas of other States. Similarly, preventive measures in respect of certain disasters, such as floods, etc. may be required to be taken in one State, as the impact of their occurrence may affect another. The administrative hierarchy of the Country is organized in to National, State and District level Administrations. This presents challenges in respect of disasters impacting more than one State. Management of such situations calls for a coordinated approach, which can respond to a range of issues quite different from those that normally present themselves – before, during and after the event. The NCMC will play a major role in handing such multi-state disasters. The NDMA will encourage identification of such situations and promote the establishment of mechanisms for coordinated strategies for dealing with them by the States and Central Ministries, departments and other relevant agencies.

4.8 Major Tasks and the Responsibilities: Centre and State

While there are disaster-specific aspects to the post-disaster response, the emergency functions are broadly common to all disasters and there are specific ministries, departments, or agencies that can provide that emergency response. Besides, very often, there are multiple hazards and secondary disasters that follow a major disaster. Hence, response intrinsically follows a multi-hazard approach.

Therefore, all the response activities have been summarized in a single matrix applicable to all types of disasters. The response responsibility matrix specifies the major theme of response. It specifies the agencies from the Central and State Government responsible for the major theme of response. All agencies responsible for response should follow the NDMA's IRS guidelines, which will help in ensuring proper accountability and division of responsibilities. Different ministries and departments have to provide specialized emergency support to the response effort. Certain agencies of Central Government will play a lead role, while others will be in a supporting role. The SDMA, CoR , or the Dept. of Revenue is the nodal agency at the state level for coordination of response. The DDMA is the nodal agency for coordination of response at District level. Various central ministries, departments, agencies, and state governments have to prepare their own hazard specific response plans as per guidelines of the NDMA and in line with the NDMP. They need to ensure preparedness for response at all times and must carry out regular mock drills and conduct tests of readiness periodically, and the ministries/ departments must report the status to the NDMA. The major tasks of response given in the responsibility matrix are:

1. Early Warning, Maps, Satellite inputs, Information Dissemination
2. Evacuation of People and Animals
3. Search and Rescue of People and Animals
4. Medical care
5. Drinking Water / Dewatering Pumps / Sanitation Facilities / Public Health
6. Food & Essential Supplies
7. Communication
8. Housing and Temporary Shelters
9. Power
10. Fuel
11. Transportation
12. Relief Logistics and Supply Chain Management
13. Disposal of animal carcasses
14. Fodder for livestock in scarcity-hit areas
15. Rehabilitation and Ensuring Safety of Livestock and other Animals, Veterinary Care
16. Data Collection and Management
17. Relief Employment
18. Media Relations

4.9 Responsibility Matrix for Preparedness and Response

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	**Early Warning, Maps, Satellite inputs, Information Dissemination**	**Lead Agencies:** IMD, CWC, INCOIS, SASE, GSI, BRO, MoIB, MoES, MoWR, MoAFW, **Support Agencies:** SoI, NRSC, DoT, MHA, NDMA, MoCIT, hazard-specific nodal ministries	• Issue forecasts, alerts, warnings • Provide early warnings (where ever possible) to reduce loss of life and property. • Disseminating warnings and information to all Central Ministries/ Departments/ Agencies and State Government • Use of satellite imageries and other scientific methods for risk assessment and forecasting	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, all other relevant Departments/ Agencies	• To disseminate early warning signals to the district administration, local authorities, and the public at large in the areas likely to be affected by a disaster so as to reduce loss of life and property • Dissemination of warnings and information up to the last mile • Ensure appropriate compilation/ analysis of received data • Use of satellite imageries and other scientific methods for risk assessment and forecasting
2	**Evacuation of People and Animals**	**Lead Agency:** MHA **Support Agencies:** MoD, CAPF, MoRTH, MoR, MoCA, ministries/ depts. with hazard-specific responsibilities, NDRF, Civil Defence	On request, support the affected state government in evacuation of people and animals from areas likely to be affected by major disaster <u>Special situations:</u> • Evacuation of large numbers of people from far flung areas and islands (e.g., Andaman and Nicobar Islands, Lakshadweep Islands, etc. in cases of cyclone) • Evacuation of visitors/pilgrims stranded in remote Himalayan regions on account of inclement weather, landslides, flash floods and avalanches • Evacuation of fishermen from the high seas	State/UT, SDMA, Revenue Dept., CoR, SEOC, FES, DDMA, all other relevant Departments/ Agencies, SDRF, Civil Defence	• Quick assessment of evacuation needs such as the number of people and animals to be evacuated and mode of evacuation • Mobilize transport and resources for evacuation • Identify and prepare sites for temporary relocation of affected people and animals • Identify requirements of resources for evacuation such as helicopters, aircrafts, high speed boats and ships to be provided to the affected state government • Request for central resources, if needed

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			in case of a cyclone		• Coordinate with central agencies to mobilise required resources • Monitor the situation • Earmark resources/ units/ battalions of SDRF for quick deployment • Prepare handbook/manuals and SOP for evacuation of people and animals • Undertake review and revise DMPs and SOPs after each major incident • Prepare evacuation plan taking into account local conditions and periodically update it • Undertake mock/simulation drills • Prepare operational checklists • Prepare list of agencies/ organizations who could assist in evacuation • Web-based resource inventory and its regular updates
3	**Search and Rescue of People and Animals**	**Lead Agencies:** MHA, NDMA, NDRF **Support Agencies:** MoD, CAPF, MoHFW, MHA, MoRTH, MoCA, MoR, ministries/ departments with hazard-specific responsibilities, Civil Defence	• Fail safe communication between early warning agencies and EOC of Central and State/ District, Central Min. • Adequate NDRF support in a state of readiness to move at a short notice • MoU with suppliers for blankets, tarpaulins, tents, boats, inflatable lights, torches, ropes, etc. with a condition that they will be supplied at short notice (usually within 24 hours) from the placement of order • SOPs for sending rescue/ relief material from other adjoining States to the affected state immediately • Support of Armed Forcesand CAPFas per requirement	State/UT, SDMA, Revenue Dept., CoR, SEOC, SDRF, FES, DDMA, all other relevant Departments/ Agencies, Civil Defence	• Various positions of IRTs (State, District, Sub-division and Tehsil) are trained and activated for response at their respective administrative jurisdiction • SDRF teams are trained, equipped and ready to move at a short notice to the affected areas • Strategic stationing of state of the art equipment for search, rescue and response with dedicated trained manpower • MoU is in place with suppliers for blankets, tarpaulins, tents, boats, inflatable lights, torches, ropes, etc. with a condition that they will be supplied

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
					quickly at short notice (usually within 24 hours) • Nodal officer selected for coordination is in regular touch with MHA/NDMA for additional requirements (including help from other Central Ministries)
4	**Medical Care**	**Lead Agencies:** MoHFW **Support Agencies:** MoD, CAPF, MoR	• Medical assistance to the affected state in response to its request for post-disaster emergency medical care • Mobile Field Hospitals similar to the military field units that has trauma-care for the disaster-affected and serve as a temporary substitute for the collapsed local general medical and surgical facilities in the disaster zone • Gradual improvement of the field hospital to conform to global standards • Mobile medical care units with OT facility, power sources, dedicated trained staff of doctors, and paramedics who could be immediately summoned at the time of emergency • Mobile medical support units stocked with medicines usually needed such as those for BP, diabetics, heart problems, common ailments, etc. as well as provisions such as: bleaching powder, chlorine tablets; nutritional supplements catering to specialized groups such as lactating mothers, elders, and children below 6. • Timely technical support to the State Governments for restoration of damaged hospitals as well as infrastructure	State/UT, SDMA, Revenue Dept., CoR, SEOC, SDRF, FES, DDMA, Health Dept., all other relevant departments, Civil Defence	• Health and Family Welfare Dept. works with the logistic section of the state level IRT to provide effective services (Medical Unit) to the field level IRTs for response. • District wise repository of hospitals (both Government and Private), availability of beds, doctors, paramedics and other trained staff available along with other infrastructure details and update it on a regular basis • Include the hospital wise information in the DM Plans at local levels • Tie-up with the companies for easy availability of common medicines during the emergency situations • Hygienic conditions are prevalent at all times in various facilities established as well as hospitals to curb the spread of diseases • Establishment of sound protocols for coordination between state's health Dept. and the central agencies • Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			• Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005		
5	**Drinking Water/ Dewatering Pumps/ Sanitation Facilities/ Public Health**	**Lead Agency:** MoDWS, MoFPI **Support Agencies:** MoWR, MoRD, MoHFW, MCAFPD	• Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 • Assist the respective state government in providing disaster-affected areas with clean drinking water and to prevent the spread of water borne diseases • Assist affected state to address the public health needs so as to prevent and mitigate a sudden outbreak of epidemic, water and food contamination as well as other public health-related problems in the aftermath of a disaster • MoU is in place with vehicle manufacturers for vehicle mounted RO Systems with integrated power source and pouch facility with a condition that system should be in place usually within 6 hours of placing order. • Easy availability of chlorine tablets to the State Government on demand. • MoU is in place with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 12 hours of request • Quick availability of hygienic portable toilets through pre-disaster agreements/ contracts with suppliers • Quick availability of packaged drinking	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, WRD, Water Supply and Sanitation Dept., Health Dept.all other relevant Departments/ Agencies, Civil Defence	• Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 • Provide disaster-affected areas with clean drinking water and to prevent the spread of water borne diseases • Provide emergency water supplies when there is scarcity of potable water • Respond to the public health needs so as to prevent and mitigate a sudden outbreak of epidemic, water and food contamination as well as other public health-related problems in the aftermath of a disaster • Dept. of Water Resources and Drinking Water and Sanitation works with the logistic section of the state level IRT to provide effective services to the field level IRTs • Necessary arrangements are made for supplying drinking water through tankers • Necessary arrangements are made for supplying chlorine tablets • MoU is in place with vehicle manufacturers for vehicle mounted RO Systems with integrated power source and pouch facility with a condition that system should be in place usually within 6 hours of placing order • MoU is in place with companies for

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			water through pre-contracts with suppliers • As per request from State/UT, assist in organizing emergency water supplies when there is scarcity of potable water		providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 6 hours of request • Availability of hygienic portable toilets and bleaching powder through pre-disaster agreements/ contracts with suppliers
6	**Food& Essential Supplies**	**Lead Agencies:** MoCAFPD, MoFPI **Supporting Agencies**: MoRTH, MoCA, MoR, MoSJE, MHA, FCI	• Ensure availability of adequate and appropriate food supplies to the disaster-affected areas • Immediate availability of ready-to-eat/ pre-cooked food/ meals • Deploying transport with essential supplies at strategic locations • MoU with suppliers to provide required quantities of family packs of essential food provisions • Special provisions to address the needs of infants/ small children (baby food) • FCI godowns are able to supply required food grains as per requirement of disaster affected areas	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA,Food and Civil Supply Dept., all other relevant Departments, Civil Defence	• Dept. of Food and Civil Supply works with the logistic section of the state level IRT to provide effective services to the field level IRTs for response • Agreements/MoUs with organisations, trusts, and firms for setting up community kitchens in the affected areas • Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the supplies reach the site on time • Deploy a dedicated team at the local level to receive the supplies, maintain log (manual or computerized), and distribute them at required locations • Food godowns have sufficient food materials and not situated at vulnerable location
7	**Communication**	**Lead Agencies:** MoCIT, DoT **Support Agencies:** MoR, MoCA, MoD, Telecom	• Detailed plans for fail safe communication with all the early warning agencies (such as IMD, CWC, etc.) and Control Rooms (Central/ State) for getting accurate information at regular intervals • Restoration of emergency communication in disaster affected areas	State/UT, SDMA, Revenue Dept., COR, SEOC, DDMA,InformationDept.,all other relevant departments	• Failsafe communication plan is prepared with all early warning agencies • Logistic section of the state level IRT coordinates with central agencies to provide effective communication support to the field level IRTs for response. • State and district EOCs are equipped

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		Providers	• Emergency response teams to be in place with detailed technical plans to restore communication after the occurrence of a disaster • Provide a dedicated radio frequency for disaster communications • Mobile communication units fitted with V-SAT terminals, VHF repeaters, reserve WT VHF Sets, portable mobile towers, etc. • Contingency plans including pre-disaster contracts with suppliers – government and private– for easy availability of resources at the time of emergency • Operational plan for establishing temporary telecommunication facilities in the affected areas jointly with the State Government • Secure, failsafe communication network among Central, State and other Control Rooms for exchanging reliable and authentic information about the affected areas, and resource mobilization • Prepare, update and maintain a State wise list of HAM Operators who could be contacted and deployed at the site of emergency when all other modes of communication fails • Inter-Operability (the ability of emergency responders to communicate among jurisdictions, disciplines, and levels of government using a variety of frequency bands, as needed and as authorized) of mobile service providers		with satellite phones/ VHF/ HF as a backup to the landline • All communication equipment, especially the satellite phones are in good working condition 24x7 on all days through regular testing • Plans for communication including telephone and HAM is prepared for smooth coordination with the field level IRTs • Establish protocols and responsibilities for coordinating with central agencies and various service providers • Prepare, update and maintain a District wise list of HAM Operators who could be contacted and deployed at the site of emergency • Have binding agreements with telecom service providers to restore damaged facilities and set up temporary facilities on emergency basis • Ensure Inter-Operability among different telecom service providers

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
8	**Housing and Temporary Shelters**	**Lead Agencies:** MoHUPA, MoUD, MoRD **Support Agencies:** MHA, MoRTH, CBRI, HUDCo, MoR, BMTPC	• Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 • Assist the respective state government in the task of providing temporary, safe, hygienic and secure living spaces to meet the needs of people in disaster-affected areas • Providing shelters/ tents to the affected population • Setting up of relief camps and catering to the needs of the responders • Prior and long-term tie-up with pre-fab shelter manufacturers/ suppliers, and tent manufacturers to provide shelters at the site usually within 24 hours of placement of orders • Establish regional logistic facilities (*covering 5 major regions in the country*) that are well-coordinated with the corresponding NDRF regional unit to maintain stocks of temporary shelters, tents and other non-food resources	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA,UDD., all other relevant Departments	• Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 • Logistic section of the state level IRT must coordinate with Railways to provide effective services to the field level IRTs for response • Alternate places for establishment of facilities as mentioned in the IRS guidelines such as relief camp, base, camp etc. are identified in advance and included in the local DM Plan • Identify shelter suppliers for supply of tents/ shelters up to the village level and enter into an MoU for supply at short notice (usually less than 24 hours) as per requirement • Stockpile tents, tarpaulins and temporary shelter material in regional warehouses/ stores/ ERCs • Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the tents/ shelters reach the site on time • Deploy a dedicated team at the local level to receive the tents/ shelters • Maintain logs (manual or computerized) of all material movements and details of distribution to required locations
9	**Power**	**Lead Agencies:** MoP **Support**	• Assistance to the respective state government in repairing power infrastructure; restore power supply in the disaster-affected areas; help power	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA,Electricity Board, Power Distribution	• Electricity Board and Power Distribution Companies work with the logistic section of the state level IRT to provide effective services to the field level IRTs for

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		Agencies: MoNRE, MoPNG, Power generating/ distribution companies	companies in establishing emergency power supply • Arrangements of alternate sources of power such as generator sets, solar lanterns, portable tower lights, etc. until resumption of normal power supply • MoU is in place with suppliers for required supplies usually within 24 hours of placement of order • Technical support to the State Government for restoration of power supply as well as infrastructure on request	Companies,all other relevant Departments	response • Pre-disaster arrangements for quick restoration of power supply with alternate mechanisms to critical facilities usually within 6 to 12 hours of placement of order • Pre-disaster agreements with central and neighbouring state governments for technical support in restoration of power supply and infrastructure • Mobile power supply units or other arrangements with power generation companies for quick deployment at the site during emergency
10	**Fuel**	**Lead Agencies:** MoPNG **Support Agencies:** MoD, MoR, MoRTH, MoCA	• Petrol pumps are functional and adequate petrol, oil and diesel are available to Government for relief, rescue and general public • Adequate supply of petrol, diesel, kerosene and LPG Gas in the affected areas in close coordination with the State Government for general public as well as emergency responders/equipment • Quick mobilization of fuel in hilly areas to avoid delays caused by complex supply chain to such areas	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, Civil Supply Dept.,all other relevant Departments	• Logistic section of the state level IRT to coordinate with the relevant departments/ agencies to provide effective services (Ground Support Unit) to the field level IRTs for response • Assess and indicate clear requirement of fuel to the Central Ministry and coordinate the delivery of fuel through local arrangements. • Ensure sufficient availability of tankers/ other vehicles for local transportation through the relevant Dept. • Establish mechanism for stocking the fuel at strategic locations with relevant agencies
11	**Transportation**	**Lead Agencies:** MoRTH, MoR, MoCA	• Adequately address the post-disaster transportation needs to ensure that the emergency response and recovery efforts are carried out in a timely manner; restore	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA,Transport Dept., Forest/ Environment Dept.,	• Dept. of Transport works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) to the field level IRTs for response

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		Support Agencies: MHA, MoD, NHAI, IWAI, NDRF, MoHFW	the public transport; resumption of the movement of essential goods • Pool heavy duty earth moving machineries, tree cutters, fork lifters and other required equipment either at strategic locations or centralized • Quick deployment of resources and equipment for quick repairs/ restoration of roads and highways for movement of rescue and relief teams with their supplies • Operational plans are in place to transport heavy machinery (like dewatering pumps, boats, etc.) through road in close coordination with the relevant Ministries • Operational plans are in place for quick restoration of train services, providing additional railway wagons, containers and passenger coaches for movement of relief supplies/rescue equipment and personnel and shifting affected population to safer places/ shifting stranded passengers in consultation with State Government • Availability of diesel locomotives and drivers in disaster-affected areas where power is disrupted/ shut as a preventive measure; maintain a live roster of such emergency support systems which can be mobilized at very short notice by periodic review of readiness • Establishment of emergency services group within the railways with staff having experience of working in disaster situations • Contingency plan is in place to deploy rail	PWD,Railways, Airport Officer, all other relevant Departments	• Requirement of transport for the sending the relief material, responders are arranged • Need of the transport of various activated section of the IRT as per Incident Action Plan is fulfilled • Indian Railway works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) • Restoration of railway tracks and functioning of railway at the earliest • Coordinate with Central Govt. for transportation of relief materials • Within and near Airports: AAI works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) and also provide Nodal Officer for coordination of the relief operations • Restoration of Airport at the earliest involving specialised response force of the central government • Coordination with state and district administration to provide air support • Cater to the needs of transporting affected people if required

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			coaches as makeshift shelters if required • Activation of railway hospitals/ mobile rail ambulances to shift/ treat injured patients in consultation with the Health Ministry • Easy availability of heavy equipment available with the Railways for search and rescue • Plan is in place for quick restoration of airport runway and restoration of air traffic for facilitation of transport of relief teams/ supply/ equipment, stranded passengers, etc. • Control room gets activated for smooth coordination in receiving and dispatching resources and equipment in close coordination with the State Government • Availability of trained manpower for making night landing during emergencies • Availability of Air Ambulances at strategic locations with trained manpower and equipment in close coordination with the Health Dept.		
12	**Relief Logistics and Supply Chain Management**	**Lead Agencies:** MHA, ministries with hazard-specific responsibilities, NDMA **Support Agencies:** MoD, MoR, MoRTH, MoCA, MoCAFPD,	• Provide necessary support to the disaster-affected state government for organizing logistics for the availability of relief and emergency supplies of food, medical, and non-food materials • Support for emergency supply of food and in some cases drinking water; first aid kits; temporary shelters, relief supplies • Make a rapid assessment of emergency relief needs in consultation with the affected state government	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, all other relevant Departments/ Agencies	• Establish a mobilisation centre at the airport/railway station for the movement of relief supplies within the state • Deploy special transport mechanism for the movement of relief supplies within the state • Make arrangements to receive and distribute relief and emergency supplies received from different parts of the country • Coordinate transportation (air, rail, road,

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		MoFPI, MoAFW	• Establish a mobilisation centre at the airport/railway station for the movement of relief supplies • Deploy special transport mechanisms for the movement of relief supplies • Coordinate transportation of material from different parts of the country, and coordinate and provide relief supplies from neighbouring states • Coordinate transportation (air, rail, road, water) for other Central ministries/departments/agencies • Locate, procure and issue resources to Central agencies involved in disaster response, and supply to the affected state • Adopt alternative means of transportation for swift delivery of relief supplies to the affected state/district		water) with Central ministries/ departments/ agencies • Arrange alternative means of transportation to send relief supplies to the affected locations if normal transport cannot reach
13	**Disposal of animal carcasses**	**Lead Agencies:** MoAFW, DoAHDF **Supporting Agencies:** MHA, MoHFW	• Detailed plans for close coordination with the State Government for managing the removal/ disposal of carcass of animals from the affected areas as soon as possible • Proper safety kits are available with the staff deployed in carcass disposal so that they are not infected	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, AHD,Agriculture Dept.,Police Dept.,all other relevant Departments	Equip and train the staff in carcass removal/ disposal at pre-identified sites to ensure that no other health hazard is created both for the staff as well as general public
14	**Fodder for livestock in scarcity-hit areas**	**Lead Agency:** MoAFW, DoAHDF **Support Agencies:** MoRTH, MoR	• When required, mobilize fodder and cattle feed to meet shortages, as in drought or scarcity conditions • Transport fodder from storage facilities or distant areas to the scarcity-hit areas • Organize fodder resource and mobilisation centres • Enlist PSUs and private agencies for	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, Forest/ Environment Dept., Agriculture Dept., AHD, Animal Welfare Organizations	• Mobilize fodder and cattle feed to meet shortages, as in drought or scarcity conditions • Transport fodder from storage facilities or collection centres to the scarcity-hit areas • Organize collection centres for fodder and cattle feed

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
			providing fodder and other support		• Enlist PSUs and private agencies for providing fodder and other support
15	**Rehabilitation and Ensuring Safety of Livestock and Other Animals, Veterinary Care**	**Lead Agency:** MoAFW, DoAHDF **Support Agencies:** MoRTH, MoR	• Support the setting up of livestock camps/ shelters for animals in distress due to disasters, including drought • Provide assistance for care of animals in the camps/ shelters • Assist State/UT in the proper management, and running of livestock camps/ shelters • Assist in proper rehabilitation of animals • Supplement the needs of State/UT to provide veterinary care to disaster-affected livestock, including drought-hit areas	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA, Forest/ Environment Dept., Agriculture Dept., AHD, Animal Welfare Organizations	• Include provisions for evacuation, safety, and rehabilitation of animals in SDMP • Set up of livestock camps/ shelters for animals in distress due to disasters, including drought • Organize proper care of animals in the camps/ shelters • Ensure proper management and running of livestock camps/ shelters • Proper rehabilitation of animals • Provide veterinary care to disaster-affected livestock, including in drought-hit areas
16	**Data Collection and Management**	**Lead Agencies:** MHA, NDMA **Support Agencies:** NIDM, MoIB, MoCIT, MoST, MoES, MoWR, MoEFCC, ministries/ departments with hazard-specific responsibilities	• Maintain proper records of all the essential services needed for rescue, response and relief phases, both by the State Governments and by the Central Ministries/ Departments • Establish a sound reporting mechanism to meet the information needs of both Central and State Governments about the disaster response	State/UT, Revenue Dept./ SEOC/ CoR, SDMA, DDMA, Bureau of Economics and Statistics, all other relevant Departments	• Representative of SDMA works with the planning section at state level for making of IAP and dissemination of information. • Creation of a cell at the District level (preferably as part of DEOC) and place dedicated resources to collect/ update data on all essential services (as per the template given in the IRS guidelines) which will help during the response phase for effective reporting and compilation.
17	**Relief Employment**	**Lead Agencies:** MoRD, MoPR, MHA **Support**	• Provide projects to employ people seeking work in drought affected areas as a relief measure • Provide financial support for such schemes	State/UT, Revenue Dept./ CoR, SDMA, DDMA	• Provide opportunities for unskilled work in public works for people seeking work in drought affected areas as a relief measure • Ensure quick and prompt payment of

Preparedness and Response					
	Major Theme	**Central/ State Ministries/ Departments and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
		Agencies: MoLE, MoWR, MoDWS, MoAFW			wages • Carry out health check-up of those seeking work • Draw from various funds including Disaster Response Fund to implement the employment schemes
18	**Media Relations**	**Lead Agencies:** MoIB, MHA, NDMA **Support Agencies:** MoCIT, MoST, MoES, MoWR, MoEFCC, ministries/ departments with hazard-specific responsibilities	• Collect, process and disseminate information about an actual or potential disaster situation to all stakeholders so as to facilitate response and relief operations; update information on disaster and disaster victims; maintain contacts with mass media; inform public regarding the impact of disaster and the measures taken for the welfare of the affected people • Ethical guidelines for disaster coverage by media as per accepted global standards respecting dignity and privacy of the affected communities and individuals and work with media to adopt the guidelines through self-regulation as well as oversight by relevant regulatory institutions • Mechanisms for broadcasting warnings, do's and don'ts etc. to media and public before (if applicable), during and after the disasters • Proper schedule for media briefing (once/ twice/ thrice daily depending on the severity of the disaster) and designate a nodal officer for interacting with media on behalf of the Government	State/UT, SDMA, Revenue Dept., CoR, SEOC, DDMA,Information Dept., all other relevant Departments	• Dept. of Information and Public Relations works with the Command staff as Information and media officer of the state level IRT to provide effective services • Ethical guidelines for coverage of disaster is prepared and shared with all media agencies • Plan is prepared for providing/ broadcasting warnings, do's and don'ts etc. to media and ensure its dissemination

4.10 Plan Activation

National Disaster Management Plan (NDMP) remains in operation during all phases of disaster cycle i.e. mitigation, preparedness, response and recovery. However, NEC may activate disaster response system (partially or fully with all support functions activated based on the situation) on the receipt of disaster warning or upon the occurrence of a disaster. The occurrence of disaster may be reported by the relevant monitoring authorities (both National and State) to the NEC by the fastest means. The NEC will activate emergency support functions including the NEOC, scale of which will commensurate with the demand of situation (size, urgency, and intensity of incident).

The activation sequence for national response in the event of a disaster is as given below:

1. The relevant State Government would assume direct responsibility in the event of a disaster.
2. The MHA would assume direct responsibility in case of Union Territories.
3. The response from Central agencies would come into operation when the relevant State Government makes a specific request for Central assistance, financial, logistical, or resources – including transport, search, rescue and relief operations by air, inter-State movement of relief materials, among others.
4. The direct involvement of Central Agencies will apply to those cases where the GoI has primary jurisdiction: organisation of international assistance, response on high seas, and impact assessment of disasters with the assistance of international agencies, and financial assistance from the National Disaster Response Fund.

5 Strengthening Disaster Risk Governance

5.1 Background

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices (UNDP 2015). UNDP defines disaster risk governance as follows (UNDP 2013):

> "The way in which public authorities, civil servants, media, private sector, and civil society at community, national and regional levels cooperate in order to manage and reduce disaster and climate related risks. This means ensuring that sufficient levels of capacity and resources are made available to prevent, prepare for, manage and recover from disasters. It also entails mechanisms, institutions and processes for citizens to articulate their interests, exercise their legal rights and obligations, and mediate their differences."

The concept has evolved over the last decade and the current thinking acknowledges that one cannot separate governance of disaster risk from the governance of other types of risks, including those associated with global climate change, environmental degradation, financial crises, and conflict situations(UNDP 2015). From the mid-2000s onwards, governance was commonly accepted as the crux of DRR, with comprehensive efforts underway to increase the DRR capacity of national and local institutions; to strengthen policy, legal and planning frameworks; to develop human and financial capacities; and to promote multi-stakeholder and multi-disciplinary approaches. There is now greater emphasis on accountability, transparency, responsiveness to the needs of those most at risk, and ensuring the rule of law/compliance with legal provisions. These are of crucial importance in disaster risk governance.

5.2 Sendai Framework and Strengthening Disaster Risk Governance

The Sendai Framework states that disaster risk governance at different levels is of great importance for an effective and efficient management of disaster risk. It also requires clear vision, plans, competence, guidance, and coordination within and across sectors, as well as participation of relevant stakeholders. Strengthening disaster risk governance is necessary to foster collaboration and partnerships for the implementation of disaster risk reduction and sustainable development. The Sendai Framework lays emphasis on the following to strengthen disaster risk governance:

a) Mainstream and integrate disaster risk reduction within and across all sectors and promote the coherence and development of relevant laws, regulations, and public policies. It must guide both the public and private sectors through the legal framework that clearly spells out the roles and responsibilities. It must address disaster risk in publically owned, managed, or regulated services and infrastructures. It must encourage actions by persons, households, communities, and businesses. It has to enhance relevant mechanisms and initiatives for disaster risk transparency. It must put in place coordination and organizational structures.
b) Adopt and implement disaster risk reduction strategies and plans, across different levels (local to national) and timescales, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening resilience – economic, social, health and environmental.
c) Carry out assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at different levels
d) Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions of sectoral laws and regulations, including those addressing land

use, urban planning, building codes, environment, resource management, health and safety standards, and update them, where needed, for better disaster risk management

e) Develop and strengthen mechanisms to periodically review and assess the progress on various DM plans as well as encourage institutional debates, including by parliamentarians and relevant officials, on DRR plans
f) Assign clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks, and undertake comprehensive public and community consultations during the development of such laws and regulations to support their implementation
g) Establish and strengthen government coordination forums composed of relevant stakeholders at the national and local levels, such as national and local platforms for disaster risk reduction.
h) Empower local authorities, as appropriate, through regulatory and financial mechanism to work and coordinate with civil society, communities and indigenous people and migrants in disaster risk management at the local level
i) Work with parliamentarians for disaster risk reduction by developing or amending relevant legislation and setting budget allocations
j) Promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations
k) Formulate relevant public policies and laws aimed at addressing issues of prevention or relocation, where possible, of human settlements in disaster risk-prone zones.

5.3 Responsibility Matrix for Strengthening Disaster Risk Governance

Based on these considerations, and the increased emphasis globally on strengthening disaster risk governance to reduce disaster risk and to build resilience, the major tasks, agencies of the central and state government are presented in a responsibility matrix similar to that in Chapter-3. India currently has in place many institutions dedicated to disaster reduction, response, and for disaster risk governance at the centre and within the states at various levels from local to the state. However, there is wide variation in the functioning, structure, and capabilities. The NDMP seeks to strengthen the entire system of disaster risk governance in the country using the framework presented here. The NDMP envisages the implementation of various measures across the country over the short (within 5 years), medium (within 10 years), and the long-term (within 15 years). Many of these are highly ambitious given the extremely uneven level of institutional arrangements across various states and districts in the country. Based on the current status of implementation of the DM Plans, each central Ministry, Department, and the State Government will restructure the respective DM Plans into these three time frames for implementation while preparing plans or revising existing ones.

The generalized responsibility matrix given in this section summarizes the themes for strengthening DR governance and specifies agencies at the centre and state with their respective roles. The matrix has six thematic areas in which central and state governments have to take actions to strengthen disaster risk governance:

1. Mainstream and integrate DRR and Institutional Strengthening
2. Capacity Development
3. Promote Participatory Approaches
4. Work with Elected Representatives
5. Grievance Redress Mechanism
6. Promote Quality Standards, Certifications, and Awards for Disaster Risk Management

		Strengthening Disaster Risk Governance			
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
1	• Mainstream and integrate disaster risk reduction within and across all sectors • Institutional Strengthening	All central ministries, departments, and agencies associated with disaster management	• Promote the coherence and development of relevant laws, regulations, and public policies • Adopt and implement disaster risk reduction strategies and plans, across different levels and timescale • Carry out assessment of the technical, financial and administrative capacity for disaster risk management • Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions • Make institutions efficient and responsive; Improve work culture • Develop mechanisms, and processes to ensure transparency and accountability • Strengthen/ establish coordination and convergence mechanisms	State/UT,SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs, all departments involved in disaster management	• Promote the coherence and development of relevant laws, regulations, and public policies • Adopt and implement disaster risk reduction strategies and plans, across different levels and timescale • Carry out assessment of the technical, financial and administrative capacity for disaster risk management at all levels within the state • Make institutions efficient and responsive • Improve work culture • Develop mechanisms, and processes to ensure transparency and accountability • Enhance relevant mechanisms and initiatives for transparency • Strengthen/ establish coordination and convergence mechanisms at state, district, and local levels • Carry out assessment of the technical, financial and administrative disaster risk management capacity at state, district, and local levels • Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions • Make institutions efficient and

		Strengthening Disaster Risk Governance			
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
					responsive; Improve work culture • Develop mechanisms, and processes to ensure transparency and accountability
2	Capacity Development ***(Hazard-wise details in Chapter-3)***	NDMA, NIDM Multiple ministries and agencies as mentioned hazard-wise in Chapter-3	• Guidance, technical support, oversight, and monitoring to departments, other agencies, and states • Implementation in central ministries, departments, and agencies • Facilitating participation of civil society organizations, private sector, and educational institutions • Give special emphasis in supporting the state-level efforts	State/UT,SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs, All departments involved in disaster management	• Implementation in state ministries, departments, and agencies • Involving communities, panchayats, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational institutions • Develop capabilities at state, district, block, and local levels to understand disaster risk, develop DM plans, implement relevant policies, laws, and ensure compliance with risk reduction safety standards
3	Promote Participatory Approaches	All central ministries, departments, and agencies associated with disaster management	• Facilitate the sound assignment of roles and tasks • Provide guidelines and support to facilitate participatory approaches with accountability	State/UT,SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs, All departments involved in disaster management, especially DRD and UDD	• Empower local authorities • Implement participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location • Establish and strengthen government coordination forums composed of relevant stakeholders • Promote for participation of individuals, households, communities, and businesses in all aspects of disaster management

		Strengthening Disaster Risk Governance			
	Major Themes	**Central/State Agencies and their Responsibilities**			
		Centre	**Responsibility – Centre**	**State**	**Responsibility – State**
4	Work with elected representatives	NIDM, NDMA, MHA, MoPA	• Sensitize the political leadership • Involve the political leadership at national level in discussions on disaster management	State/UT, SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs, All departments involved in disaster management, especially DRD and UDD	• Sensitize the political leadership • Involve the political leadership at state, district, block, and local levels in discussions on disaster management
5	Grievance redress mechanism	Nodal Ministries/ departments notified by the GoI hazard-wise for overall coordination and response	Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response	State/UT, SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs, all departments involved in disaster response	Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response
6	Promote quality standards, such as certifications and awards for disaster risk management ***(Hazard-wise details in Chapter-3)***	MoRTH, MoR, AERB, DAE, BIS, MoRD, MoUD, MoHRD, Professional bodies, Various organizations involved in developing standards	• Formulate laws • Regulations • Develop enforcement mechanisms • Work out Techno-Legal regimes, institutional arrangements for monitoring compliance • Establish codes for disaster risk reduction	State/UT, SDMA, CoR,Revenue Dept., DDMA, Panchayats, ULBs	• Ensure implementation of standards • Develop suitable bye-laws specifically for urban and rural areas • Monitor compliance

6 Recovery and Building Back Better

6.1 Scope

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of betterment reconstruction. While disasters result in considerable disruption of normal life, enormous suffering, loss of lives and property, global efforts consider the recovery, rehabilitation and reconstruction phase as an opportunity to "Build Back Better" (BBB) integrating disaster risk reduction into development measures, and making communities resilient to disasters. The Sendai Framework expects that after a disaster, the stakeholders will be prepared for BBB. Existing mechanisms may require strengthening in order to provide effective support and achieve better implementation. Disaster recovery tends to be very difficult and long-drawn out. The reconstruction will vary depending upon the actual disaster, location, pre-disaster conditions, and the potentialities that emerge at that point of time. The NDMP provides a generalized framework for recovery since it is not possible to anticipate every likely element of betterment reconstruction.

The reconstruction and rehabilitation plan is designed keeping in view the worst case scenarios (i.e. L3 type of disasters) in which the capacity of the State and District administration would be overwhelmed and require assistance from the Central Government for re-establishing normalcy in the disaster affected areas. This chapter provides a general framework for the role of Government and its development partners in restoring after a disaster, various essential and basic services. Much of this support will involve the coordinated working of multiple agencies – Government and Non-Government. All the agencies are required to closely monitor response activities and to obtain valuable data regarding the severity and intensity of the event, the affected geographical area and the potential unsatisfied critical needs of the affected population in order to evolve a comprehensive recovery plan.

6.2 Approach

The approach to re-construction and recovery is guided by the NPDM 2009. Its salient paragraphs are given below:

Para 9.1.1 of the NPDM states that - the approach to the reconstruction process has to be comprehensive so as to convert adversity into opportunity. Incorporating disaster resilient features to 'build back better' will be the guiding principle.

The appropriate choice of technology and project impact assessment needs to be carried out to establish that the projects contemplated do not create any side effects on the physical, socio-cultural or economic environment of the communities in the affected areas or in their neighbourhood. Systems for providing psycho-social support and trauma counselling need to be developed for implementation during reconstruction and recovery phase.

Para 9.2.1 of NPDM states that - Reconstruction plans and designing of houses need to be a participatory process involving the government, affected community, NGOs and the corporate sector. After the planning process is over, while owner driven construction is a preferred option, participation of the NGOs and corporate sector will be encouraged. Reconstruction programmes will be within the confines and the qualitative specifications laid down by the Government.

Para 9.3.1 states - Essential services, social infrastructure and intermediate shelters/camps will be established in the shortest possible time. For permanent reconstruction, ideally, the work including the construction of houses must be completed within two to three years. Central Ministries / Departments concerned and the State Governments should create dedicated project teams to speed up the reconstruction process.

According to Para 9.3.2 of NPDM the plans for reconstruction in highly disaster prone areas need to be drawn out during the period of normalcy, which may include architectural and structural designs in consultation with the various stakeholders. The Para 9.5.1 of NPDM suggest that state governments should give emphasis on restoration of permanent livelihood of those affected by disasters and to pay special attention to the needs of women-headed households, artisans, farmers and people belonging to marginalised and vulnerable sections.

6.3 Recovery Process

Disaster recovery process is not a set of orderly actions triggered by the impact of a disaster upon a community. It will consist of several related activities such as the following:

- Damage assessments
- Debris clearance, removal and its environmentally safe disposal
- Restoration and even upgrading utilities including communication networks
- Re-establishment of major transport linkages
- Temporary housing
- Detailed building inspections
- Redevelopment planning
- Environmental assessments
- Demolition
- Reconstruction
- Integrating DRR into various development initiatives
- Financial management
- Economic impact analyses

The major steps/ processes of the recovery process and the processes involved are summarized in Table 6-1:

Table 6-1: Major steps of the recovery process and the key processes involved

	Major steps	Process
1	Post-Disaster Needs Assessment and Credible Damage Assessment	• Preliminary assessment reports • Compilation and transmittal of damage and loss data • Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment • Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts • Results monitoring and evaluation plan for recovery program • Select the most appropriate and achievable processes and methodology for conducting early and credible damage and needs assessments
2	Developing a vision for Build-Back Better (BBB)	• High level meetings as well as broad-based, wider consultations with experts, civil society, and key stakeholders

	Major steps	Process
		• Build consensus among the range of stakeholders within and outside government
3	Ensure coherence of BBB with the development programs and goals	• Discussions at top level to align the recovery vision with the government's broader, longer term development goals and growth and poverty reduction strategies
4	Incorporating resilience and BBB in recovery vision	Consultations and background studies on: • Disaster resistant physical recovery • Options for fast economic recovery • Gender and equity concerns • Vulnerability reduction • Natural resource conservation and environmental protection • Social recovery
5	Balancing recovery across sectors	• Balance public and private sectors BBB programs • Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities • Prioritize infrastructure reconstruction • Address the recovery of the lives and livelihoods of disaster-affected communities • Show sensitivity to the needs of the affected population with regard to public expectations from recovery
6	Prioritising sectors for recovery	Determine relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications, infrastructure, environment, livelihoods, tourism, social protection, health, and education.

6.4 Early, Mid and Long-term Recovery

According to UNISDR (2009), recovery is "the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors." UNISDR notes that recovery programmes, coupled with the heightened public awareness and engagement after a disaster, provide a valuable opportunity to develop and implement disaster risk reduction measures and to apply the BBB principle. It is an important component of risk reduction strategy and if implemented systematically, the recovery process prevents the affected community from sliding into further poverty and deprivation. While the Disaster Management Act 2005 mandates the government to carry out rehabilitation and reconstruction activities, it does not explicitly refer to 'recovery' as a component to be used as a part of disaster management strategy. However, the National Policy on Disaster Management 2009 recognizes 'recovery' as one of the six elements within the disaster management continuum where it is linked to physical, social and economic assets within the overall context of 'safe development'. The disaster recovery programmes usually proceed in three distinct stages to facilitate a sequenced, prioritized, and flexible multi-sectoral approach. Three recovery stages, in which appropriate policies and programmes tend to be planned and implemented are: a) Early, b) Mid-Term, and c) Long-Term, which are described briefly in Table 6-2.

The salient provisions of the recovery framework include the following:

1) Institutional arrangements: Ensuring institutional mechanisms at the national, state, district, and local (urban and rural) levels that clearly defines roles and responsibilities in recovery

2) Coordination: There is considerable interdependence between stakeholders – government, international agencies, private sector, civil society organizations – in realizing the objectives of recovery and inter-agency coordination is extremely important
3) Public-Private Partnerships (PPP): Participation of the private sector has to be leveraged for larger public good and the Public-Private Partnerships is one effective way to facilitate the private sector involvement in recovery
4) Information and Communication Technology (ICT): Effective use of ICT in recovery programme, disseminating messages among all stakeholders, and providing information on all aspects of recovery programme
5) Decision Support System (DSS): Setting up an adequate DSS that includes Management Information System (MIS), databases, deployment of spatial data management technologies
6) Pool of Expertise: Pooling of professional skills and expertise in diverse areas
7) Community Participation: Ensuring the pro-active involvement of communities, proper community outreach, empowerment, and gender equity in programme formulation and implementation
8) Monitoring and Evaluation (M&E): M&E is an important component required for promoting transparency in the recovery processes and it should include technical and social audits.

Table 6-2 Recovery Stages

Recovery Stage	Duration	Brief Description
Early	3 – 18 Months	Cash for work, resumption of markets, commerce and trade, restoration of social services, transitional and temporary shelters
Mid-Term	Up to 5 Years (concurrent with early recovery)	Recovery plans for assets and livelihoods, reconstruction plans for housing, infrastructure, public buildings and cultural heritage buildings
Long-Term	Within 10 Years	Implemented alongwith developmental plans: infrastructure strengthening, environmental, urban and regional planning

6.5 Reconstruction

Long term recovery efforts must focus on redeveloping and restoring the socio-economic viability of the disaster area(s). The reconstruction phase requires a substantial commitment of time and resources by the Governments (State and Central) and other agencies. It is important to note that much of this commitment would be beyond the scope of traditional emergency management programmes. The reconstruction challenge involved would most often be the result of a catastrophic event that has caused substantial damage over a very large area and/or affected a very large population. These reconstruction efforts include:

- Reconstruction of public infrastructures and social services damaged by the disaster, which can be completed over the long-term
- Re-establishment of adequate housing to replace that has been destroyed
- Restoration of jobs/ livelihood that was lost
- Restoration of the economic base of the disaster areas

6.6 Co-ordination of Reconstruction

Recovery efforts require the coordination at several levels of government and the stakeholder institutions having specific responsibilities for central, state, private sector, voluntary organizations, and international aid agencies.

6.6.1 Central Government

The role of the central government will include among others the following:

- Coordinate with various stakeholders
- Facilitate solicitation and management of donated resources and volunteers
- Coordinate with various stakeholders to promptly resolve recovery issues
- Provide resources on "need basis" and which are within the capabilities of Central Government, as per norms

6.6.2 State Government

The damage assessment and all the phases of recovery and reconstruction (short to long-term) are the responsibility of the State/UT government. Some of the key tasks are:

- Lead in and support need and damage assessment operations
- Provide relevant data regarding the severity of the disaster and assessment of individual needs
- Participate in and support public information and education programmes regarding recovery efforts and available Central/ State Government assistance
- Coordinate with the Central Government and other stakeholders for reconstruction management

6.6.3 Private Sector

There is a need for facilitating the involvement of private sector in disaster management and for businesses to integrate disaster risk into their management practices. There is a need to involve the private sector in the areas of:

- Technical support
- Reconstruction effort
- Risk management including covering risks to their own assets
- Financial support to reconstruction efforts
- Risk-informed investments in recovery efforts

6.6.4 Voluntary Organizations and International Aid Agencies

They may participate in the following activities:

- Joint need and damage assessment
- Support government effort in reconstruction process especially in so far as the mandate requires them

- Provide technical support to reconstruction and recovery efforts
- Assist the government in disseminating public information regarding reconstruction and rehabilitation plan
- Training and capacity development of local communities

6.7 Rehabilitation

6.7.1 Background

Rehabilitation, an integral part of disaster recovery; other being reconstruction, could be defined as an overall dynamic and intermediate strategy of institutional reform and reinforcement, reconstruction and improvement of infrastructure and services; aimed towards support to the initiatives and actions of the affected populations in the political, economic and social domains, as well as reiteration of sustainable development. Generally, rehabilitation package includes total reconstruction of damaged physical and psychological infrastructure, as well as economic and social rehabilitation of the people in the affected region. The rehabilitation is classified into the following:

- Physical
- Social
- Economic and
- Psychological

6.7.2 Physical Rehabilitation

Physical rehabilitation is a very important facet of rehabilitation. It includes:

- Reconstruction of physical infrastructure such as houses, buildings, railways, roads, communication network, water supply, electricity, and so on
- Short-term and long-term strategies towards watershed management, canal irrigation, social forestry, crop stabilization, alternative cropping techniques, job creation, employment generation and environmental protection
- Rehabilitation of agriculture, artisan work and animal husbandry
- Adequate provision for subsidies, farm implements, acquisition of land for relocation sites, adherence to land-use planning, flood plain zoning, retrofitting or strengthening of undamaged houses, and construction of model houses

6.7.3 Relocation

Relocation is a very sensitive part of the physical rehabilitation process and it must be ensured that need based considerations and not extraneous factors should drive the relocation policy. The local authorities, in consultation with the affected population and under the guidance of the State Government shall determine relocation needs taking into account criteria relevant to the nature of the calamity and the extent of damage. Relocation efforts should invariably include activities like:

- Avoid secondary displacement as far as possible
- Gain consent of the affected communities
- Clearly define land acquisition process
- Take into consideration urban/ rural land use planning before moving ahead
- Provide customized relocation packages

- Decentralize powers for undertaking the relocation process
- As far as possible, ensure relocation site is near to their agricultural lands and/or sources of livelihood, as applicable
- Ensure provision of livelihood rehabilitation measures for relocated communities, wherever necessary, to the extent possible

6.7.4 Social Rehabilitation

Social rehabilitation is also an important part of disaster rehabilitation. The vulnerable groups such as the artisans, elderly, orphans, single women and young children would need special social support to survive the impact of disasters. The rehabilitation plan must have components that do not lose sight of the fact that the victims have to undergo the entire process of re-socialization and adjustments in a completely unfamiliar social milieu. Thus, this type of rehabilitation would include various activities such as:

6.7.5 Revival of Educational Activities

Educational facilities may suffer greatly in a major disaster placing considerable stress on children. Therefore, the following steps will be helpful in helping children to recover and cope with the situation:

- Give regular counselling to teachers and children
- Encourage children to attend the schools regularly
- Provide writing material, and work books to children
- Make children participate in all activities pertaining to resurrection of normalcy in the school
- Try to inculcate conducive attitudes to enable the students to play a positive role in self-development
- Establish village level education committees
- Identify local groups that could conduct smooth functioning of education activities

6.7.6 Rehabilitation of the Elderly, Women and Children

The elderly, women, and children are more vulnerable after a major disaster. Hence the following measures will help in their rehabilitation:

- Identify familiar environs to rehabilitate elderly, women and children
- Make efforts to attach destitute, widows and orphans with their extended family, if that is not possible then identify foster families
- Organize regular counselling to strengthen the mental health of women and children
- Initiate various training programmes to make the women economically self-sufficient
- Give due attention to health, nutrition and hygiene in the long-term rehabilitation package for women and children
- Activate/reactivate the *anganwadis* (day-care centres), and old-age homes within the shortest possible time
- Set up at least one multi-purpose community centre per village
- Make efforts to build residential female children homes at the block level
- Set up vocational training camps to improve the skills of orphans and children
- Promote self-help groups

6.7.7 Economic Rehabilitation

The major components of economic rehabilitation are livelihood restoration and ensuring the continuity of businesses, trade, and commerce. Restoring employment and income generating opportunities to disaster affected communities is a vital component of post-disaster reconstruction. Livelihood opportunities are severely disrupted by the destruction or loss of essential assets; with the result that people are unable to engage in normal income generating activities; become demoralized and dependent on humanitarian aid. Economic recovery should be based on:

- Analysis of existing livelihood strategies and sustainability of businesses
- A comprehensive analysis of existing and future risks
- The vulnerabilities of the affected families
- The accessibility of linkages to external influences and institutions including skills and knowledge
- Access to functioning markets

As per the Para 9.5.1 of NPDM – the State governments will have to lay emphasis on the restoration of permanent livelihood of those affected by disasters and special attention to the needs of women-headed households, artisans, farmers and people belonging to marginalized and vulnerable sections.

6.7.8 Psychological Rehabilitation

Another crucial dimension of disaster rehabilitation is psychological rehabilitation. Dealing with victim's psychology is a very sensitive issue and must be dealt with caution and concern. The psychological trauma of losing relatives and friends, and the scars of the shock of disaster event can take much longer to heal than the stakeholders in disaster management often realize. Thus, counselling for stress management should form a continuous part of a disaster rehabilitation plan. Efforts should be made to focus more on:

- Psycho-therapeutic health programmes
- Occupational therapy
- Debriefing and trauma care
- Tradition, values, norms, beliefs, and practices of disaster-affected people

6.8 Fund Mobilization

6.8.1 Background

Reconstruction and rehabilitation projects, after a major disaster, are usually highly resource intensive. Such projects are typically financed through the State exchequer. Recently, large funds have been raised from multilateral/ bilateral funding agencies/ international agencies in close coordination with the national Governments. The State Government, through the relevant ministry of the Central Government, shall finalize the fund mobilization strategy, incorporating appropriate conditions governing flow of funds, its disbursement, and usage as per norms decided by the Central Government. This will include:

1. Estimation of funds required based on the detailed damage assessment reports and consolidation of the same under sectoral and regional heads
2. Contracting with funding agencies and evolving detailed operating procedures for fund flow and corresponding covenants.

6.8.2 Funds Disbursement and Monitoring

The funds raised through funding agencies are usually accompanied by stringent disbursement and usage restrictions. It is therefore important to monitor the disbursement of funds to ensure that none of the covenants are breached. The fund disbursal shall be monitored by the State Government by:

- Prioritizing resource allocation across approved projects
- Establishing mechanisms for disbursement of funds to the beneficiaries
- Strengthen the monitoring mechanisms for fund utilization and progress of implementation

6.8.3 Recovery of reconstruction costs

The State Government, in consultation with the relevant Ministry of the Central Government, can finalize and implement select cost recovery measures such as:

- Imposing special tax/ surcharge (Central Government)
- Imposing local taxes
- Issuing tax free Government bonds

7 Capacity Development - An Overview

7.1 Background

Capacity development covers strengthening of institutions, mechanisms, and capacities at all levels of all stakeholders. The United Nations International Strategy for Disaster Reduction (UNISDR) defines 'Capacity Development' for DRR as follows:

> "The process by which people, organisations and society systematically stimulate and develop their capability over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions – within a wider social and cultural enabling environment." (UNISDR, 2009)

It is an important component of investing in disaster risk reduction. In the domain of disaster risk management, the Sendai Framework emphasizes the need for enhancing the technical, financial, and administrative capabilities of institutions, governments, and communities to deal with the identified risks at different levels. The framework calls for reinforcing the capacity to implement, and enforce risk reduction measures. Capacity development commonly refers to a process that is driven from the inside and starts from existing capacity assets. The framework underlines the need for capacity development of women in disaster management and building their ability to participate effectively in managing disaster risk.

Investing in capacity development for DRR will be a continuing process to enhance the capability of individuals, agencies, and communities to improve the performance of their DM functions. The process of capacity building will include elements of human resource development, i.e., individual training, organizational development such as improving the functioning of groups, and the strengthening of organizations, regulations, and institutions. Involving stakeholders through participatory approaches is essential to establish ownership and commitment. The sustainability of capacity development initiatives increases in direct relation to the level of participation and ownership of the internal partners. In order for capacity development for disaster risk reduction to be effective, it must be clear in its purpose.

As capacity development entails activities on various levels, i.e. legal and institutional frameworks, systems of organisations, organisation and human and material resources, it is necessary to address challenges on all of them by implementing a mix of activities, on short and long term. The reason for this is that changes at one level often require changes at other levels too, as the levels are interdependent. Therefore, the focus of many capacity development efforts for DRR must go beyond human resource development and pay enough attention to organisational and institutional issues. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the resilience to disasters. Investing in capacity development is the cost-effective way to save lives, prevent or reduce losses and ensure effective recovery and rehabilitation.

The NPDM 2009 underlines the need for a strategic approach to capacity development and notes that the active and enthusiastic participation of various stakeholders is necessary for it to be effective. The national policy notes that capacity development must address the challenge of "putting in place appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters."

7.2 Capacity Development Themes

The capacity development covers all aspects of disaster management. The key aspects and broad thematic areas for capacity development applicable to these dimensions of DM are summarized in Table 7-1. The hazard-specific capacity development needs for prevention and response are given in the plan matrix of the Chapter-3 and Chapter-4. The list is indicative, illustrative, and not exhaustive. Further, those chapters provide certain extent of detailing. Even those are indicative and in consonance with national, regional, and global practices, there will be changes, which will be incorporated in the periodic revisions of the plan and during its implementation. The effort will be to follow the emerging best practices.

Table 7-1: Summary of Broad Capacity Development Themes

Capacity Development Themes	
Key Aspect	**Thematic Areas**
Prevention or mitigation for disaster risk reduction	• Hazards, Risk, and Vulnerability Assessment • Human resource development • Institutional strengthening • Launching demonstration projects • Safety education in educational institutions • Improve the awareness and preparedness of stakeholders at all levels • Documenting lessons from previous disasters and ensuring their wide dissemination • Preparing DM plans, regular updating, and mock drills • Institutional arrangements, policies, legal support, and regulatory framework • Developing appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions • Strengthening early warning systems • Mainstreaming of disaster risk assessment, mapping and management into development plans and programs • Revision of building codes and standards for rehabilitation reconstruction practices both for urban and rural areas • Retrofitting techniques • Rapid visual surveys for safety evaluation of buildings • Training and skill development for masons and other artisans • Reinforce systems to implement, monitor, and enforce regulations for DRR to promote disaster-resistant built environment • Promoting community-based DM taking into account specific needs, regional diversities and multi-hazard vulnerabilities • Design and implement social safety-net mechanisms, including community-based systems • Disaster resilience of health care systems by integrating disaster risk management into primary, secondary and tertiary health care • Business resilience, and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices • Preparedness and response plans at all levels • Community-based DRR and DM

Capacity Development Themes	
Key Aspect	**Thematic Areas**
Effective preparedness and response	• Emergency response capabilities – EOCs, infrastructure, equipment upgrades and adoption of best available technologies • Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization • Comprehensive revamping of Fire and Emergency Services with institutional reforms and modernization • Adoption and adaptation of emerging global good practices • Rigorous training and HRD of first responders • Early warnings, maps/ satellite data/ effective dissemination of information • Table-top exercises, simulations, and mock drills to improve operational readiness of the plans • Rescue equipment at all levels • Systems to provide basic services in emergencies • Housing and Temporary shelters • Medical care for casualties, health care and sanitation • Power and fuel supply management • Transportation systems and network • Logistics and supply chain management • Media relations • Managing the dead, disposal of animal carcasses, and debris • Collection and management of data • Legal services/ support
Recovery and Build Back Better	• Post-Disaster Needs Assessment systems and expertise • Credible damage assessment mechanisms and expertise • Planning capabilities to ensuring coherence of BBB with overall development efforts and goals • Studies and research for incorporating resilience into BBB models • Studies on past disasters and recovery to draw useful lessons

The NPDM 2009 envisages a pivotal role for the National Institute of Disaster Management (NIDM) in the area of capacity building. Similarly, the State Disaster Management Institutes and ATIs should play a lead role in the States/ UTs. The NPDM envisages capacity development in the domain of DM at all levels of government and across various autonomous institutions. It also stresses the importance of capacity development efforts to promote community-based DM efforts. The policy notes that to sustain DRR, it is necessary to undertake capacity development across the education sector covering schools to professional institutions. It recognizes that skill development in all sectors to incorporate multi-hazard resistant features along with strengthening of relevant licensing, certification, and standards.

7.3 National Institute of Disaster Management (NIDM) and other Institutions

The NIDM, in partnership with other research institutions has capacity development as one of its major responsibilities, along with training, research, documentation and development of a National level information base. It will network with other knowledge-based institutions and function within the broad policies and guidelines laid down by the NDMA. It will organise training for trainers, DM

officials and other stakeholders. The NIDM will strive to emerge as a 'Centre of Excellence' in the field of Disaster Management. The NIDM will play an important role in developing and facilitating the implementation of a National training schedule for DM. It will also be the nodal institution for Regional and International cooperation for training. There are a number of renowned institutes in various States, which are imparting training in DM. These will be strengthened with financial assistance and such efforts will be replicated by other States/UTs. Also, the DM cells in all Administrative Training Institutes, Police Academies, State Institutes of Rural Development, Training centres of five CAPFs from where NDRF is drawn up (BSF, CRPF, CISF, ITBP, and SSB) and the NDRF Academy, Nagpur will contribute most significantly in developing DM related skills. The capacity of existing institutes needs to be upgraded in accordance with regional and local requirements.

7.4 Capacity Development of Local Bodies – Rural and Urban

The capacities of Panchayats and ULBs have to be developed in the sphere of disaster management. Without adequate capacity development, the local bodies cannot contribute effectively to disaster management or in ensuring the proper implementation of DM plans. Capacity development is also necessary for true empowerment of the bodies of local self-governance. The elected leaders and officials of Panchayats and ULBs should be trained to competently handle different types of crises, contribute to disaster preparedness, make proper use of available warnings, organize operations such as search, rescue, relief, medical assistance, and carry out damage assessment. They should also have sound understanding of the needs of proper post-disaster rehabilitation. The local leadership can play a big role in disaster management in all stages and in DM planning. Capacity development must aim at increasing the competence of local bodies in all aspects of disaster management, mainstreaming DRR, and in promoting a culture of disaster prevention and DRR. The capabilities of the local bodies have to be developed in financial, technical, and managerial spheres. The state level training institutes (ATI, SIDM, and others) will develop need-based training programs for the capacity development of rural and urban local bodies.

7.5 Training Communities

Enhancing the capacity of communities, as they are the first responders to disasters, is a significant part of the capacity development process. The Sendai Framework notes the need to build the knowledge of civil society, communities, and volunteers on disaster risk reduction. Capacity building has to include awareness, sensitisation, orientation, and developing skills of communities and community leaders. Assistance from NDRF, Civil Defence, civil society organisations, local community-based organizations, and Self-Help Groups will be encouraged. The overall responsibility to give impetus to leadership and motivation will rest with local authorities, PRIs and ULBs under the overall guidance of State and District authorities.

7.6 National and State Disaster Resource Networks

India Disaster Resource Network (IDRN) is a portal providing nation-wide inventory of DM-related resources covering almost all the basic needs. It is a web based platform, for managing the inventory of equipment, skilled human resources and critical supplies for emergency response. Primary focus of IDRN portal is to enable the decision makers to find answers on availability of equipment and human resources required to combat any emergency situation. At the State-level, Government of India has encouraged each state to establish its own State Disaster Resource Network (SDRN) portal on the pattern of IDRN.

7.7 Capacity Development - Ministries and States

The Central Ministries, departments and agencies as well as the State Governments will take actions for capacity development of different stakeholders as shown in Table7-2 given below on the basis of proper capacity development needs assessment.

Table 7-2: Capacity development activities - Centre and State

	Task	Central	State	Activities
1	Deploying good resources, advanced technology and equipment	GoI, NDMA, MHA, All Nodal Min./ Dept.	SDMA, CoR, Revenue Dept.,all Nodal Dept./ All Line Depts.	• Identifying existing ones • Identification of gap between existing ones and those required on the basis of hazard risk and vulnerability and lessons learnt from recent past disasters • Procurements of additional equipment with advanced technologies
2	Resource Network	MHA, NIC, NIDM, NDMA	State Govt., SDMA, CoR, Revenue Dept., DDMA	• Maintaining the resource network • Monitoring and maintaining the resource data • Regular updating the resource data
3	Communication	NDMA, MHA, DoT, DST, NIC	State Govt., SDMA, CoR, Revenue Dept.,DDMA	Developing fail-safe communications with advance technology
4	National Disaster Information System	NDMA, NIDM, MHA, DoT, various Min., Dept., DST, NIC	State Govt., SDMA, CoR, Revenue Dept., DDMAs	• Interface with the National Emergency Communication Network (NECN) and HRVA • Facilitate access to Central Ministries/ Dept./ States and other authorised users • Examine integration of national HRVA data base with the IDRN for effective resource management
5	Early Warning	IMD, CWC, GSI, INCOIS, MoD, DRDO, MoAFW, IIRS, NRSC, ISRO	State/ UT and nodal Dept. of the States, Panchayats, ULBs	• Improve the last mile connectivity • Up-grade technical infrastructure and systems
6	Strengthening training institutes for disaster management	NIDM, MoHRD, MHA, NDMA	State/ UT, State ATIs	• Research and extension support grants • Create/ strengthen state level DM institutes
7	Strengthening of Emergency Operation Centres	NDMA, MHA	State Govt., SDMA, CoR	• Review functioning • Improve capabilities based on experience after each disaster event • Deploy best of ICT • Conduct capacity audits of EOCs • Set up State and District

	Task	Central	State	Activities
				level EOCs with adequate trained manpower • Regular reviews and improvement of SOPs, protocols, etc. • Mobile control rooms
8	Strengthening of Fire and Emergency Services	MHA, MoEFCC	State/UT, SDMA, CoR, Revenue Dept., and departments, ULBs	Revamping with institutional reforms, modernization, and changes in legal framework
9	Mainstreaming of DM into local governance	NDMA, MHA, Nodal Min./ Dept., all Ministries	State Govt., SDMA, CoR, Revenue Dept., all Nodal Dept./ All Line Dept.	Conduct trainings and workshops on incorporating DM plans into local governance
10	Strengthening Community skills	MHA, NDMA, NDRF, Nodal Min.	SDMA, CoR, Revenue Dept., all Nodal Dept.	• Training on CBDR and preparedness at local levels • Address gender issues, and special needs of children, disabled, aged, etc. holistically in the DM context • Promote private sector and civil society involvement • Promote PPPs
11	Use of media for disaster management	NDMA, MHA, Min. I&B, Nodal Min./ Dept.	SDMA, CoR, Revenue Dept., all Nodal Dept.	Trainings and Workshops
12	Human Resource Development	NDMA, MHA, MoHRD, NIDM, DoPT, Nodal Min./Dept.	SDMA, CoR, Revenue Dept., all Nodal Dept.	Organize relevant training programs & refresher courses
13	To enhance DM and DRR capacities at local levels	MHA, NDMA, NIDM	SDMA, SIDM	Conduct trainings in disaster management at district level
14	Developing the technical capacities and professional disciplines	NIDM, MoST, MoEF, MoHRD	SDMA, SIDM	• Technical and professional programs relevant to various specialized aspects of DM • Develop ToTs • Research in key areas of DM
15	Promoting disaster management education and research	NIDM, MoHRD, MoST, MoEF, MoHFW, UGC, NCERT, CBSE,ICSE, AICTE, and other relevant agencies/ boards	SDMA, State Ed. Boards	• Incorporate subjects of relevance to DM in curriculum • Introduced specialized programs, degrees, courses and diplomas • Promote relevant research projects, programs within institutes and through research grants
16	Sensitization and education for political leaders	NIDM, NIRD, NDMA, NDRF, MoUD, MoRD	SDMA, SIDM, ATI, SIRD, SDRF	• Educate political leadership and elected representatives on risk sensitive planning, disaster prevention, and mitigation

8 Financial Arrangements

8.1 Background

The financial aspects of Disaster Risk Management entail various factors ranging from development planning to immediate relief post disaster, followed by investments made for reconstruction. As per the prevailing practice, the funds for preparedness, mitigation and reconstruction are allocated by the Government as a part of budgetary allocations.

However, a firm commitment is made by the Government regarding funds for immediate relief as recommended by the FC and precipitated for five years. The FC makes recommendations regarding financing of disaster risk management also, amongst other subjects being dealt by it. The Second FC made a provision for 'Margin Money' for meeting out such contingencies. Subsequent FC have reviewed various aspects of funding disaster management in the country in consultation with the various stake holders. Based on their recommendations, various funds have been maintained by Govt. of India and States for funding disaster relief. The 13th Finance Commission (FC-XIII) has given its recommendations for maintaining National Disaster Response Fund and State Disaster Response Fund in accordance with the DM Act 2005. The FC-XIV has taken them forward and made recommendations regarding National Disaster Response Fund and State Disaster Response Fund.

With regard to setting up of a separate fund for disaster mitigation, the FC-XIII did not recommend for the same, but observed that "As far as disaster mitigation is concerned, we believe that it should be a part of the plan process and that the expenditure therein should be met out of the plan resources of the respective ministries of the Union and the States." The FC-XIV did not make any recommendation on the Mitigation Funds.

The DM Act 2005 has clearly mandated upon the Government to ensure that the funds are provided by the Ministries and Departments within their budgetary allocations for the purpose of disaster management. The Act has stressed upon the need for mainstreaming of the Disaster Risk Management by way of making definite budgetary arrangements for the purpose by the respective Ministries and Departments within their overall agenda.

As of now, no specific allocations are being made by the Government for disaster management, except in the cases of specific projects undertaken by any Ministry or Department. Financial mainstreaming of DRR concepts is necessary to entrench the need for disaster risk resilience within the main development agenda of the country.

8.2 National Disaster Response Fund

The state government is primarily responsible for undertaking rescue, relief and rehabilitation measures in the event of a natural disaster. At times, its efforts need to be strengthened and supplemented with Central assistance. Providing financial assistance for disaster preparedness, restoration, reconstruction and mitigation in the event of a natural disaster are not part of National Disaster Response Fund's mandate. In the event of a calamity of a severe nature, where the requirement of funds for relief operations is beyond the funds available in the State's State Disaster Response Fund account, additional Central assistance is provided from National Disaster Response Fund, after following the laid down procedure.

As per this procedure, the State Government is required to submit a memorandum indicating the sector wise damage and requirement of funds. On receipt of the memorandum from the State, an

Inter-Ministerial Central Team is constituted and deputed to submit a report after an on the spot assessment of damage and requirement of funds for relief operations, as per the extant items and norms of State Disaster Response Fund and National Disaster Response Fund. The report of the Central Team is considered by the Inter-Ministerial Group (IMG) / National Executive Committee (NEC) headed by the Home Secretary. Thereafter, a High Level Committee (HLC) approves the quantum of immediate relief to be released from National Disaster Response Fund. The Disaster Management Division of MHA provides support to the HLC. The MHA oversees the utilisation of funds provided from the National Disaster Response Fund and monitors compliance with norms.

8.3 State Disaster Response Fund

The State Disaster Response Fund shall be used only for meeting the expenditure for providing immediate relief to the victims of cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst, pest attack, frost and cold wave. While the state can draw from State Disaster Response Fund for the emergency response and relief, there are provisions to adjust a portion of the expense against funds released from National Disaster Response Fund between the fiscal in which National Disaster Response Fund is released and the expenses incurred by state in the previous fiscal under State Disaster Response Fund. In case the same state faces another severe disaster during the same year, no reduction will he made while releasing assistance from the National Disaster Response Fund. The state-specific disasters within the local context in the State, which are not included in the notified list of disasters eligible for assistance from State Disaster Response Fund and National Disaster Response Fund, can be met from State Disaster Response Fund within the limit of 10 percent of the annual funds allocation of the State Disaster Response Fund. The two funds have provisions for the following:

- Gratuitous Relief
- Search and Rescue ops - as per actual cost incurred
- Relief measures
- Air dropping of essential supplies
- Emergency supply of drinking water
- Clearance of affected area, including management of debris
- Agriculture, Animal husbandry, fishery, Handicraft, artisans
- Repair/ Restoration (of immediate nature) of damaged Infrastructure
- Capacity development

The default period of assistance is as per norms prescribed. However, based on assessment of the ground situation, the SEC may extend it beyond the prescribed time limit subject to the condition that expenditure on this account should not exceed 25 percent of State Disaster Response Fund allocation for the year. The SEC will organize contributions from the relevant State Government, administer the State Disaster Response Fund and invest the accretions to the State Disaster Response Fund in accordance with the norms approved by GOI from time to time.

State has to meet the capacity development expenses from the State Disaster Response Fund and not National Disaster Response Fund, subject to a limit of 10 percent of the State Disaster Response Fund. Capacity Development covers the following:

- Setting up/strengthening of Emergency Operation Centres (EOCs) in the State

- Training/Capacity Building of stakeholders and functionaries in the State
- Supporting disaster management centres in the state
- Preparation of Disaster Management Plans based on Hazards, Risks, and Vulnerability Analysis
- Strengthening of SDMA and DDMA

In most cases, the SEC and if necessary a central team will carry out need assessment. The State Governments must take utmost care and ensure that all individual beneficiary-oriented assistance is disbursed through the beneficiary's bank account. The scale of relief assistance against each items for all disasters including 'local disaster' should not exceed the norms of State Disaster Response Fund/ National Disaster Response Fund. Any amount spent by the State for such disasters over and above the ceiling would be borne out of the resources of the State Government and not from State Disaster Response Fund.

For disasters needing central support over and above the State Disaster Response Fund, the MHA processes the request of the state government for support from the Government of India. The Ministry of Finance will make the budgetary provisions for the relief funds required for strengthening response mechanisms, disaster management institutions, capacity development of stakeholders, and DRR. The effective implementation of these statutory provisions would place India on a firm footing for effectively managing disasters and minimising their negative socio-economic consequences. Another important aspect of disaster management is financial resilience. This requires a systematic approach, combining an optimum mix of *ex ante* and *ex post* financing mechanisms based *inter alia* on the country's current economic status.

8.4 National Disaster Mitigation Fund

As per Section 47 of the DM Act 2005, Central Government may constitute a National Disaster Mitigation Fund for projects exclusively for the purpose of mitigation. This Section has not been notified by the Government so far. As mentioned earlier, the FC-XIV restricted its recommendation to existing arrangements on the financing of the already constituted funds (National Disaster Response Fund and State Disaster Response Fund) only, as per its terms of reference. The FC-XIV did not make any specific recommendation for a mitigation fund.

8.5 Recommendations of the Fourteenth Finance Commission

In regard to grants for disaster management, Fourteenth Finance Commission (FC-XIV) has adopted the procedure of the XIII FC and used past expenditures on disaster relief to determine the State Disaster Response Fund corpus. While making recommendations, XIV FC have taken note of the additional responsibility cast on States and their district administrations under the Disaster Management Act. XIV FC has also taken note of the location-specific natural disasters not mentioned in the notified list, which are unique to some States.

8.6 Statutory Provisions

8.6.1 Financing Prevention, Mitigation and Preparedness

The provisions relating to funding of prevention, mitigation and preparedness are listed below:

i. Section 6 (g) provides that NDMA may recommend provision of funds for the purpose of mitigation;

ii. Section 18 (f) provides that SDMAs may recommend provision of funds for mitigation and preparedness measures;
iii. Section 35 (c) provides that the Central government may ensure appropriate allocation of funds for prevention of disaster, mitigation, capacity-building and preparedness by the Ministries or Departments of the Government of India;
iv. Section 36 (e) provides that the Ministries or Departments of Government of India shall allocate funds for measures for prevention of disaster, mitigation, capacity-building and preparedness;
v. Section 38 (d) provides that the State Government may allocate funds for measures for prevention of disaster, mitigation, capacity-building and preparedness by the departments of the Government of the State in accordance with the provisions of the State Plan and the District Plans;
vi. Section 39 (c) provides that the departments of the state government shall allocate funds for prevention of disaster, mitigation, capacity- building and preparedness

8.6.2 Allocation by Ministries and Departments

Section 49 provides for Allocation of funds by Ministries and Departments. It states that:

"(1) Every Ministry or Department of the Government of India shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan.

(2) The provisions of sub-section (1) shall, *mutatis mutandis*, apply to departments of the Government of the State."

8.6.3 Provisions in the Act for Disaster Risk Reduction

Some of the statutory provisions incorporated in the National Disaster Management Act for mainstreaming DRR and financing thereof are reproduced below.

i. Section 6 (i) provides that the NDMA may take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;
ii. Section 18 (2) (g) provides that the SDMA may review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;
iii. Section 22 (2)(b) provides that the SEC may examine the vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation;
iv. Section 23 (4) (b) provides that the State Plan shall include measures to be adopted for prevention and mitigation of disasters;
v. Section 23 (4) (c) provides that the State Plan shall include the manner in which the mitigation measures shall be integrated with the development plans and projects;
vi. Section 23 (4) (d) provides that the State Plan shall include, capacity-building and preparedness measures to be taken;
vii. Section 30 (2) (iv) provides that the District Authority may ensure that the guidelines for prevention of disasters, mitigation of its effects, preparedness and response measures as laid down by the National Authority and the State Authority are followed by all departments of the Government at the district level and the local authorities in the district;

viii. Section 30 (2) (xiii) provides that the District Authority may facilitate community training and awareness programmes for prevention of disaster or mitigation with the support of local authorities, governmental and non-governmental organisations;

ix. Section 30 (xiv) provides that the District Authority may set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public;

x. Section 31 (3) (b) provides that the District Plan shall include the measures to be taken, for prevention and mitigation of disaster, by the Departments of the Government at the district level and local authorities in the district;

xi. Section 32 (a) provides that every office at the district level shall prepare a Plan setting out:

- provisions for prevention and mitigation measures as provided for in the District Plan and as is assigned to the department or relevant agency;
- provisions for taking measures relating to capacity-building and preparedness as laid down in the District Plan;
- the response plans and procedures, in the event of, any threatening disaster situation or disaster;

xii. Section 35(2) (b) provides that the central government may ensure the integration of measures for prevention of disasters and mitigation by Ministries or Departments of the Government of India into their development plans and projects;

xiii. Section 36 (b) provides that every Ministry/ Department of Government of India shall integrate into its development plans and projects, the measures for prevention or mitigation of disasters in accordance with the guidelines laid down by the National Authority;

xiv. Section 37 (1) (a) mandates all the Ministries and Departments of Government of India to prepare a disaster management plan inter alia specifying:

- the measures to be taken by it for prevention and mitigation of disasters in accordance with the National Plan;
- the specifications regarding integration of mitigation measures in its development plans in accordance with the guidelines of the National Authority and the National Executive Committee;

xv. Section 38 (2) (e) provides that the State Government may ensure integration of measures for prevention of disaster or mitigation by the departments of the Government of the State in their development plans and projects;

xvi. Section 38 (2) (f) provides that the State Government may integrate in the State development plan, measures to reduce or mitigate the vulnerability of different parts of the State to different disasters;

xvii. Section 39 provides that the departments of State Government shall integrate into its development plans and projects, the measures for prevention of disaster and mitigation;

xviii. Section 40 (1) (a) (ii) mandates all department of the State to prepare a disaster management plan that shall integrate strategies for the prevention of disaster or the mitigation of its effects or both with the development plans and programmes by the department

8.7 Implementation of DRR– Financial Aspects

8.7.1 Plan Schemes

The primary mechanism for funding DRR related schemes and projects in India are through Plan Schemes at Central and State level. Various nodal Ministries play a key role in disaster management as far as specific disasters are concerned. These nodal Ministries as well as other Ministries and Departments have dedicated schemes, aimed at disaster prevention, mitigation, capacity building, etc. within their particular domain. Existing examples include the scheme of MHA for Strengthening of Fire and Emergency Services, Financial assistance to ATIs other Training institutions for disaster management, Integrated Coastal Zone Management programme of MoEFCC, and flood management and flood forecasting programmes of MoWR. The DoS has a Disaster Management Support programme and MoES has a project on Tsunami and Storm Surge Warning System. NDMA is implementing an important World Bank funded project for cyclone risk mitigation. The National Cyclone Risk Mitigation Project encompasses cyclone forecasting tracking and warning systems, capacity building and structural measures.

Apart from this, many of the schemes, which are implemented by various ministries/ departments, have embedded DRR components, as for example, those implemented by the MoEFCC. There are many other programmes that improve societal resilience, which is a critical component of DRR, such as the National Rural Health Mission, Mahatma Gandhi Employment Guarantee Scheme, and the Urban Development's Urban Renewal Mission.

Outlay for reconstruction activities are normally embedded in the plan schemes of the Union Government to ensure that "Building Back Better" is in consonance with the approved programs. Post disaster reconstruction work is funded by the Union Government through increased outlay for the on-going infrastructure projects in the region and providing more untied grant to the affected State. The Centre/State may also utilize funds from international agencies for specific intervention in a particular region in the form of an externally aided project.

8.7.2 Flexi Funds as a part of Centrally Sponsored Schemes

As per Department of Expenditure, Ministry of Finance, O.M No. 55(5)/PF-II/2011 dated 6.1.14, all Central Ministries shall keep at least 10 percent of their Plan budget for each CSS as flexi-fund (except for schemes which emanate from a legislation or schemes where the whole or a substantial proportion of the budgetary allocation is flexible. States may use the flexi-funds for the CSS to meet the following objectives:

a) Provide flexibility to States to meet local needs and requirements within the overall objective of each program or scheme;
b) Pilot innovations and improve efficiency within the overall objective of the scheme and its expected outcomes;
c) Undertake mitigation /restoration activities in case of natural calamities in the sector covered by the CSS

The utilisation of flexi-funds for mitigation/restoration activities in the event of natural calamity must be in accordance with the broad objectives of the CSS. It is possible to combine flexi-fund component across schemes within the same sector but the flexi-funds of a CSS in a particular sector however, shall not be diverted to fund activities/schemes in another sector. The flexi-funds constitute a source of funding for mitigation activities within overall objectives of the particular

CSS(s) under which they are allocated and this would still leave a gap in terms of funding purely mitigation related projects especially those addressing cross cutting themes that cover multiple sectors.

8.7.3 Externally Aided Projects

Besides the fund which are available through plan and non-plan schemes, efforts have also been made by the centre to mobilize the resources from external funding agencies for vulnerabilities assessment, capacity development, institutional strengthening of response mechanism and mitigation measures etc. The Central Government would continue to support states for reconstruction and rehabilitation in the aftermath of major disasters through aid from Word Bank and other such external funding agencies.

8.8 Risk Transfer and Insurance

As of now Government of India is acting as a self-insurer for the purpose of maintaining relief funds (National Disaster Response Fund and State Disaster Response Fund). The funds are monitored by MHA in consultation with Ministry of Finance. The amount committed for State Disaster Response Fund is invested by the Union in government securities. MHA has issued guidelines in consultation with Ministry of Finance for the maintenance and encashment of the securities as and when required. However, need for projects or risk transfer instruments by private agencies is also acknowledged by the Government. The corresponding policy changes and fund requirement is to be deliberated in detail in consultation with the IRDA, insurance sector and other stakeholders.

9 International Cooperation

9.1 Participation in International Efforts

India plays an active role in global initiatives on disaster management. India is a signatory to the Sendai Framework for Disaster Risk Reduction and is committed to achieve the priorities and the objectives through systematic and institutional efforts. With multi-dimensional initiatives and expertise, India is taking a leading role in strengthening regional cooperation among South Asian countries for reducing disasters.

India is one of the participating countries and works closely with the UNISDR. The United Nation Disaster Management Team in India comprises of UN agencies such as Food and Agriculture Organization, International Labour Organization, United Nations Development Programme, United Nations Educational, Scientific and Cultural Organization, United Nations Population Fund, United Nations High Commission for Refugees, United Nations Children's Fund, World Food Programme, and World Health Organization. India is participating in the Global Facility for Disaster Risk Reduction programme. India is one of the founder members of Asian Disaster Reduction Centre. India has agreements with the several countries for cooperation in the field of disaster management. India has been working closely with many countries for the exchange of ideas and expertise in disaster management.

9.2 Accepting Foreign Assistance

As a matter of policy, the Government of India does not issue any appeal for foreign assistance in the wake of a disaster. However, if the national government of another country voluntarily offers assistance as a goodwill gesture in solidarity with the disaster victims, the Central Government may accept the offer. The Ministry of Home Affairs, Government of India is required to coordinate with the Ministry of External Affairs, Government of India, which is primarily responsible for reviewing foreign offers of assistance and channelizing the same. In consultation with the concerned State Government, the MHA will assess the response requirements that the foreign teams can provide.

9.3 Accepting Multilateral Assistance

In the case of an offer of assistance from UN Agencies, the India will accept the offer only if the government considers it necessary, based on various factors. If accepted, GoI will issue directions to the respective Ministry or State Government to coordinate with the concerned UN agency. Any financial assistance offered by UN financial institutions involving foreign exchange will require the approval of the Department of Economic Affairs, GoI. India will allow UN agencies and international NGOs already operating in the country at the time of the disaster event to continue their humanitarian assistance to people in the affected area in coordination with the relevant Central Ministries/Departments and the State Government as per applicable norms and protocols.

9.4 Fostering Partnerships

India is keen to share expertise and work with other countries in the areas of disaster management. India can play a major role for capacity building in the Asia Pacific region and is look forward to build sustained regional and international partnerships under the Sendai Framework. India is committed to work with countries in the region and beyond in building resilient nations and communities, against disasters. India is looking forward to engage with international community in providing humanitarian assistance to other countries in need.

10 Maintaining and Updating the Plan

10.1 Background

Regular maintenance is critical to ensure the relevance and effectiveness of the DM plans. Plan maintenance is the dynamic process. The plan must be periodically updated to make it consistent with the changes in Government policies, initiatives, and priorities as well as to incorporate technological changes and global experiences. Evaluating the effectiveness of plans involves a combination of training events, exercises, and real-world incidents to determine whether the goals, objectives, decisions, actions, and timing outlined in the plan led to a successful response. In this way, the emergency preparedness exercises become an integral part of the planning process. The DM planners must be aware of lessons and practices from various parts of India as well as lessons from across the world. The trainings, mock drills and exercises is crucial to evaluating the operational aspects of the plan, rectify gaps, and improving the efficiency of the plan. The likelihoods of emergencies and actual occurrences are also occasions for evaluating the plan, making innovations, and for updating the plan, SOPs and guidelines. At times, operations experience setbacks due to outdated information, ineffective procedures, incorrect role assignments, and outdated norms. Further, the priorities for a jurisdiction may change over time as the makeup of the included communities change, as resources expand or contract, and as capabilities evolve.

10.2 Training

At different levels, the nodal agency tasked with developing respective DM plan has to disseminate it to all other agencies associated with the plan execution having with specific responsibilities (Central Ministries/ Departments, State Governments/ UTs, etc.). These key stakeholder agencies are required to train their personnel, so that they have the knowledge, skills and abilities needed to perform the tasks identified in the plan. Each agency shall assign nodal officers for DM and prepare adequate training schedule.

Each nodal agency for DM must hold, in accordance with a mandatory timetable, training workshops with regular mock drills, atleast twice a year. Such programs are crucial to ensure full preparedness and to maintain operational readiness of the disaster response operation teams, institutional mechanisms, and the equipment. These drills will be organized to test their readiness to deploy within the shortest possible time following the DMP activation. They shall be conducted in a manner similar to that of the drills carried out fire fighting department or the army units. These workshops and drills must be held at the pre-designated locations or base camps under the guidance of the designated incident commanders and associated departmental heads. The objective of all these trainings and drills would be to both familiarize the teams with the DMP and to increase their operational efficiencies. The trainings are crucial because they go beyond concepts and guidelines into inculcating in the individuals the critical importance of working as a coherent team for emergency response with a clear chain of command. The workshops and drills will also provide an opportunity to practice SOPs. These workshops would also give the teams an opportunity to develop all the stakeholders into a cohesive response unit.

10.3 Testing the Plan and Learning to Improve

Evaluating the effectiveness of a plan involves a combination of training events, exercises and real-time incidents to determine whether the goals, objectives, decisions, actions and timings outlined in

the plan led to a successful response. The purpose of exercises and drills is to promote preparedness by testing the plan with equal participation of all relevant stakeholders. The process of evaluation and remedial actions will identify, illuminate, and correct problems with the DMP. This process must capture information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, or lessons-learned processes that may indicate that deficiencies exist. Members of the planning team should reconvene to discuss the problem and to consider and assign responsibility for generating remedies across all mission areas.

Remedial actions may involve revising planning assumptions and operational concepts, changing organizational tasks, or modifying organizational implementing instructions (i.e., the SOPs/SOGs). Remedial actions may also involve reassessment of capabilities, revisiting assumptions made in the DMP, and finding solutions to overcome the deficiencies. The final component of a remedial action process is a mechanism for tracking and following up on the assigned actions. As appropriate, significant issues and problems identified through a remedial action process and/or the annual review should provide the information needed to allow the planning team to make the necessary revision(s) to the plan.

10.4 Revise / Update

This step closes the loop in the planning process. It focuses on adding the information gained by exercising the plan to the lessons learnt while executing, and start the planning cycle all over again. All the relevant stakeholders should establish a process for reviewing and revising the plan. Reviews should be a recurring activity. Each DM plan must be reviewed at least once in a year. It should also be reviewed and updated as indicated below:

- Major review and revisions after each major incident
- After significant change in operational resources (e.g., policy, personnel, organizational structures, management processes, facilities, equipment)
- Subsequent to any notification or formal update of planning guidance or standards
- After every case of plan activation in anticipation of an emergency
- After the completion of major exercises
- A change in the district's demographics or hazard or threat profile
- Enactment of new or amended laws or ordinances

In exceptional circumstances where the magnitude of the incidence or the situation demands/ needs extra measures to be taken, appropriate authority will make necessary amendments. Various ministries, States, and Union Territories will cooperate with the exercise of revising the plan as needed. As per section 11(4) of the DM Act, NDMP is to be reviewed and updated annually.

References

BMTPC (2016) Vulnerability Atlas of India. http://www.bmtpc.org/topics.aspx?mid=56&Mid1=180 (Accessed 10-Apr-2016)

MoAFW (2009) Manual for Drought Management, Ministry of Agriculture, Government of India

DesInventar (2016) http://www.desinventar.net/definitions.html (Accessed 15-Apr-2016)

GoI (2005) Disaster Management Act 2005

GoI (2009) National Policy on Disaster Management

IMD (2016) Terminology on Cyclonic disturbances over the North Indian Ocean. http://www.rsmcnewdelhi.imd.gov.in/images/pdf/cyclone-awareness/terminology/terminology.pdf (Accessed 15-Apr-2016)

NDMA Guidelines: http://ndma.gov.in/en/ndma-guidelines.html(accessed 10-Feb-2016)

NIH (2016) http://www.nih.ernet.in/rbis/india_information/draught.htm (Hydrology and Water Resources Information System for India (Accessed: 15-Apr-2016)

NOAA (2016) http://www.tsunami.noaa.gov/ (Accessed 10-Apr-2016)

SFAC (2016) Compendium of recommendations of the SFAC Standing Fire Advisory Council available on the website of NDRF. http://ndrfandcd.gov.in/CMS/FIRECompendium.aspx (accessed 20 April 2016)

UNDP (2013) Disaster risk Governance: Issue Brief. UNDP. New York.

UNDP (2015) Strengthening Disaster Risk Governance: UNDP Support during the HFA Implementation Period 2005-2015 (New York, 2015)

UNISDR (2009) UNISR Terminology on Disaster Risk Reduction. http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf (Accessed 15-Apr-2016)

UNISDR (2015a), Sendai Framework for Disaster Risk Reduction 2015-2030. http://www.unisdr.org/we/inform/publications/43291

UNISDR (2015b) Proposed Updated Terminology on Disaster Risk Reduction: A Technical Review. http://www.preventionweb.net/files/45462_backgoundpaperonterminologyaugust20.pdf-

UNISDR (2015c) Global Assessment Report 2015. https://www.unisdr.org/we/inform/publications/42809

UNISDR (2016) http://www.unisdr.org/2006/ppew/tsunami/what-is-tsunami/backinfor-brief.htm (Accessed: 15-Apr-2016)

UNISDR (2016) http://www.unisdr.org/2006/ppew/tsunami/what-is-tsunami/backinfor-brief.htm (Accessed 10-Apr-2016)

UNISDR 2004, Living With Risk: A Global Review of Disaster Reduction Initiatives, UNISDR, 2004; pg. 17

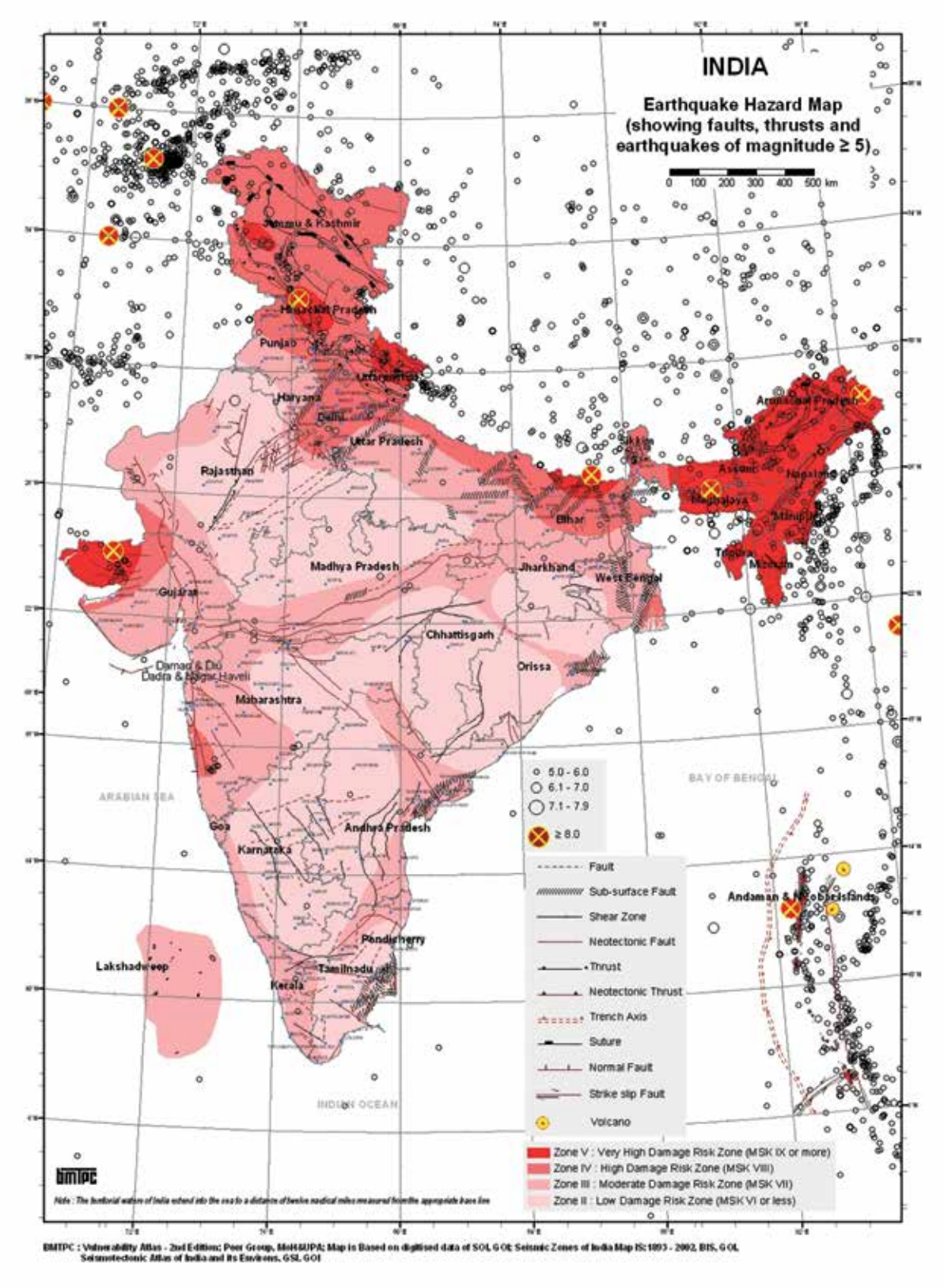
Annexure-I: List of NDMA's Disaster Management Guidelines

	Theme	Title of NDMA Guideline	Year
1	Biological Disaster	National Disaster Management Guidelines – Management of Biological Disasters	2008
2	Chemical (Industrial)	National Disaster Management Guidelines – Chemical Disasters	2007
3	Chemical (Terrorism)	National Disaster Management Guidelines – Management of Chemical (Terrorism) Disasters	2009
4	Cyclones	National Disaster Management Guidelines – Management of Cyclones	2008
5	DM Plans for States	National Disaster Management Guidelines – Preparation of State Disaster Management Plans	2007
6	Drought	National Disaster Management Guidelines – Management of Drought	2010
7	Earthquakes	National Disaster Management Guidelines – Management of Earthquakes	2007
8	Fire Services - Scaling, Type of Equipment and Training	National Disaster Management Guidelines – Scaling, Type of Equipment and Training of Fire Services	2012
9	Flood	National Disaster Management Guidelines – Management of Floods	2008
10	Heat Wave	Guidelines for Preparation of Action Plan – Prevention and Management of Heat-Wave	2016
11	Hospital Safety	National Disaster Management Guidelines – Hospital Safety	2016
12	Incident Response System	National Disaster Management Guidelines – Incident Response System	2010
13	Information and Communication System	National Disaster Management Guidelines – National Disaster Management Information and Communication System	2012
14	Landslide and Snow Avalanches	National Disaster Management Guidelines – Management of Landslide and Snow Avalanches	2009
15	Medical Preparedness and Mass Casualty Management	National Disaster Management Guidelines – Medical Preparedness and Mass Casualty Management	2007
16	Minimum Standards for Relief	Guidelines on Minimum Standards of Relief	2016
17	Nuclear and Radiological Emergencies	National Disaster Management Guidelines – Nuclear and Radiological Emergencies	2009
18	Psycho-Social Support	National Disaster Management Guidelines – Psycho-Social Support and Mental Health Services in Disasters	2009
19	School Safety Policy	National Disaster Management Guidelines – School Safety Policy	2016
20	Seismic Retrofitting of Deficient Buildings and Structures	National Disaster Management Guidelines – Seismic Retrofitting of Deficient Buildings and Structures	2014
21	Tsunamis	National Disaster Management Guidelines – Management of Tsunamis	2010
22	Urban Flooding	National Disaster Management Guidelines – Management of Urban Flooding	2010

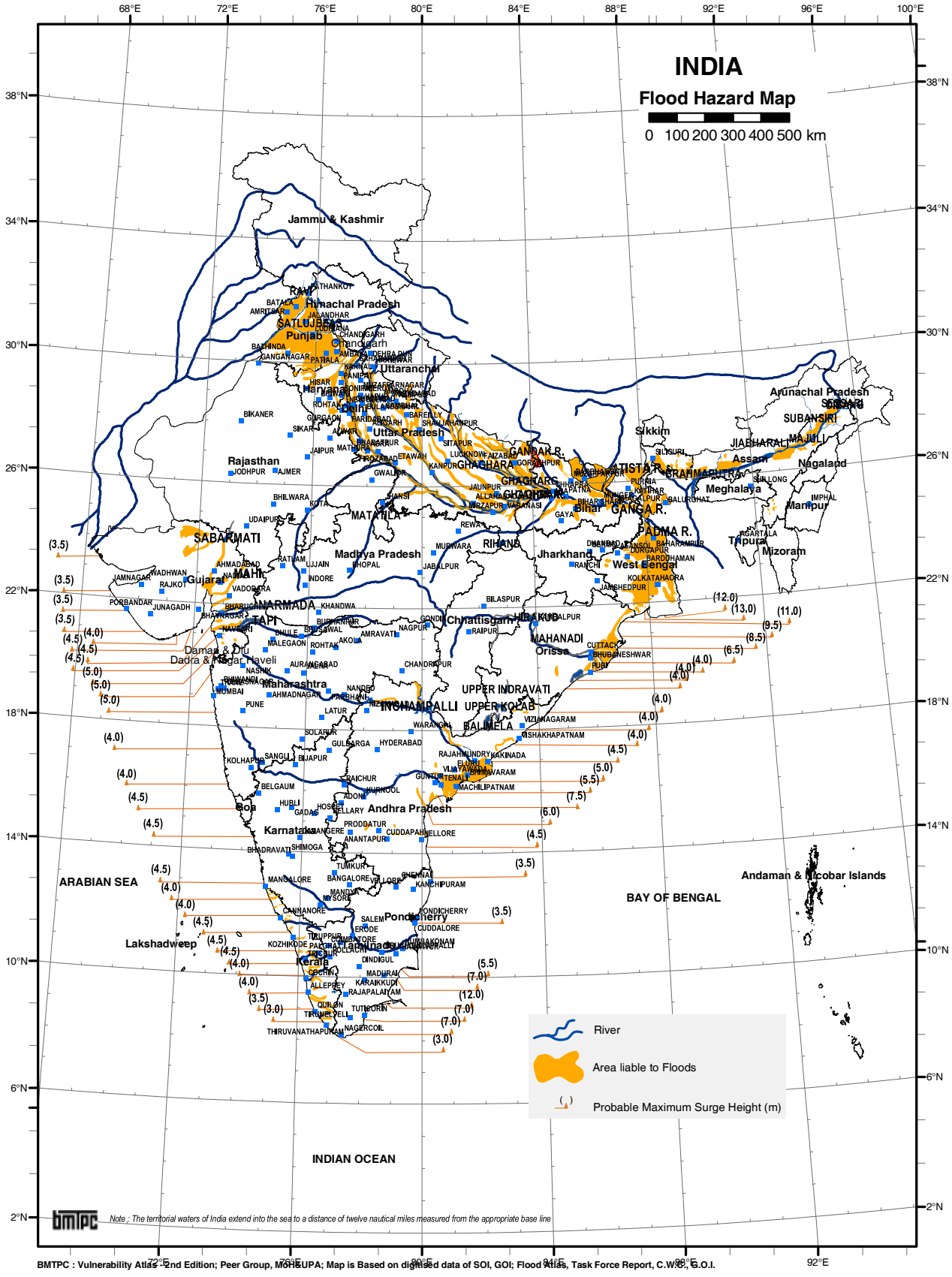
Source: http://ndma.gov.in/en/ndma-guidelines.html (as on 30 April 2016)

Annexure-II: Hazard Vulnerability Maps for India

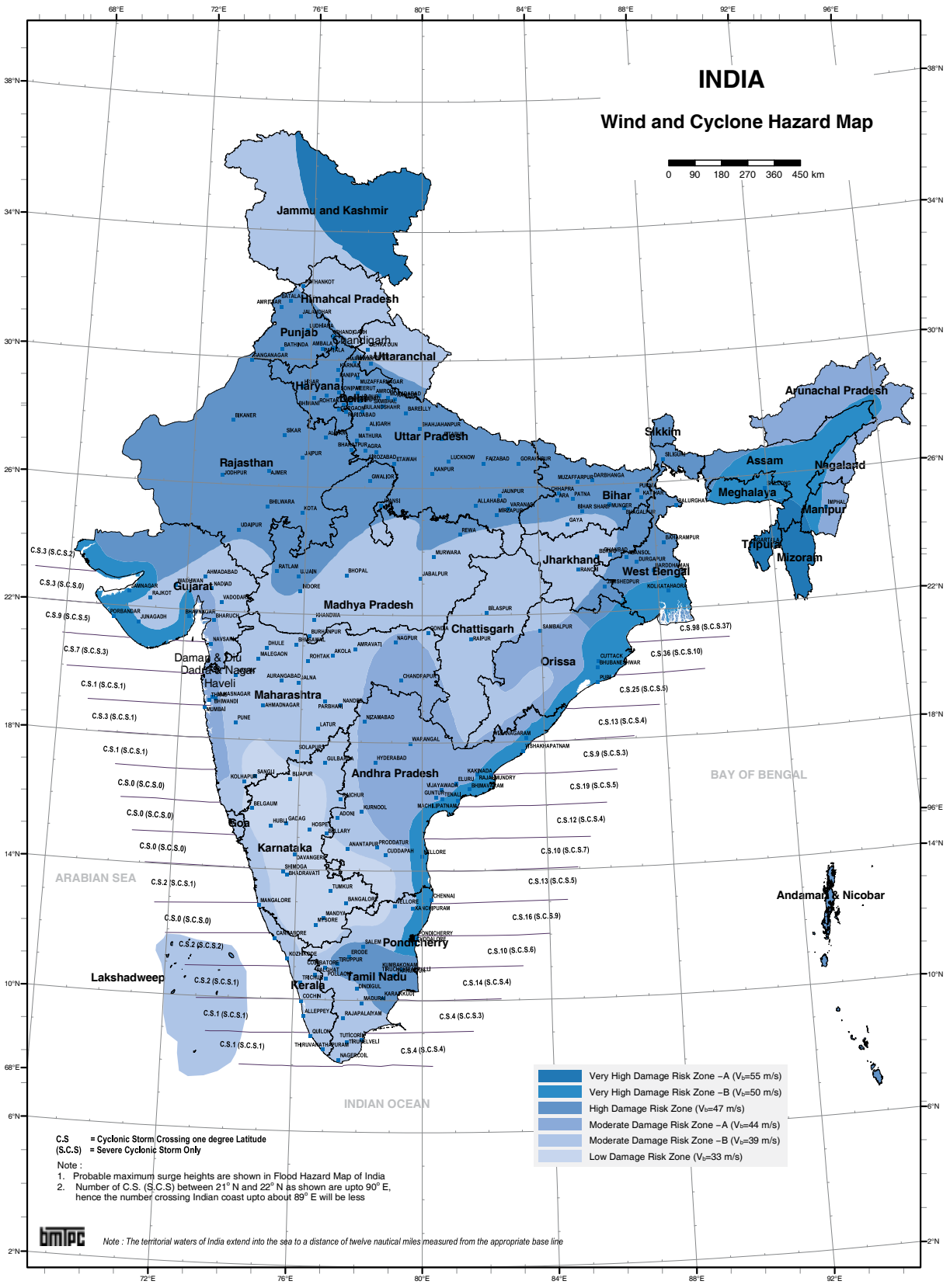
Earthquake Vulnerability Zones of India



Flood Vulnerability Zones of India



Wind and Cyclone Vulnerability Zones of India



BMTPC : Vulnerability Atlas –2nd Edition; Peer Group, MoH&UPA; Map is Based on digitised data of SOI, GOI ; Basic Wind Speed Map, IS 875(3) –1987; Cyclone Data, 1877-2005, IMD, GOI

Glossary

(for a more comprehensive glossary, refer to www.unisdr.org)

Adaptation: The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Building Code: A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

Capacity: The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

Capacity Development: The process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions.

Climate Change: (a) The Inter-Governmental Panel on Climate Change (IPCC) defines climate change as: "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use".

(b) The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Coping Capacity: The ability of people, organizations, and systems using available skills and resources to face and manage adverse conditions, emergencies, or disasters.

Critical Facilities: The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

Disaster: A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster Risk: The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Disaster Risk Management: The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster Risk Reduction: The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Early Warning System: The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Emergency Services: The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations.

Environmental Degradation: The reduction of the capacity of the environment to meet social and ecological objectives and needs.

Forecast: Definite statement or statistical estimate of the likely occurrence of a future event or conditions for a specific area.

Geological Hazard: Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Hydro-Meteorological Hazard: Process or phenomenon of atmospheric, hydrological or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Land-use Planning: The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses.

Mitigation: The lessening or limitation of the adverse impacts of hazards and related disasters.

Non-structural Measures: Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Preparedness: The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Prevention: The outright avoidance of adverse impacts of hazards and related disasters.

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Response: The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Retrofitting: Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Risk: The combination of the probability of an event and its negative consequences.

Risk Assessment: A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk Management: The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

Risk Transfer: The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Structural Measures: Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems.

Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Vulnerability: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Contact Us

For more information on *National Disaster Management Plan*
Please contact:

National Disaster Management Authority
NDMA Bhawan, A-1 Safdarjung Enclave,
New Delhi-110 029

Tel: +91-11-26701700

Web: www.ndma.gov.in