



NATIONAL DISASTER MANAGEMENT PLAN

November 2019



**NATIONAL DISASTER MANAGEMENT AUTHORITY
MINISTRY OF HOME AFFAIRS
GOVERNMENT OF INDIA**

National Disaster Management Plan

National Disaster Management Plan

A publication of:

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

National Disaster Management Plan - 2016

Revised Edition - November, 2019

When citing this report the following citation should be used:

National Disaster Management Plan, 2019.

A publication of the National Disaster Management Authority, Government of India.
November 2019, New Delhi.

National Disaster Management Plan



National Disaster Management Authority
Ministry of Home Affairs
Government of India

November, 2019



प्रधान मंत्री
Prime Minister
MESSAGE

It is a pleasure to learn that the National Disaster Management Authority (NDMA) has prepared the updated and revised National Disaster Management Plan (NDMP). The updated NDMP is an improvement over the earlier version. This plan will enhance the understanding of stakeholders on disaster risks and will further strengthen our capacity to recover in the wake of natural disasters.

Taking forward the country's agenda for achievement of targets set under Sendai Framework for Disaster Risk Reduction - SFDRR (2015 -2030), the Plan has also focused on achieving a coherence with other international agreements such as Sustainable Development Goals (SDGs) and Paris Agreement on Climate Change (COP 21). The period of these agreements coincide with SFDRR. This coherence will result in ensuring sustainable and climate resilient development that will ultimately reduce disaster risk.

It is imperative to mainstream disaster risk reduction in developmental planning and to adopt an inclusive approach towards risk reduction to ensure sustainability of developmental initiatives and to widen its reach to cover every citizen.

The success of a Plan depends on its successful implementation. It is the responsibility of all stakeholders, both government and non-government, to execute this plan wisely and carry out responsibilities assigned to them in a time-bound manner. This will also help in achieving the objectives of the National Plan.

I congratulate NDMA for coming out with a revised and more comprehensive National Plan with some new relevant features to cover more disasters and adding new dimensions of sustainable development and climate change. I am sure that this will help in making India more resilient to disasters and our nation will lead the world in the field of disaster management.



(Narendra Modi)



गृह मंत्री
Home Minister

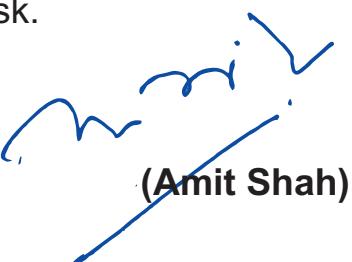
MESSAGE

I am glad to note that India is among the leading countries in the field of disaster management that has already put in place many effective methodologies to deal with natural disaster. The revised National Disaster Management Plan, I am sure, will prove to be a strategic tool in further strengthening disaster resilient development in the country.

It is a matter of great satisfaction that the revised version has comprehensively analyzed all important aspects and included mainstreaming of disaster risk reduction in the National Plan with an inclusive approach.

Such mitigation and risk reduction initiatives result in decreased requirements in response, efforts and in saving loss of lives and properties. The revised plan has done justice to all phases of disaster management and stakeholders must ensure they revolve around this Plan.

I convey my best wishes to NDMA for their effort and congratulate all associated in this noble task.



(Amit Shah)



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

Preface

A Disaster Management Plan needs to be a dynamic and actionable document, which needs to be updated and revised periodically. Keeping this in mind, the existing National Plan of 2016 has been revised enhancing it considerably improving the approach and adding new dimensions. We hope that the revised version will prove to be more useful and effective in addressing the difficult challenges of disaster risk reduction facing Ministries/ Departments of Central Government, States and UTs.

The revision of the existing National Disaster Management Plan 2016 started in April, 2017 with a consultative workshop. This was followed by several rounds of extensive consultations internally and with different stakeholders and experts from different domains. After 3-4 rounds of revision process, a final draft was also placed on the website of NDMA for one month inviting comments and suggestions from all stakeholders including common people and was also circulated to all Ministries / Departments and States / UTs for comments and inputs. Incorporating their comments and suggestions suitably the revised Plan was finalized and approved by Members of NDMA.

The hazard and vulnerability profile of India is now well known. India's proneness to multiple disasters caused by natural and human induced factors aggravated by climate change impacts pose many threats and challenges for communities and agencies involved in management of disasters. With the enactment of Disaster Management Act 2005 and adoption of National Policy on Disaster Management 2009, Government of India has established improved institutional arrangements and DRR mechanisms to deal with any threatening disaster situation or disaster.

In the year 2015, GOI adopted three landmark international agreements having bearing on disaster management:

- (i) Sendai Framework for Disaster Risk Reduction (SFDRR) in March 2015;
- (ii) Sustainable Development Goals (SDGs) (2015-30) in September 2015; and
- (iii) Paris Agreement on Climate Change at the 21st Conference of Parties (COP 21), under the United Nations Framework Convention on Climate Change in December 2015.

These international agreements should not be seen in isolation. A sustainable development needs to be disaster resilient and be adaptive to climate change impacts. Keeping this in mind the revised plan has put special emphasis on establishing coherence between the three international agreements with special consideration to Ten Point Agenda on DRR, enunciated by Prime Minister during Asian Ministerial Conference on DRR (AMCDRR) in November 2016 in New Delhi. This will help all concerned stakeholders in central government as well as in States and UTs in striving to achieve the national goals.

Considering the significance of climate change impacts on frequency and intensity of disasters, Climate Change Risk Management has been included as a new and sixth thematic area for disaster risk management in the responsibility framework, in addition to the existing five thematic areas, Understanding Risk, Inter Agency Coordination, Investing in DRR – Structural Measures, Investing in DRR – Non-structural Measures and Capacity Development.

It goes without saying that the Disaster Management Plan can be effective only if it is implemented in letters and spirit. For this there is a need to mainstream disaster risk reduction measures in developmental plans and policies by Ministries / Departments of Government of India and Governments of States and UTs. This plan will help in understanding the ways and strategies to mainstream disaster risk reduction in their plans and policies as it provides an understanding on the same in new chapter added in this plan on mainstreaming.

The revised Plan also puts special emphasis on making the Plan inclusive. We are aware that the impacts of disasters are felt more by some sections of the community, owing to their differential vulnerabilities and capacities due to physical, socio-economic and other reasons. The revised NDMP has considered this aspect as well. A new chapter on Social Inclusion addresses special considerations and suggests measures considering gender-based vulnerabilities, conditions of SC/ST communities, the elderly, children and persons with disabilities. This will help other stakeholders too in making their disaster management plans inclusive.

In order to synchronise the National Disaster Management Plan with the post-2015 international agreements, 2030 has been envisaged as the ending year for long-term actions. The activities envisaged as short, medium and long term ending in 2022, 2027 and 2030 respectively, have been included in this revised Plan. While some of the actions are a continuation from the previous plan, for all practical purposes, the activities are concurrent with the three phases overlapping in most cases. All responsibilities of Central Government Ministries and Departments and those of State/Union Territories Governments have been placed with a definite time frame, which will start and go on simultaneously with different timelines of completion.

While utmost care was taken with dedicated efforts in making the revisions, a Plan will always have scope for improvement because of its dynamic nature. This version is an improvement over the earlier one and with more experience by implementing this Plan, we will get to know more insights to be incorporated in future versions. We hope that this Plan will help all concerned stakeholders in their efforts and initiatives towards building a disaster resilient community and country. Suggestions and comments are always needed and will be welcomed.



Kamal Kishore

Member

Dr. D. N. Sharma

Member

Lt. Gen. N C Marwah (Retd)

Member

G V V Sarma, IAS

Member Secretary

Acknowledgements

The process of revising the National Disaster Management Plan started in April 2017 with a consultative workshop with various stakeholders. This was followed by a series of consultations and reviews before the revised guidelines were finalised. The broad approach was two-pronged – to improve upon the existing content and to add new dimensions to it.

We gratefully acknowledge the support and contribution of everyone directly or indirectly involved in the mammoth exercise of revising the Plan.

Shri G. V. V. Sarma, Member Secretary, NDMA, Lt. Gen. N. C. Marwah (Retd.), Dr. D. N. Sharma and Shri Kamal Kishore, Members, NDMA, and Dr. Pradeep Kumar, the then Secretary in-charge, NDMA, gave valuable suggestions and inputs going through the drafts and provided unwavering support and guidance.

Dr. V. Thiruppugazh, Additional Secretary (Policy and Plan), NDMA, who led the entire process, brought novel ideas and dimensions to the Plan. His inputs and guidance, and his critical review of each successive draft were instrumental in finalising this Plan. Shri Anuj Tiwari, Senior Consultant (Policy, Plan and Mainstreaming) coordinated with all stakeholders, seeking their inputs and comments, provided technical inputs and supported the overall revision process. Dr. Pavan Kumar Singh (Joint Advisor, Operations) and Shri Nawal Prakash (Senior Research Officer) provided technical support and inputs. Officials and Consultants of NDMA, and subject experts also contributed to the content of sections pertaining to their respective areas of expertise.

UNNATI - Organisation for Development Education provided technical support for preparing this revised Plan. Dr. C. P. Geevan provided valuable technical support for the revision of NDMP. Mr Binoy Acharya and his team members at UNNATI, also contributed to the revision process from time to time.

Relevant matrices and the final draft were also shared with all Ministries and Departments, Government of India; and States and UTs. We would like to place on record their contributions of valuable suggestions and comments, which were suitably incorporated in the revised Plan.

Contents

Message from Hon'ble Prime Minister	xix
Message from Hon'ble Home Minister	xxvii
Preface	
Acknowledgements	
Abbreviations	
Executive Summary	
1 Preliminaries	1
1.1 Rationale	1
1.2 Paradigm Shift	3
1.3 Main Pillars of the NDMP	4
1.4 Legal Mandate	4
1.5 Three Post-2015 Global Frameworks—Disasters, Sustainable Development and Climate Change: Mutual Reinforcement and Coherence	5
1.6 Prime Minister's Ten-Point Agenda for Disaster Risk Reduction	6
1.7 Social Inclusion	8
1.8 Mainstreaming DRR	8
1.9 Vision	9
1.10 Scope	9
1.11 Objectives	10
1.12 Time Frames – Short, Medium and Long-Term	11
→ 1.13 Types of Disasters	12
1.13.1 Natural Hazards	12
1.13.2 Human-Induced Disasters	14
1.14 Institutional Framework	15
1.14.1 National Level	15
1.14.2 State Level	20
1.15 Plan Implementation	22
2 Hazard Risks and Challenges	23
2.1 Background	23
2.2 Hazard Risks and Vulnerabilities	24
2.2.1 Multi-Hazard Vulnerability	24
2.2.2 Natural Hazards	24
2.2.3 Human-induced Hazards	36
2.2.4 Fire Risk	41
2.3 Regions/Areas Involving Multiple States Requiring Special Attention	42
2.3.1 Himalayan Region	42
2.3.2 Coastal Areas	43
2.3.3 Riverine Regions	43
2.3.4 North East Region (NER)	43
2.3.5 Union Territories, Islands and Marine Assets	44
2.3.6 Arid/Semi-Arid and Drought-Prone Regions	44
2.4 Climate Change	45
2.4.1 Climate and Human-Induced Climate Change	45
2.4.2 IPCC Fifth Assessment Report	46

2.4.3	India and Climate Change	47
2.4.4	Temperature	48
2.4.5	Impact on Indian Monsoon	48
2.4.6	Storm and Cyclones	49
2.4.7	Sea-Level Rise	49
2.4.8	Coastal Inundation due to Sea Level Rise	49
2.4.9	Integrating DRR and Climate Change Adaptation (CCA)	50
2.5	Livestock – DRR Challenges	50
2.5.1	Background	50
2.5.2	Global Approaches in Livestock Emergencies	51
2.5.3	Key Interventions	51
2.5.4	Risk Management and Insurance	52
2.6	Environment and Wildlife Conservation	52
2.6.1	Background	52
2.6.2	Environmental Monitoring and Assessment	53
2.6.3	Protected Areas, Ecosystem Rehabilitation	53
2.6.4	India and Biodiversity Conservation	54
2.6.5	DRR and Climate Change in Wildlife Action Plan	55
2.7	Disaster Management for Cultural Heritage Sites, their Precincts and Museums	56
2.8	Global Catastrophic Risks	57
3	Coherence and Mutual Reinforcement of Three Post-2015 Global Frameworks for DRR	59
3.1	Background	59
3.2	Sendai Framework for DRR	59
3.2.1	New Emphasis on Disaster Risk Management	59
3.2.2	Four Priorities; Seven Targets	61
3.3	Sustainable Development Goals (SDG) and Disaster Resilience	62
3.4	COP21 Paris Agreement on Climate Change Action and Disaster Risk Reduction	64
3.5	Coherence and Mutual Reinforcement—Thematic Area for DRR	66
4	Social Inclusion in Disaster Risk Reduction	73
4.1	Background	73
4.2	Gender Perspective and DRR	74
4.2.1	Gender-based Vulnerabilities	74
4.2.2	Sexual and Gender Minorities	76
4.3	Scheduled Castes and Scheduled Tribes	76
4.3.1	Scheduled Castes	77
4.3.2	Scheduled Tribes	77
4.4	Children	78
4.5	Elderly	79
4.6	Persons with Disabilities (PWD)	80
4.7	Making Disaster Risk Management Inclusive	81
4.8	Responsibility Framework—Social Inclusion	83
5	Mainstreaming Disaster Risk Reduction	89
5.1	Background	89
5.2	Mainstreaming—Sub Thematic Areas for DRR	90
5.3	Improving the Awareness and Understanding of Risk	91
5.4	Legal Support and Disaster Governance	91
5.5	Disaster Risk Transfer	91
5.6	Ensuring Social Inclusiveness in Disaster Risk Management	92
5.7	Enabling Coherence and Mutual Reinforcement of Initiatives under the Major Global Frameworks for Enhancing Disaster Resilience	92
5.8	Institutional Arrangements and Capacity Development for Disaster Risk Management	93

5.9	Intra-Government Coordination and Integration	93
5.10	Budget Allocations	93
5.11	Changes in Project Appraisal	94
5.12	Setting Targets, Timeframes and Indicators	94
5.13	Implementation	94
6	Building Disaster Resilience – Responsibility Framework: Part-A, Prelude	97
6.1	Introduction	97
6.2	Thematic Areas for DRR	98
6.2.1	Understanding Risk	98
6.2.2	Inter-Agency Coordination	99
6.2.3	Investing in DRR – Structural Measures	99
6.2.4	Investing in DRR – Non-Structural Measures	99
6.2.5	Capacity Development	99
6.2.6	Climate Change Risk Management	100
7	Building Disaster Resilience – Responsibility Framework, Part-B	101
7.1	Cyclone and Wind	102
7.1.1	Understanding Risk	102
7.1.2	Inter-Agency Coordination	105
7.1.3	Investing in DRR – Structural Measures	106
7.1.4	Investing in DRR – Non-Structural Measures	107
7.1.5	Capacity Development	109
7.1.6	Climate Change Risk Management	111
7.2	Flood	114
7.2.1	Understanding Disaster Risk	114
7.2.2	Inter-Agency Coordination	117
7.2.3	Investing in DRR – Structural Measures	118
7.2.4	Investing in DRR – Non-Structural Measures	120
7.2.5	Capacity Development	123
7.2.6	Climate Change Risk Management	125
7.3	Urban Flood	129
7.3.1	Understanding Disaster Risk	129
7.3.2	Inter-Agency Coordination	131
7.3.3	Investing in DRR – Structural Measures	132
7.3.4	Investing in DRR – Non-Structural Measures	133
7.3.5	Capacity Development	135
7.3.6	Climate Change Risk Management	137
7.4	Seismic/ Earthquakes	141
7.4.1	Understanding Disaster Risk	141
7.4.2	Inter-Agency Coordination	143
7.4.3	Investing in DRR – Structural Measures	144
7.4.4	Investing in DRR – Non-Structural Measures	145
7.4.5	Capacity Development	146
7.5	Tsunami	149
7.5.1	Understanding Disaster Risk	149
7.5.2	Inter-Agency Coordination	151
7.5.3	Investing in DRR – Structural Measures	152
7.5.4	Investing in DRR – Non-Structural Measures	153
7.5.5	Capacity Development	155
7.5.6	Climate Change Risk Management	157
7.6	Landslides and Snow Avalanches	160
7.6.1	Understanding Disaster Risk	160

7.6.2	Inter-Agency Coordination	162
7.6.3	Investing in DRR – Structural Measures	163
7.6.4	Investing in DRR – Non-Structural Measures	163
7.6.5	Capacity Development	166
7.6.6	Climate Change Risk Management	168
7.7	Drought	171
7.7.1	Understanding Risk	171
7.7.2	Inter-Agency Coordination	174
7.7.3	Investing in DRR - Structural Measures	175
7.7.4	Investing in DRR – Non-Structural Measures	176
7.7.5	Capacity Development	179
7.7.6	Climate Change Risk Management	181
7.8	Cold Wave and Frost	185
7.8.1	Mitigation Measures for People	185
7.8.2	Mitigation Measures for Crops and Animals	185
7.8.3	Climate Change Risk Management	186
7.9	Thunderstorm, Lightning, Dust, Squall and Strong Winds	188
7.9.1	Understanding Risk	188
7.9.2	Inter-Agency Coordination	188
7.9.3	Investing in DRR – Structural measures	190
7.9.4	Investing in DRR – Non-structural measures	190
7.9.5	Capacity Development	193
7.9.6	Climate Change Risk Management	193
7.10	Cloudburst and Hailstorm	195
7.10.1	Understanding Risk	195
7.10.2	Inter-Agency Coordination	196
7.10.3	Investing in DRR – Structural Measures	196
7.10.4	Investing in DRR – Non-Structural Measures	197
7.10.5	Capacity Development	197
7.10.6	Climate Change Risk Management	199
7.11	Glacial Lake Outburst Flood (GLOF)	200
7.11.1	Understanding Risk	200
7.11.2	Inter-Agency Coordination	201
7.11.3	Investing in DRR – Structural Measures	202
7.11.4	Investing in DRR – Non-Structural Measures	202
7.11.5	Capacity Development	203
7.11.6	Climate Change Risk Management	204
7.12	Heat Wave	207
7.12.1	Understanding Risk	207
7.12.2	Inter-Agency Coordination	209
7.12.3	Investing in DRR – Structural Measures	212
7.12.4	Investing in DRR – Non-Structural Measures	213
7.12.5	Capacity Development	214
7.12.6	Climate Change Risk Management	216
7.13	Chemical (Industrial) Disasters	219
7.13.1	Understanding Risk	219
7.13.2	Inter-Agency Coordination	221
7.13.3	Investing in DRR – Structural Measures	222
7.13.4	Investing in DRR – Non-Structural Measures	223
7.13.5	Capacity Development	225
7.14	Nuclear and Radiological Emergencies	228

7.14.1	Understanding Risk	228
7.14.2	Inter-Agency Coordination	229
7.14.3	Investing in DRR – Structural Measures	230
7.14.4	Investing in DRR - Non-Structural Measures	230
7.14.5	Capacity Development	231
7.15	Biological and Public Health Emergencies (BPHE)	235
7.15.1	Understanding Risk	235
7.15.2	Inter-Agency Coordination	237
7.15.3	Investing in DRR – Structural Measures	238
7.15.4	Investing in DRR – Non-Structural Measures	240
7.15.5	Capacity Development	242
7.15.6	Climate Change Risk Management	246
7.16	Fire Hazard	249
7.16.1	Understanding Risk	249
7.16.2	Inter-Agency Coordination	250
7.16.3	Investing in DRR – Structural Measures	250
7.16.4	Investing in DRR – Non-Structural Measures	251
7.16.5	Capacity Development	252
7.17	Forest Fire Hazard	253
7.17.1	Understanding Risk	253
7.17.2	Inter-Agency Coordination	255
7.17.3	Investing in DRR – Structural Measures	256
7.17.4	Investing in DRR – Non-Structural Measures	257
7.17.5	Capacity Development	259
7.17.6	Climate Change Risk Management	261
8	Preparedness and Response	263
8.1	Background	263
8.2	Institutional Framework	264
8.3	National Early Warning System	265
8.3.1	Central Agencies Designated for Natural Hazard-Specific Early Warnings	265
8.3.2	Role of Central Agencies/ Departments	266
8.4	Coordination of Response at National Level	266
8.5	Fire and Emergency Services (F&ES)	267
8.6	Responding to Requests for Central Assistance from States	268
8.7	Management of Disasters Impacting more than one State	268
8.8	Response System Activation	268
8.9	Emergency Functions and the Responsibilities: Centre and State	269
8.10	Responsibility Framework for Preparedness and Response	271
9	Recovery and Building Back Better	291
9.1	Scope	291
9.2	Approach	292
9.3	Recovery Process	292
9.4	Early, Mid and Long-term Recovery	295
9.5	Reconstruction	296
9.6	Co-ordination of Reconstruction	296
9.6.1	Central Government	296
9.6.2	State Government	296
9.6.3	Private Sector	297
9.6.4	Voluntary Organizations and International Aid Agencies	297
9.7	Rehabilitation	297
9.7.1	Background	297

9.7.2	Physical Rehabilitation	298
9.7.3	Relocation	298
9.7.4	Social Rehabilitation	298
9.7.5	Revival of Educational Activities	299
9.7.6	Rehabilitation of the Elderly, Women, Children and PWD	299
9.7.7	Economic Rehabilitation	299
9.7.8	Psychological Rehabilitation	300
9.7.9	Restoration of Damaged Cultural Heritage Sites, their Precincts and Museums	300
9.8	Fund Mobilization	301
9.8.1	Background	301
9.8.2	Mobilizing, Disbursement and Monitoring	301
9.8.3	Recovery of Reconstruction Costs	303
10	Capacity Development – An Overview	305
10.1	Background	305
10.2	NIDM, NDRF and Other Institutions	306
10.3	Capacity Development of Local Bodies – Rural and Urban	307
10.4	Training of Communities	307
10.5	Disaster Resource Networks – National, State and District	307
10.6	Capacity Development Themes	308
11	Financial Arrangements	311
11.1	Background	311
11.2	National Disaster Response Fund	311
11.3	State Disaster Response Fund	312
11.4	National Disaster Mitigation Fund	313
11.5	Recommendations of the Fourteenth Finance Commission	313
11.6	Statutory Provisions	314
11.6.1	Financing Prevention, Mitigation, and Preparedness	314
11.6.2	Allocation by Ministries and Departments	314
11.6.3	Provisions in the Act for Disaster Risk Reduction	314
11.7	Implementation of DRR – Financial Aspects	316
11.7.1	Public Funded Schemes	316
11.7.2	Flexi Funds as a part of Centrally Sponsored Schemes	316
11.7.3	Externally Aided Projects	317
11.8	Risk Transfer and Insurance	317
12	Strengthening Disaster Risk Governance	319
12.1	Background	319
12.2	Sendai Framework and Strengthening Disaster Risk Governance	320
12.3	Responsibility Framework for Strengthening Disaster Risk Governance	321
13	International Cooperation	327
13.1	Participation in International Efforts	327
13.2	Accepting Foreign Assistance	327
13.3	Accepting Multilateral Assistance	327
13.4	Fostering Partnerships	328
14	Maintaining, Monitoring and Updating the Plan	329
14.1	Background	329
14.2	Training and Drills	329
14.3	Testing the Plan and Learning to Improve	330
14.4	Monitoring by Central Ministries/Depts. and States/UTs	330
14.5	Revise/ Update	330

References	333
Annexure - I: List of NDMA's Disaster Management Guidelines	337
Annexure - II: Hazard Risk Maps for India	339
Earthquake Hazard Map	340
Wind Hazard Map	341
Flood Hazard Map	342
Landslide Incidence Map	343
Thunderstorm Incidence Map	344
Annexure - III: Sendai Framework Indicators	345

List of Figures

Figure 1-1: Disaster Management Cycle	2
Figure 1-2: Time Frames—Short, Medium and Long Term	11
Figure 1-3: National-level disaster management - basic institutional framework	15
Figure 1-4: State-level disaster management - basic institutional framework	20
Figure 3-1: Sendai Framework for Disaster Risk Reduction - 7 Global Targets	61
Figure 3-2: Seventeen Sustainable Development Goals	63
Figure 3-3: Coherence and mutual reinforcement of SDGs and Sendai Framework	63
Figure 3-4: Main elements of the COP21, Paris Agreement on Climate Change	64
Figure 3-5: Common concerns of climate change adaptation and disaster risk reduction	65
Figure 3-6: Post-2015 Global Frameworks—Coherence and Mutual Reinforcement within National Efforts	67
Figure 3-7: Envisaging coherence and Mutual Reinforcement of SDGs and Sendai Framework	68
Figure 3-8: Envisaging coherence and mutual reinforcement of SDGs and COP21 for climate change action	69

List of Tables

Table 1-1: Categories of Natural Hazards	12
Table 1-2: Key National-Level Decision-Making Bodies for Disaster Management	16
Table 1-3: Nodal Ministry for Management/ Mitigation of Different Disasters	18
Table 2-1: India - General profile	23
Table 2-2: Classification used in India for tropical cyclones	25
Table 2-3: Status of the PA Network in India (July 2017)	55
Table 3-1: India's national initiatives relevant for DRR across the three Global Frameworks	69
Table 7-1: Snow and frost – Illustrative Crop Protection Measures	186
Table 8-1: Central Agencies Designated for Natural Hazard-Specific Early Warnings	265
Table 9-1: Major Steps of the Recovery Process and the Key Processes Involved	294
Table 9-2 Recovery Stages	295
Table 9-3: Important aspects in mobilizing and managing the funds of a recovery programme	302
Table 10-1: Capacity Development for DRR Themes - Centre and State	308

Abbreviations

AAI	: Airports Authority of India
ADWR	: Airborne Doppler Weather Radar
AERB	: Atomic Energy Regulatory Board
AGD	: Agriculture Department
AHD	: Animal Husbandry Department
AIAI	: All India Association of Industries
AICTE	: All India Council of Technical Education
ALTM	: Airborne Laser Terrain Mapping
AMCDRR	: Asian Ministerial Conference on Disaster Risk Reduction
ANM	: Auxiliary Nurse Midwife
AP	: Andhra Pradesh
AR5	: IPCC's Fifth Assessment Report
ARG	: Automatic Rain Gauge
ARHD	: Archaeology Department
ASHA	: Accredited Social Health Activist
ASI	: Archaeological Survey of India
ASSOCHAM	: Associated Chambers of Commerce and Industry of India
ATI	: Administrative Training Institute
AWS	: Automatic Weather Stations
AYUSH	: Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy
BAI	: Builders Association of India
BBB	: Build Back Better
BIS	: Bureau of Indian Standards
BMTPC	: Building Materials and Technology Promotion Council
BPHE	: Biological and Public Health Emergencies
BRO	: Border Roads Organisation
BSF	: Border Security Force
CADA	: Coastal Area Development Authority
CAPF	: Central Armed Police Forces
CARA	: Central Adoption Resource Authority
CBRI	: Central Building Research Institute, Roorkee
CBRN	: Chemical, Biological, Radiological and Nuclear
CBSE	: Central Board of Secondary Education
CCA	: Climate Change Adaptation
CCM	: Climate Change Mitigation
CCS	: Cabinet Committee on Security
CDEF	: Civil Defence
CDMM	: Centre for Disaster Mitigation and Management, Vellore
CDRC	: Central Drought Relief Commissioner
CEDMM	: Centre of Excellence in Disaster Mitigation and Management/IIT-Roorkee
CFI	: Construction Federation of India
CIDC	: Construction Industry Development Council
CII	: Confederation of Indian Industry

CIMFR	: Central Institute of Mining & Fuel Research
CISF	: Central Industrial Security Force
CMG	: Crisis Management Group
CoA	: Council of Architecture
COP	: Conference of the Parties
COR	: Commissioner of Relief
CRIDA	: Central Research Institute for Dryland Agriculture
CRPF	: Central Reserve Police Force
CRRI	: Central Road Research Institute
CRZ	: Coastal Regulation Zone
CSIR	: Council of Scientific and Industrial Research
CSO	: Central Statistics Office
CSS	: Centrally Sponsored Schemes
CUD	: Culture Department
CWC	: Central Water Commission
CWPRS	: Central Water and Power Research Station
CWWG	: Crop Weather Watch Group
CZMA	: Coastal Zone Management Authority
DAE	: Department of Atomic Energy
DCPU	: District Child Protection Unit
DDMA	: District Disaster Management Authority
DEOC	: District Emergency Operation Center
Dept.	: Department
DFIN	: Finance Department
DFRI	: Disaster Risk Financing Instruments
DGM	: Directorates of Geology and Mining
DISCOM	: Power Distribution Companies
DMC	: Drought Monitoring Cell
DMD	: Disaster Management Department
DMP	: Disaster Management Plan
DOS	: Department of Space
DOT	: Department of Telecommunications
DRD	: Department of Rural Development
DRDO	: Defence Research and Development Organization
DRM	: Disaster Risk Management
DRR	: Disaster Risk Reduction
DSJE	: Social Justice and Empowerment Department
DSS	: Decision Support System
DTRL	: Defense Terrain Research Laboratory
DWR	: Doppler Weather Radar
EDD	: Education Department
EFD	: Forest and Environment Department
EHRA	: Earthquake Hazard and Risk Assessment
EIA	: Environment Impact Assessment
EOC	: Emergency Operations Centre
EREC	: Earthquake Risk Evaluation Centre
EWS	: Early Warning System
F&ES	: Fire and Emergency Services

FAO	: Food and Agriculture Organisation
FC	: Finance Commission
FCI	: Food Corporation of India
FCSD	: Food and Civil Supply Department
FC-XIII	: Thirteenth (13th) Finance Commission
FC-XIV	: Fourteenth (14th) Finance Commission
FICCI	: Federation of Indian Chambers of Commerce and Industry
FIHD	: Department for Fisheries (or relevant dept.)
FRI	: Forest Research Institute
FSI	: Forest Survey of India
GACC	: Global Anthropogenic Climate Change
GAR	: Global Assessment Report
GDP	: Gross Domestic Product
GLOF	: Glacial Lake Outburst Flood
GOI	: Government of India
GRM	: Grievance Redress Mechanism
GSI	: Geological Survey of India
HAP	: Heat (Wave) Action Plan
HAZCHEM	: Hazardous Chemicals
HAZMAT	: Hazardous Material
HEOC	: Health Emergency Operation Centre
HF	: High Frequency
HFA	: Hyogo Framework for Action
HFWD	: Health & Family Welfare Department
HLC	: High Level Committee
HP	: Himachal Pradesh
HRVCA	: Hazard Risk, Vulnerability and Capacity Assessment
IAEA	: International Atomic Energy Agency
IAF	: Indian Air Force
IAP	: Incident Action Plan
IBA	: Important Bird Areas (IBA)
IBTA	: Industry/ Business/ Trade Association(s)
ICAR	: Indian Council of Agricultural Research
ICG	: Indian Coast Guard
ICMBA	: Important Coastal and Marine Biodiversity Areas
ICR-ER	: Integrated Control Room for Emergency Response
ICT	: Information Communication Technology
IDRN	: Indian Disaster Resource Network
IDS	: Integrated Defense Staff
IDSP	: Integrated Disease Surveillance Programme
IEC	: Information Education Communication
IERMON	: Indian Environmental Radiation Monitoring Network
IHR	: Indian Himalayan Region
IIA	: Indian Institute of Architects
IIE	: Indian Institute of Entrepreneurship
IIT	: Indian Institute of Technology
IMD	: India Meteorological Department
INCOIS	: Indian National Centre for Ocean Information Services

IND	: Improvised Nuclear Device
INDC	: Intended Nationally Determined Contributions
INDD	: Industries Department
INSARAG	: International Search and Rescue Advisory Group
IPCC	: Inter-Governmental Panel on Climate Change
IPRD	: Information and Public Relations Department
IRC	: Indian Roads Congress
IRD	: Irrigation Department
IRDA	: Insurance Regulatory and Development Authority
IRS	: Incident Response System
IRT	: Incident Response Team
ISO	: International Organization for Standardization
ISRO	: Indian Space Research Organisation
ITBP	: Indo Tibetan Border Police
IWRM	: Integrated Water Resources Management
JJB	: Juvenile Justice Board
LBSNAA	: Lal Bahadur Shastri National Academy of Administration
LSA	: Landslide and Snow Avalanches
M&E	: Monitoring and Evaluation
MAFW	: Ministry of Agriculture and Farmers Welfare
MAH	: Major Accident Hazard
MAI	: Moisture Adequacy Index
MANAGE	: National Institute of Agricultural Extension Management
MCA	: Ministry of Corporate Affairs
MCAFDPD	: Ministry of Consumer Affairs, Food and Public Distribution
MCF	: Ministry of Chemicals and Fertilizers
MCM	: Million Cubic Metres
MCOAL	: Ministry of Coal
MCOM	: Ministry of Communications
MDWS	: Ministry of Drinking Water and Sanitation
MEA	: Ministry of External Affairs
MEITY	: Ministry of Electronics and Information Technology
MFAHD	: Ministry of Fisheries, Animal Husbandry and Dairying
MFIN	: Ministry of Finance
MFPI	: Ministry of Food Processing Industries
MHA	: Ministry of Home Affairs
MHFW	: Ministry of Health and Family Welfare
MHIPE	: Ministry of Heavy Industries and Public Enterprises
MHRD	: Ministry of Human Resource Development
MHUA	: Ministry of Housing and Urban Affairs
MLBE	: Ministry of Labour and Employment
MMSME	: Ministry of Micro, Small and Medium Enterprises
MNCFC	: Mahalanobis National Crop Forecast Centre
MNRE	: Ministry of New and Renewable Energy
MOCA	: Ministry of Civil Aviation
MOCI	: Ministry of Commerce and Industry
MOCU	: Ministry of Culture
MOD	: Ministry of Defence

MOEFCC	: Ministry of Environment, Forest and Climate Change
MOES	: Ministry of Earth Sciences
MOIB	: Ministry of Information and Broadcasting
MOJS	: Ministry of Jal Shakti
MOLJ	: Ministry of Law and Justice
MOM	: Ministry of Mines
MOPA	: Ministry of Parliamentary Affairs
MOPR	: Ministry of Panchayati Raj
MOR	: Ministry of Railways
MORD	: Ministry of Rural Development
MOSH	: Ministry of Shipping
MOSPI	: Ministry of Statistics and Programme Implementation
MOST	: Ministry of Science and Technology
MoU	: Memorandum of Understanding
MP	: Madhya Pradesh
MPFI	: Ministry of Food Processing Industries
MPNG	: Ministry of Petroleum and Natural Gas
MPPGP	: Ministry of Personnel, Public Grievances and Pensions
MPWR	: Ministry of Power
MRTH	: Ministry of Road Transport and Highways
MSDE	: Ministry of Skill Development and Entrepreneurship
MSIHC	: Manufacture Storage and Import of Hazardous Chemicals
MSJE	: Ministry of Social Justice and Empowerment
MSTL	: Ministry of Steel
MTEX	: Ministry of Textiles
MTOU	: Ministry of Tourism
MTRA	: Ministry of Tribal Affairs
MWCD	: Ministry of Women and Child Development
MYAS	: Ministry of Youth Affairs and Sports
NABARD	: National Bank for Agriculture and Rural Development
NAC	: National Academy of Construction
NAPCC	: National Action Plan on Climate Change
NBCC	: National Buildings Construction Corporation
NCC	: National Cadet Corps
NCDC	: National Centre for Disease Control
NCERT	: National Council of Educational Research and Training
NCMC	: National Crisis Management Committee
NCMRWF	: National Centre of Medium Range Weather Forecasting
NCPCR	: National Commission for Protection of Child Rights
NDC	: Nationally Determined Contributions
NDMA	: National Disaster Management Authority
NDMP	: National Disaster Management Plan
NDRF	: National Disaster Response Force
NDVI	: Normalized Differential Vegetation Index
NEC	: National Executive Committee
NER	: North East Region
NERC	: National Emergency Response Centre

NGO	: Non-Governmental Organisations
NHAI	: National Highways Authority of India
NHWIS	: National Hazardous Waste Information System
NICMAR	: National Institute of Construction Management and Research
NIDM	: National Institute of Disaster Management
NIESBUD	: National Institute for Entrepreneurship and Small Business Development
NIO	: North Indian Ocean
NIRD	: National Institute of Rural Development
NISA	: National Institute of Security Academy
NITI	: National Institution for Transforming India
NITTTR	: National Institute of Technical Teachers' Training and Research
NLRTI	: National-Level Research and Technical Institutions
NLSDA	: National Level Skill Development Agencies
NPDM	: National Policy on Disaster Management
NRAA	: National Rainfed Area Authority
NRE	: Nuclear and/or Radiological Emergency
NRSC	: National Remote Sensing Centre
NSDA	: National Skill Development Agency
NSDC	: National Skill Development Corporation
NSG	: National Security Guard
NSS	: National Service Scheme
NWDA	: National Water Development Agency
NYKS	: Nehru Yuva Kendra Sangathan
O&M	: Operation and Maintenance
OHSAS	: Occupational Health and Safety Assessment Series
PED	: Power/ Energy Department
PG	: Postgraduate
PRD	: Panchayati Raj Department
PRI	: Panchayati Raj Institutions (District, Block and Village levels)
PWD	: Persons with Disabilities
R&D	: Research and Development
RD	: Revenue Department
RDD	: Radiological Dispersal Device
RDSO	: Research Designs and Standards Organization
RMI	: Risk Management and Insurance
RO	: Reverse Osmosis
RTSMN	: Real Time Seismic Monitoring Network
SAARC	: South Asian Association for Regional Cooperation
SASE	: Snow and Avalanche Study Establishment
SAU	: State Agricultural University
SBSE	: State Board of Secondary Education
SCPS	: State Child Protection Society
SDG	: Sustainable Development Goals
SDMA	: State Disaster Management Authority (or equivalent Nodal Agency)
SDMC	: State Drought Monitoring Cell
SDRF	: State Disaster Response Force
SDRN	: State Disaster Resource Network

SEB	: State Electricity Board
SEC	: State Executive Committee
SEOC	: State Emergency Operation Centre
SERC	: Structural Engineering Research Centre
SFAC	: Standing Fire Advisory Council
SFDRR	: Sendai Framework for Disaster Risk Reduction
SHG	: Self Help Group
SIDM	: State Institute of Disaster Management
SIHFW	: State institute of Health and Family Welfare
SIRD	: State Institute of Rural Development
SLBC	: State Level Bankers' Committee
SLRTI	: State-Level Research and Technical Institutions
SLSDA	: State Level Skill Development Agencies
SOG	: Standard Operating Guidelines
SOP	: Standard Operating Procedure
SPCB	: State Pollution Control Board
SPWD	: State Public Works Department
SREX	: IPCC Special Report on Managing the Risks of Extreme Events to Advance Climate Change Adaptation
SRSAC	: State Remote Sensing Application Centre
SSB	: Sashastra Seema Bal
T1	: Short-Term, ending 2022
T2	: Medium-Term, ending 2027
T3	: Long-Term, ending 2030
TAA	: Thematic Area for Action
TN	: Tamil Nadu
TOD	: Tourism Department
ToT	: Training of Trainers
TRAD	: Transport Department
UDD	: Urban Development Department
UFDM	: Urban Flood Disaster Management
UGC	: University Grants Commission
ULB	: Urban Local Bodies (municipal corporations, municipalities, nagarpalikas)
UN	: United Nations
UNCRPD	: UN Convention on the Rights of Persons with Disabilities
UNDP	: United Nations Development Programme
UNESCO	: United Nations Educational, Scientific and Cultural Organization
UNFCCC	: United Nations Framework Convention on Climate Change
UNISDR	: United Nations International Strategy for Disaster Reduction, now UN Office for DRR
UP	: Uttar Pradesh
USDDM	: Urban Storm Drainage Design Manual
UT	: Union Territory
VHF	: Very High Frequency
WAP	: Wildlife Action Plan
WCD	: Women and Child Department
WCTn	: Wind Chill Effective Minimum Temperature
WIHG	: Wadia Institute of Himalayan Geology
WMO	: World Meteorological Organization
WSD	: Water and Sanitation 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 created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMA) headed by the respective Chief Ministers and the District Disaster Management Authorities (DDMA) headed by the District Collectors/ District Magistrate and co-chaired by Chairpersons of the local bodies. In each State/ Union Territory (UT), there will be one nodal agency, for coordination of disaster management, which is referred in the plan as ‘Disaster Management Department’ (DMD). The institutional arrangements have been set up consistent with the paradigm shift from the relief-centric approach of the past to a proactive, holistic and integrated approach for Disaster Risk Reduction (DRR) by way 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 DM Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, 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. It is meant to be implemented in 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 and build-back better). While the names of ministries/ departments of the Centre and State/UT having specific roles and responsibilities are mentioned in the Plan, in the spirit of the DM Act 2005 and the exigencies of humanitarian response, every ministry/ department and agency is expected to contribute to DM going beyond their normal rules of business.

Main Pillars of NDMP

The NDMP, in a sense, has five main pillars:

- I. Conforming to the national legal mandates—the DM Act 2005 and the NPDM 2009
- II. Participating proactively to realising the global goals as per agreements to which India is signatory—Sendai Framework for DRR, Sustainable Development Goals (SDGs) and Conference of Parties (COP21) Paris Agreement on Climate Change
- III. Prime Minister’s Ten Point Agenda for DRR articulating contemporary national priorities
- IV. Social inclusion as a ubiquitous and cross-cutting principle
- V. Mainstreaming DRR as an integral feature

The NDMP of 2016 was the world’s first ever national plan explicitly aligned with the Sendai Framework. Once again, taking a global lead, the revised plan attempts to incorporate the emerging global approach of bringing about coherence and mutual reinforcement of the three Post-2015 Global

Frameworks. The revised plan also incorporates the Ten Point Agenda on DRR, enunciated by Prime Minister during Asian Ministerial Conference on DRR (AMCDRR) in November 2016 in New Delhi.

The period envisaged as ‘Long-Term’ in this revised plan is co-terminus with year 2030, the ending year of the major post-2015 global frameworks. The activities running concurrently in most cases are grouped under overlapping time frames—short, medium, and long-term, ending by 2022, 2027 and 2030 respectively in addition to the recurring/ regular (i.e., routine) ones. They do not signify any order of priority. 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 across all sectors, achieve substantial and inclusive disaster risk reduction by building local capacities starting with the poor and decreasing significantly the loss of lives, livelihoods, and assets in different forms including economic, physical, social, cultural, and environmental while enhancing the ability to cope with disasters at all levels.

Multi-Hazard Vulnerability

India, due to its, physiographic and climatic conditions is one of the most disaster-prone countries of the world. Vulnerability to human-induced disasters/emergencies also exists. The NDMP covers disaster management cycle for all types of hazards—natural and human-induced. Heightened vulnerabilities to disaster risks can be related to increasing population, urbanisation, industrialisation, development within high-risk zones, environmental degradation, and climate change. Besides the natural factors and anthropogenic climate change, various human activities could also be responsible for aggravated impacts and increased frequency of disasters.

Building Resilience

The role of the central agencies is to support the disaster-affected State or the UT in response to requests for assistance. 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 priorities of the Sendai Framework and those related to DRR in SDGs and Paris Agreement have been integrated into the planning framework for Disaster Risk Reduction under the following Thematic Areas for Disaster Risk Reduction:

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

While all these themes had been included previously in the NDMP, in this version, they have been elaborated in greater detail. Besides, there are chapters describing three cross-cutting themes:

- a) Coherence and Mutual Reinforcement for DRR of the Post-2015 Global Frameworks
- b) Social Inclusion and
- c) Mainstreaming DRR

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 various ministries or agencies.

At the national level, the central government has assigned nodal responsibilities to specific ministries for coordinating disaster-specific responses. 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. Different central ministries and departments will assist in the response efforts as per request from the State/ UT. The various agencies whose responsibilities are defined in detailed DM plans for the State/ UT and district will be responsible for specific response measures. The nodal agency for coordination of response at state will be DMD and at the district level DDMA supported by other agencies.

Recovery and Building Back Better

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of building back better. Disasters result in considerable disruption of normal life, enormous suffering, loss of lives and property. The 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. Build back better 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 building back better 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, 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 building back better.

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 phases of disaster management.

Financial Arrangements

The financing of disaster relief has been an important aspect of federal fiscal relations. According to NPDM 2009, the primary responsibility of disaster management lies with the State Governments. This means, 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 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.

Changes Introduced—Highlights

This NDMP, the revised version, comprises of fourteen chapters compared to ten in the previous plan due to addition of chapters on three cross-cutting themes relating to DRR: a) coherence and mutual reinforcement of three post-2015 global frameworks b) social inclusion and c) mainstreaming. New sections have been added relating to the following hazards: a) Thunderstorm, Lightning, Squall, Dust Storm, and Strong Wind b) Cloudburst and Hailstorms c) Glacial Lake Outburst Flood (GLOF) d) Heat wave e) Biological and Public Health Emergencies (BPHE) and f) Forest Fire Hazard. The following challenges of DRR have been discussed in some detail: a) Climate Change Risks b) Livestock c) Environment and Wildlife d) Cultural heritage sites, their precincts and museums and e) Global Catastrophic Risks. Another major feature added is the inclusion of time frames and providing an indicative grouping of various elements of the plan into the time frames. Based on feedbacks and intensive reviews, more details have been added to different sections.

Structure of the Plan

The NDMP has fourteen chapters: 1) Preliminaries, 2) Hazard Risks and Challenges, 3) Coherence and Mutual Reinforcement of Three Post-2015 Global Frameworks for DRR, 4) Social Inclusion in DRR, 5) Mainstreaming DRR, 6) Building Disaster Resilience – Responsibility Framework: Part-A, Prelude, 7) Building Disaster Resilience – Responsibility Framework, Part-B, 8) Preparedness and Response, 9) Recovery and Building Back Better, 10) Capacity Development – An Overview, 11) Financial Arrangements, 12) Strengthening Disaster Risk Governance, 13) International Cooperation, and 14) Maintaining, Monitoring and Updating the Plan.

1

Preliminaries

1.1 Rationale

The revised terminology of the United Nations Office for Disaster Risk Reduction (UNISDR¹) defines 'disaster' as:

"A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts." (UNISDR 2016)

The effect of the disaster can be immediate and localized but is often widespread, often persisting for long after the event. The effect may challenge or overwhelm the capacity of a community or society to cope using the resources immediately, and therefore may require assistance from external sources, which could include neighbouring jurisdictions, or those at the national or international levels. 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."

The NDMP provides a framework and direction to the government agencies for all phases of disaster management cycle (Fig. 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 (DM) Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, 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.

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

¹ The United Nations Office for Disaster Risk Reduction officially changed its acronym to UNDRR from UNISDR on 1 May 2019. However, the former acronym UNISDR is still used in references published under International Strategy for Disaster Risk Reduction.

state governments will deploy the first responders and carry out other activities pertaining to disaster management.

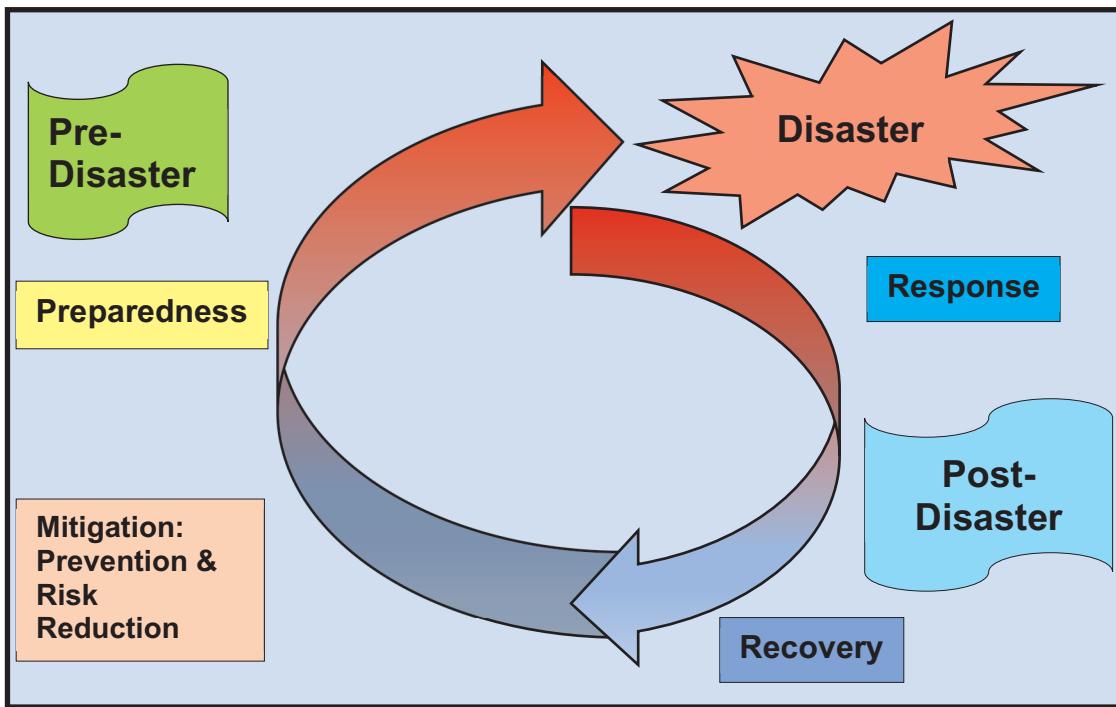


Figure 1-1: Disaster Management Cycle

The NDMP provides a framework covering all aspects of the disaster management cycle. It covers disaster risk reduction, mitigation, preparedness, response, recovery, and building back better. 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 implemented in a scalable manner over all phases of disaster management: a) mitigation (prevention and risk reduction), b) preparedness, c) response and d) recovery (immediate restoration to long-term building back better).

The NDMP provides a framework with role clarity for rapid mobilization of resources and effective disaster management by the Central and State Governments and other concerned stakeholders 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. 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.

According to the revised UNISDR terminology, Disaster Management (DM) is “the organization, planning and application of measures preparing for, responding to and recovering from disasters” and

Disaster Risk Management (DRM) is “the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses” (UNISDR 2016a). The sense in which DM Act 2005 uses the term disaster management, covers nearly DM, DRR and DRM without maintaining a strict distinction between them.

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:

"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.

Apart from sudden large-scale disasters (intensive risks), the accumulation of impacts from small frequent events (extensive risks) and slowly developing health, safety, security and environmental crises have a quiet but massive effect on society and on sustainable development. Disaster risk is the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity. According to UNISDR (2016), the definition of disaster risk reflects the concept of hazardous events and disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify.

Acceptable risk, or tolerable risk, is the extent to which a disaster risk is deemed acceptable or tolerable depending on existing social, economic, political, cultural, technical and environmental conditions. In engineering terms, acceptable risk is used to assess and define the structural and non-structural measures that are needed to reduce possible harm to people, property, services and systems to a chosen tolerated level, according to codes or “accepted practice” which are based on known probabilities of hazards and other factors.

Residual Risk is the disaster risk that remains even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained. The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socioeconomic policies such as safety nets and risk transfer mechanisms, as part of a holistic approach.

1.2 Paradigm Shift

The DM Act 2005 and the NPDM 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 NPDM 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 NPDM 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.

1.3 Main Pillars of the NDMP

The NDMP, in a sense, can be said to have five main pillars:

- I. Conforming to the national legal mandates – the DM Act 2005 and the NPDM 2009
- II. Participating proactively to realise the global goals as per agreements to which India is a signatory – Sendai Framework for Disaster Risk Reduction (SFDRR), Sustainable Development Goals (SDGs) and Paris Agreement on Climate Change – consistent with the international consensus for achieving mutual reinforcement and coherence of these frameworks
- III. Prime Minister’s Ten Point Agenda for DRR articulating contemporary national priorities
- IV. Social inclusion as a ubiquitous and cross-cutting principle
- V. Mainstreaming DRR as an integral feature

Across these five ‘pillars’, there are both overlapping and non-overlapping themes as well as some nuanced differences in emphasis. The NDMP has attempted a grand synthesis of all this within a considerably ambitious and futuristic plan while revising the earlier plan which, incidentally, was the first national plan globally explicitly aligned with the Sendai Framework. The period envisaged as ‘Long-Term’ in this plan is co-terminus with year 2030, the ending year of the major post-2015 global frameworks.

1.4 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 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 various central ministries and departments to have adequate DM plans. While the NDMP 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, be it hazard-specific nodal ministries or not, 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.

As per the mandate of the DM Act, the NDMP assigns specific and general responsibilities to all ministries and departments for disaster management. The DM Act enjoins the NDMP to assign necessary responsibilities to various ministries to support and implement the plan. Therefore, it is incumbent on all ministries to accept all the implicit and explicit responsibilities mentioned in the NDMP even if they are beyond what are explicitly mentioned in the normal rules of business. Disaster management requires assumption of responsibilities beyond the normal functioning. The NDMP will be complemented by separate contingency plans, SOPs, manuals, and guidelines at all levels of the multi-tiered governance system.

1.5 Three Post-2015 Global Frameworks—Disasters, Sustainable Development and Climate Change: Mutual Reinforcement and Coherence

The adoption in 2015 of three landmark global agreements - the Sendai Framework for Disaster Risk Reduction (UNISDR 2015a), Sustainable Development Goals (UN 2015) and COP21 Paris Agreement on Climate Change (UNFCCC 2015) has opened the significant opportunity to build coherence across DRR, sustainable development and response to climate change. The adoption of SDGs – ‘Transforming Our World: The 2030 Agenda for Sustainable Development’ is a global transformative plan of action that has poverty eradication as an overarching aim. It has, at its core, the integration of the economic, social and environmental dimensions of sustainable development. 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.

DRR and resilience are recurring common theme in the three global agreements. All three agreements share a common aim of making development sustainable. The most significant shift recognised in the Sendai Framework is a strong emphasis on disaster risk management in contrast to disaster management. 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.

Strong commitment to ambitious goals and accelerated implementation of these international agreements are global priority. Given the complementarities between the post-2015 agendas, synchronising and mutually reinforcing the actions in the three domains helps in better outcomes. Efforts must be made to ensure that each of them do not build in “policy risks” or, contradictory policies, that generate more - rather than less - risk in development. Promoting coherence and mutual reinforcement in all three agreements requires political recognition, monitoring, reporting and supporting partnerships at various levels. Recognising the emerging global consensus, the NDMP has attempted to address the challenges of providing coherence and mutual reinforcing of the national initiatives corresponding to the three Post-2015 global frameworks embracing the domains of DRR, sustainable development and the responses to meet challenges of global climate change.

1.6 Prime Minister's Ten-Point Agenda for Disaster Risk Reduction

The Prime Minister, Shri Narendra Modi, enunciated a Ten-Point Agenda in his inaugural speech at the Asian Ministerial Conference on Disaster Risk Reduction 2016, held in New Delhi during November 2016 (AMCDRR), which has also been incorporated in the NDMP. The ten key elements consist of the following:

1. All development sectors must imbibe the principles of disaster risk management
2. Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states
3. Women's leadership and greater involvement should be central to disaster risk management
4. Invest in risk mapping globally to improve global understanding of Nature and disaster risks
5. Leverage technology to enhance the efficiency of disaster risk management efforts
6. Develop a network of universities to work on disaster-related issues
7. Utilise the opportunities provided by social media and mobile technologies for disaster risk reduction
8. Build on local capacity and initiative to enhance disaster risk reduction
9. Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster
10. Bring about greater cohesion in international response to disasters

Given below is a description of the Ten Point of Agenda for DRR:

First, all development sectors must imbibe the principles of disaster risk management. This will ensure that all development projects - airports, roads, canals, hospitals, schools, bridges – are built to appropriate standards and contribute to the resilience of communities they seek to serve. Over the next couple of decades, most of the new infrastructure in the world will come up in Asia. This points to the need for ensuring that all the infrastructure development conforms to the best available standards of disaster safety. Such an approach is a smart strategy, which will pay off in the long term. It is necessary that all the public investments must incorporate disaster risk considerations. In India, the 'housing for all' programme and 'smart cities' initiatives represent such opportunities. India will work with other partner countries and stakeholders to build a coalition or mechanism for promoting disaster resilient infrastructure in the region. This will help generate new knowledge for hazard risk assessment, disaster resilient technologies and mechanisms for integrating risk reduction in infrastructure financing.

Second, it is necessary to work towards risk coverage for all – starting from poor households, it must cover small and medium enterprises as well as large multi-national corporations. Currently, in most countries of the region, penetration of insurance is limited only to a narrow section, mostly in the middle and upper-middle income groups. It is necessary to think big and innovatively to widen the risk insurance cover. States have an important role in not just regulating but also encouraging coverage for those who need it the most. Some bold steps have been taken to ensure financial inclusion and risk insurance for the poorest. The *Jan Dhan Yojana* has brought millions of people into the banking system. The Suraksha Bima Yojana provides risk insurance to millions who need it the most. The newly launched *Fasal Bima Yojana* (crop insurance) will provide risk cover to millions of farmers. These are the basic building blocks of resilience at the household level.

Third, it is necessary to encourage greater involvement and leadership of women in disaster risk management. Women are disproportionately affected by disasters. They also have unique strengths and insights. India must train a large number of women volunteers to support special needs of women affected by disasters. There is also need for women engineers, masons and building artisans to participate in post-disaster reconstruction and promote women self-help groups which can assist in livelihood recovery.

Fourth, it is necessary to invest in mapping risks globally. For mapping risks related to hazards such as earthquakes, there are widely accepted standards and parameters. Based on these, India has mapped seismic zones, with five as highest seismic risk and two as low risk. For disaster risk related to other hazards such as chemical hazards, forest fires, cyclones, different types of floods, India needs to adopt globally accepted standards and categories. This will help India to ensure that there is a shared understanding of the nature and severity of disaster risks and compare with that in other parts of the world.

Fifth, efforts must be made to leverage technology to enhance the efficiency of our disaster risk management efforts. An e-platform that brings together organizations and individuals and helps them map and exchange expertise, technology and resources would go a long way in maximizing the collective impact.

Sixth, it will be helpful to develop a network of universities to work on disaster-related aspects since universities have social responsibilities too. Over the first five years of the Sendai Framework, an effort can be made to develop a global network of universities working together on problems of disaster risk management. As part of this network, different universities could specialize in multi-disciplinary research on disaster issues most relevant to them. Universities located in coastal areas could specialize in managing risks from coastal hazards, and the ones located in the hill cities could focus on mountain hazards.

Seventh, utilize the opportunities provided by social media and mobile technologies. Social media is transforming disaster response. It is helping response agencies in quickly organizing themselves and enabling citizens to connect more easily with authorities. In disaster after disaster, affected people are using social media to help each other. Those responsible for disaster management must recognize the potential of social media and develop applications relevant to various aspects of disaster risk management.

Eighth, disaster management must build on local capabilities and initiatives. The task of disaster risk management, particularly in rapidly growing economies, is so huge that formal institutions of the state can at best be instrumental in creating the enabling conditions. Specific actions have to be designed and implemented locally. Over the last two decades, most community-based efforts have been confined to disaster preparedness and contingency planning for the short term. It is necessary to expand the scope of community-based efforts and support communities to identify local risk reduction measures and implement them. Such efforts reduce risk and create opportunities for local development and sustainable livelihoods. Localization of disaster risk reduction will also ensure that good use is made of the traditional best practices and indigenous knowledge. Response agencies need to interact with their communities and make them familiar with the essential drill of disaster response. For example, if a local fire service visits one school in its area every week, it would sensitize thousands of children over a period of one year.

Ninth, ensure that the opportunity to learn from a disaster is not wasted. After every disaster there are studies and reports on lessons learnt that are rarely applied. Often the same mistakes are repeated. It is necessary to have a vibrant and visual system of learning. The United Nations could

start an international competition of documentary films that record disaster events, their scale, and relief, rehabilitation, reconstruction and recovery afterwards. Post -disaster recovery is an opportunity to not just ‘build back better’ in terms of physical infrastructure, but also in terms of improved institutional systems for managing risk. For this, it is necessary to put in place systems that can quickly provide risk assessments. India must work with partner countries and multilateral development agencies to establish a facility for technical support to post-disaster reconstruction of houses.

The **tenth** and last, it is necessary to bring about greater cohesion in international response to disasters. In the aftermath of a disaster, disaster responders pour in from all over the world. This collective strength and solidarity could be enhanced further if the activities are organised under a common umbrella. The United Nations could think of a common logo and branding under which all those who are helping with relief, rehabilitation and reconstruction operate.

1.7 Social Inclusion

Hazards do not discriminate based on human social conditions, but human responses to disasters often do. Existing socio-economic conditions mean that disasters can lead to different outcomes for demographically similar communities, where the most vulnerable groups also suffer disproportionately on multiple counts compared to others. The preamble of NPDM 2009 notes that the economically weaker and socially marginalized sections, women, Scheduled Castes, Scheduled Tribes and minorities tend to suffer more during disasters. The DM Act 2005 specifically forbids all forms of discrimination – be it based on sex, caste, community, descent or religion – in any aspect of DM. Social inclusion is about equality of rights and opportunities, dignity of the individual, acknowledging diversity, and contributing to resilience for everyone, not leaving aside members of a community based on age, gender, disability or other.

1.8 Mainstreaming DRR

A disaster can set back significantly the development of an affected region and even beyond, depending on its scale, reversing decades or more of accumulated gains. Development without recognising disaster probabilities and incorporating adequate risk reduction could, in effect, worsen existing risks and carries with it the likelihood of introducing new risks, aggravating the negative impact of potential disasters. Mainstreaming of DRR is the extensive and sound integration of DRR into all developmental initiatives to enhance disaster resilience, reduce losses and hasten the progress towards development goals. Mainstreaming DRR is an approach in which both development and DRR incorporated concurrently in a seamless manner into all the aspects of development – policies, planning and implementation. Since climate change impact act as risk multipliers worsening uncertainties associated with almost every hydro-meteorological hazard, sound approaches to DRR mainstreaming naturally integrates the how climate change impacts alter the risk scenarios. The unfortunate fact that DRR mainstreaming has remained somewhat improperly understood or vaguely interpreted theme by both decision-makers and practitioners is weakness that needs to be corrected. Undoubtedly, going forward, DRR mainstreaming will assume a more central role in both development and DM. Hence, it is one of the main pillars of the NDMP. In many ways, the actions under SDGs and the responses to climate change are integral to development initiatives and building disaster resilience is common theme in all these. DRR mainstreaming focuses attention on building disaster resilience, not as a sub-component of a disaster-specific plan, but an approach that must tightly be integrated into all developmental plans.

1.9 Vision

The vision incorporates the goals reflected in national policies, laws and the PM's Ten-Point Agenda for DRR as well as international best practices, frameworks and discourses:

Make India disaster resilient across all sectors, achieve substantial and inclusive disaster risk reduction by building local capacities starting with the poor and decreasing significantly the loss of lives, livelihoods, and assets in different forms including economic, physical, social, cultural, and environmental while enhancing the ability to cope with disasters at all levels.

1.10 Scope

As per the DM Act 2005, the NDMP 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 periodically. Central Government shall make appropriate provisions for financing the plan implementation. Disaster management, covering prevention and mitigation, 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 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 forces² 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. Unless otherwise specified, the guidelines issued by NDMA serve as the primary reference for this document. The GOI has notified certain central ministries and departments for hazard-specific nodal responsibilities for overall coordination of disaster management for different hazards. In addition, GOI has notified disaster-wise certain ministries for coordinating immediate post-disaster response. These notified ministries/ departments must prepare detailed DM plans to carry out the roles assigned to

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

them. At the same time, each central ministry, department, state, and district must formulate respective DM plans specifying how each entity can contribute to effectively manage disasters.

1.11 Objectives

Along with the mandate given in the DM Act 2005 and the NPDM 2009, the national plan has incorporated the national commitments in the domain of DRR associated with the three major post-2015 global frameworks and the PM's Ten Point Agenda. 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, prevent the emergence of new disaster risks, reduce the existing risks and manage the residual 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
15. Ensuring DRR is socially inclusive, gender sensitive and empowering
16. Build and strengthen the resilience of poor communities to prevent disasters aggravating poverty and to protect livelihoods
17. Enhanced mainstreaming of disaster risk reduction and climate adaptation strategies within the agriculture sector including sustainable farming
18. Special focus on disaster risk reduction measures for agriculture and livestock
19. Promoting resilient health systems to develop the capacities and resilience of communities to cope and recover from disaster impacts
20. Enhance the resilience of health systems by integrating DRR into all levels of health care
21. Promote disaster-resilient schools, colleges and other educational facilities
22. Promote women's leadership and active participation in disaster risk reduction
23. Strengthen efforts to mainstream DRR into water management and reduce the likely impacts of water-related hazards
24. Strengthening and promoting the resilience of new and existing critical infrastructure
25. Integration of disaster risk reduction considerations and measures into financial and fiscal instruments

26. Mainstreaming DRR into development and implementation of all projects and schemes (rural and urban)
27. Strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems
28. Promote comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios
29. Implementation of ecosystem-based approaches regarding shared resources, such as within river basins, mountainous regions and coastlines
30. Effective use of science, technology and traditional knowledge in all aspects of DRR

1.12 Time Frames – Short, Medium and Long-Term

The implementation of the measures in the plan must be completed within the short (T1), medium (T2), and long-term (T3), ending by 2022, 2027, 2030 respectively (Fig. 1-2). The year 2030 is the end of time frame for all the three post-2015 international agreements – Sendai Framework, SDG and the COP21. By being a signatory to these agreements, India has also adopted these timeframes. For consistency, the completion of all measures envisaged in the NDMP is also 2030. The reference to ‘Short’, ‘Medium’ and ‘Long’ are to timeframes required for completion and do not signify any order of priority. These are tentative and subject to changes depending on many factors particularly technology. Some of the actions envisaged could shift from a longer time frame to a shorter one. However, all out efforts are needed to ensure that those under smaller time frames are not taking additional time for completion.

Time frames envisaged in the NDMP			
Short-Term (T1)	T1 (2022)		
Medium-Term (T2)	T1/T2	T2 (2027)	
Long-Term (T3)	T1/T2/T3	T2/T3	T3 (2030)

Figure 1-2: Time Frames—Short, Medium and Long Term

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. The timeframes short, medium and long do not mean that the three are necessarily sequential in all cases. In fact, in many cases, they may be overlapping, starting at the same time while in some cases, the work on the medium and long-term targets may be dependent on the completion of the previous phase. Nevertheless, the medium and long-term categories do not imply a lower priority but are actions that require time long period for completion provided they are started as early as possible.

There is considerable variation in the implementation status of the proposed measures across ministries, departments, states, and UTs. Each central Ministry, Department, and the State Government must appropriately categorize the items in their DM Plans according to the time frames for implementation while preparing their plan or at the time of revising existing plans.

In the case of recovery, there are three recovery periods after a disaster: a) Early – within 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 the types of recovery programmes. Hence, the NDMP discusses them only in general terms without timelines.

1.13 Types of Disasters

Primarily disasters are triggered by natural hazards or human-induced or result from a combination of both. The 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 increase 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) threats and events that might escalate to emergencies/ disasters.

1.13.1 Natural Hazards

The widely accepted classification system used by the Disaster Information Management System of DesInventar³ classifies disasters arising from natural hazards into five major categories and is used globally for the Sendai targets monitoring:

- 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.
- 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 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 1-1. The below classification is not a watertight 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 1-1: Categories of Natural Hazards

	Family	Main Event	Short Description/ Secondary Disaster
1	Geophysical	Earthquake/ Mass movement of earth materials	<ul style="list-style-type: none"> • 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

³ <http://www.desinventar.net/definitions.html> (accessed Sep 20, 2019)

	Family	Main Event	Short Description/ Secondary Disaster
			<ul style="list-style-type: none"> • Mass movement of earth materials, usually down slopes • Surface displacement of earthen materials due to ground shaking triggered by earthquakes
		Volcano	<ul style="list-style-type: none"> • 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	<p>Tsunamis are difficult to categorize they are essentially an oceanic process that is manifested as a coastal water-related hazard. 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.</p>
2	Hydrological	<ul style="list-style-type: none"> • Flood • Landslides • Wave Action 	<ul style="list-style-type: none"> • 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 landslides that occur when heavy rain or rapid snow/ice melt send large amounts of vegetation, mud, or rock downslope 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

Family	Main Event	Short Description/ Secondary Disaster
		<ul style="list-style-type: none"> 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	<p>Hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that may last for minutes to days</p> <ul style="list-style-type: none"> Cyclone, Storm Surge, Tornado, Convective Storm, Extra-tropical Storm, Wind Cold Wave, Derecho Extreme Temperature, Fog, Frost, Freeze, Hail, Heat wave Lightning, Heavy rain Sandstorm, Dust-storm Snow, Ice, Winter Storm, Blizzard
4	Climatological	<p>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</p> <ul style="list-style-type: none"> Drought Extreme hot/cold conditions Forest/Wildfire Fires Glacial Lake Outburst Flood (GLOF) Subsidence
5	Biological	<p>Exposure to germs and toxic substances</p> <ul style="list-style-type: none"> Epidemics: viral, bacterial, parasitic, fungal, or prion infections Insect infestations Animal stampedes

1.13.2 Human-Induced Disasters

The NPDM 2009 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, urban flooding, oil spills, etc.). Hazards due to CBRN threats and events rank very high among the causes that are human induced acts. Terrorist activities and secondary incidences arising from intentional or non-intentional activities also add to these risks and calls for adequate preparedness and planning.

1.14 Institutional Framework

1.14.1 National Level

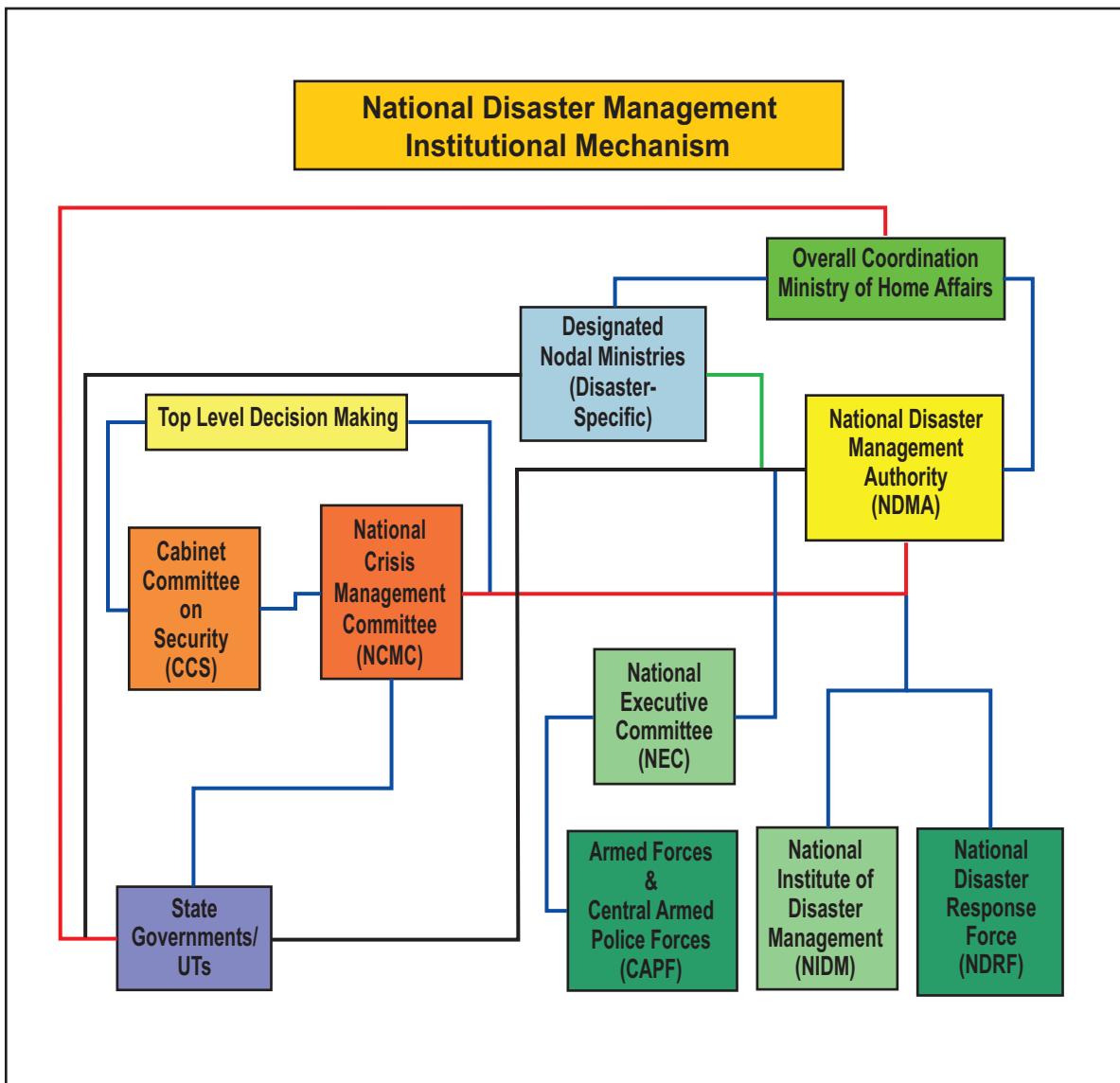


Figure 1-3: National-level disaster management - basic institutional framework

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

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 regarding disaster management. The NDMA is the agency responsible for the approval of the NDMP and facilitating its implementation. Figure 1-3 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.

The DM Act does not have any provisions for notifying any disaster as a 'national calamity' or a 'national disaster'. In most cases, state governments will be carrying out disaster management with the central government playing a supporting role. Generally, the central agencies will participate 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 Disaster Management Authorities (DMA) at national (NDMA), the state (SDMA) and the district (DDMA) levels. The role, composition and the role of the key decision-making bodies for disaster management at national level are briefly described in the Table 1-2. The 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.

Table 1-2: 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Cabinet Secretary (Chairperson) Secretaries of Ministries/ Departments and agencies with specific DM responsibilities 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Prime Minister (Chairperson) Members (not exceeding nine, nominated by the Chairperson) 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Union Home Secretary (Chairperson) Secretaries to the GOI in the Ministries/ Departments of 	<ul style="list-style-type: none"> To assist the NDMA in the discharge of its functions Preparation of the National Plan Coordinate and monitor the implementation of the National Policy

	Name	Composition	Vital role
		<p>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, Urban Development, Water Resources, River Development and Ganga Rejuvenation, The Chief of the Integrated Defense Staff of the Chiefs of Staff Committee, ex officio as members.</p> <ul style="list-style-type: none"> Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways, Chairman, Central Water Commission and Secretary, NDMA are special invitees to the meetings of the NEC. 	<ul style="list-style-type: none"> 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 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 any specific threatening disaster situation or disaster. Coordinate with relevant Central Ministries/ Departments/ Agencies which are expected to assist the affected State as per protocols and Standard Operating Procedures (SOPs) Coordinate with the Armed Forces, Central Armed Police Forces⁴ (CAPF), the National Disaster Response Force (NDRF) and other uniformed services which comprise the GOI's response to aid the State authorities Coordinate with all relevant specialized scientific institutions/ agencies responsible for providing early warning and monitoring Coordinate with SDRF, civil defense 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 paramilitary forces for rapid deployment	Assist 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	<ul style="list-style-type: none"> 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

⁴ CAPF includes Assam Rifles, BSF, CRPF, CISF, ITBP and SSB

Name	Composition	Vital role
	heads of national levels scientific, research and technical organizations, besides eminent scholars, scientists and practitioners.	<ul style="list-style-type: none"> • 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 specific disasters (see Table 1-3 for current list of disaster-specific nodal ministries notified by GOI).

Table 1-3: Nodal Ministry for Management/ Mitigation of Different Disasters

SN	Disaster	Nodal Ministry/ Department
1.	Accident – Air (Civil Aviation)	Min. of Civil Aviation (MOCA)
2.	Accidents – Rail	Min. of Railways (MOR)
3.	Accidents – Road	Min. of Road Transport and Highways (MRTC)
4.	Avalanche	Min. of Defence (MOD) – Border Road Organization (BRO)
5.	Biological Emergencies	Min. of Health and Family Welfare (MHFW)
6.	Cold-Wave	Min. of Agriculture and Farmers Welfare (MAFW)
7.	Cyclone/ Tornado	Min. of Earth Sciences (MOES)
8.	Drought	Min. of Agriculture and Farmers Welfare (MAFW)
9.	Earthquake	Min. of Earth Sciences (MOES)
10.	Flood	Min. of Jal Shakti (MOJS)
11.	Floods – Urban	Min. of Housing and Urban Affairs (MHUA)
12.	Forest Fire	Min. of Environment, Forests, and Climate Change (MEFCC)
13.	Frost	Min. of Agriculture and Farmers Welfare (MAFW)
14.	Hailstorm	Min. of Agriculture and Farmers Welfare (MAFW)
15.	Industrial and Chemical	Min. of Environment, Forests and Climate Change (MEFCC)
16.	Landslides	Min. of Mines (MOM)
17.	Nuclear and Radiological	Dept. of Atomic Energy (DAE)
18.	Oil Spills	Min. of Defence (MOD) – Indian Coast Guard (ICG)

SN	Disaster	Nodal Ministry/ Department
19.	Pest Attack	Min. of Agriculture and Farmers Welfare (MAFW)
20.	Tsunami	Min. of Earth Sciences (MOES)

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 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 Plan 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.

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) are 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 the guidelines with advice/ inputs drawn from experts of DAE and facilitate training and preparedness activities in respect of response to RN emergencies with technical advice obtained from experts from DAE.

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. Some of them are emerging as centres of excellence in the specialised areas of risk management – flood, earthquake, cyclone, drought, landslides, and industrial disasters.

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. A National Disaster Response Academy is operational in Nagpur and new infrastructure is being set up to cater to national and international training programmes for disaster management. It has also been decided that Disaster Management Training Wings of four CAPFs (BSF, CRPF, ITBP and CISF) will be merged with this Academy. 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.

1.14.2 State Level

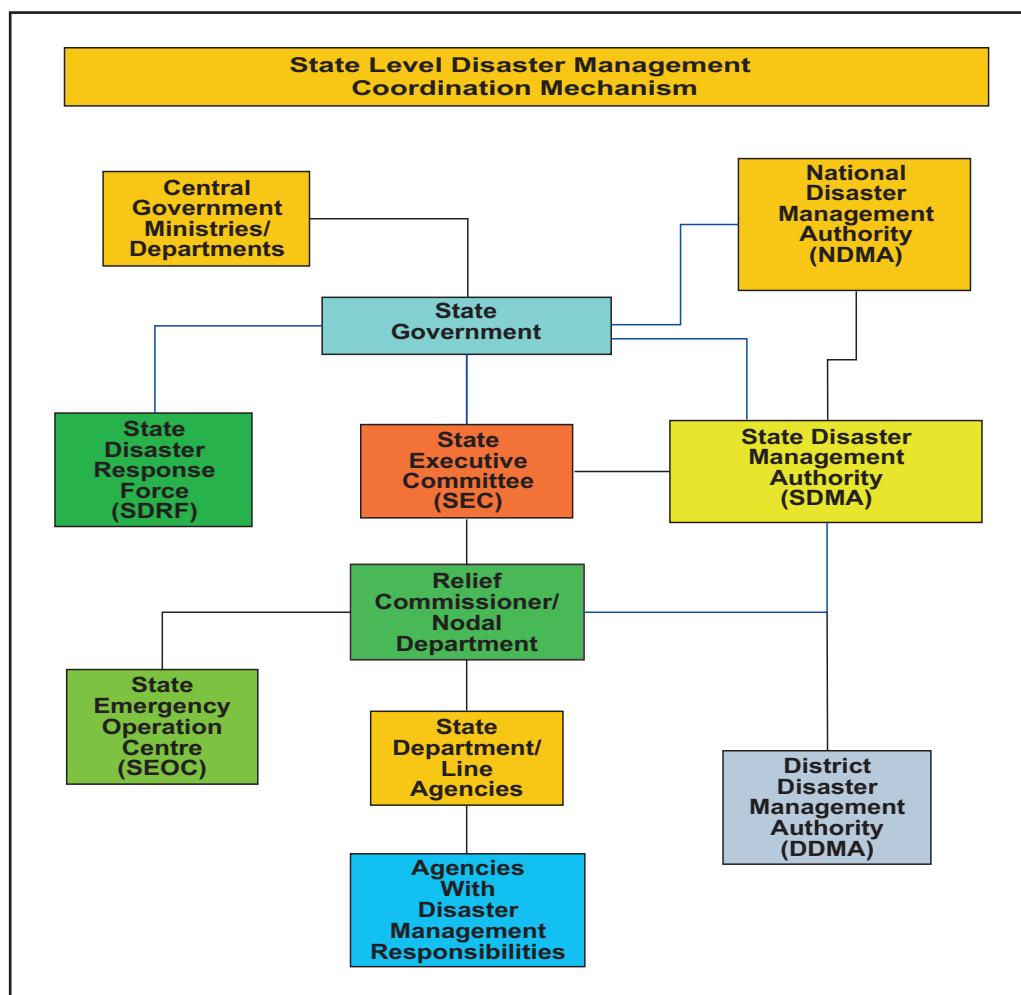


Figure 1-4: State-level disaster management - basic institutional framework

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.

As per the DM Act of 2005, each state in India/ Union Territory (UT) shall have its own institutional framework for disaster management. Each State/UT will have one nodal department for coordination of disaster management, referred hereafter as DM department (DMD), although the name and department is not the same in each State/UT. Among other things, the DM Act, mandates that each State/UT shall take necessary steps for the preparation of State/UT DM plans, integration of measures for prevention of disasters or mitigation into State/UT development plans, allocation of funds, and establish EWS. Depending on specific situations and needs, the State/UT 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 (SDMA) and a similar system in each Union Territory. 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. Figure -1-4 provides schematic view of the typical state-level institutional framework. The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

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 as notified by the state government 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. The SDMA will approve the disaster management plans prepared by various departments. 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.

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 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.

1.15 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 NDMP sets out the priorities, time frames and defines the Thematic Areas for DRR along with Sub-Thematic Areas that must be implemented in a highly distributed, decentralised and coordinated manner by the central and state governments. It is *not* one omnibus plan that must be implemented by one agency with using one overarching budget; instead it is one that must be financed from the union and state budgets through various ministries and government agencies. The centrally allocated finances are limited to National Disaster Response Fund and State Disaster Response Fund meant for immediate relief and emergency response after a disaster. Since DRR mainstreaming is an integral part of the main plans of centre, central ministries, states/UTs and state/UT -level agencies, there cannot be a separate financial allocation for it.

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. Respective DM authorities must regularly 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 short, medium and long-term timeframes ending in 2030, with the actions under these timeframes often running concurrently and not sequentially. In a broad sense, the approach described in the NDMP applies to all those working for disaster risk reduction in the country, be it government, private, not-for-profit entities, national agencies or international organisations.

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 guidelines covering various aspects of disaster management and including a separate one for response (list is given in Annexure-I).

The DM plans of all central ministries/ departments and the states/UTs must be made in accordance with NDMP and consistent with it in terms of goals and timeframes. It is not possible to give an exhaustive list of activities envisaging all the disaster risk reduction functions pertaining to all the tiers of government (central, state and local) and all other stakeholders. Hence the Central Ministries and State Governments should go beyond the activities mentioned in this document in identifying activities based on the context for pro-active disaster risk reduction using NDMP as a guide rather than as a final word.

2

Hazard Risks and Challenges

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	32.87 lakh (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' N and 37°6' N; longitudes 68°7'E and 97° 25'E
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 (the mainland, Lakshadweep Islands, and the Andaman and Nicobar Islands)
7	Desert	442,289 sq.km
8	Population	1.2 billion; Male: 51.5%; Female: 48.5% (Census 2011)
9	States*	28
10	Union Territories*	9
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 (Dec.-Feb.) b) Summer (Mar.-Jun.) c) South-West monsoon (Jun.-Sep.) and d) Post monsoon (Oct.-Nov.)

(*) Note: From October 31, 2019⁵

Based on GOI website: <https://www.india.gov.in/india-glance/profile>

⁵ The Jammu and Kashmir Reorganisation Act (2019), bifurcates the state of Jammu and Kashmir into two UTs, a) Ladakh without a legislative assembly consisting of two districts (Leh and Kargil) and b) Jammu and Kashmir (J&K) having a legislative assembly consisting of all other districts of former state .

2.2 Hazard Risks and Vulnerabilities

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% 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.

Building Materials & Technology Promotion Council (BMTPC) has prepared the Vulnerability Atlas of India (VAI), which has been updated in 2019 (third edition) and is available online⁶. Some of the maps for the country are provided in Annexure-II. These maps present for each State/UT the hazard map for earthquake, wind, and flood. The maps available online show not only the boundaries of the hazard zones of various intensities but also indicate district-wise areas lying in the different intensities. The Vulnerability Atlas has been structured to serve as a tool towards natural disaster prevention, preparedness and mitigation for housing and related infrastructure at local as well as national levels.

In the context of human vulnerability to disasters, 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 by disasters and differently abled persons are exposed to higher risks. The DM Act 2005 and National Policy on Disaster Management 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.

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 has 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

⁶ Vulnerability Atlas of India. <http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/Index.html> (accessed Oct. 15, 2019)

Sea and the east coast in the Bay of Bengal. More cyclones occur in the Bay of Bengal than in the Arabian Sea. An analysis of the frequencies of cyclones on the East and West coasts of India during 1891-2000 shows that nearly 308 cyclones (out of which 103 were severe) affected the East Coast⁷.

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 bimodal 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.

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 (NIO) Basin (including the Indian coast) generates only about seven per cent of the World's cyclones, their impact is comparatively high and devastating, especially when they strike the coasts bordering the North Bay of Bengal. 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.

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 India⁸ 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 knot; one knot = 1.852 kmph

The 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.

⁷ Cyclones and their Impact in India: <https://ncrmp.gov.in/cyclones-their-impact-in-india/> (accessed Sep. 20, 2019)

⁸ IMD (2016)

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. Large number of casualties during tropical cyclones occur as a result of storm surge. Climate change with the resultant sea-level rise will worsen the impacts 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. The global climate change and the resultant increase in extreme weather events will naturally worsen the uncertainties associated with floods.

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 per cent of India's territory is prone to moderate to severe earthquakes. Three recent major earthquakes affected 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 and part of eight other States/UTs (Bihar, Gujarat, Himachal Pradesh, Uttarakhand,

Jammu & Kashmir, Ladakh, Punjab and West Bengal) are in Seismic Zone V i.e., prone to very high damage risk. Wide-spread losses—human and material, 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 activity⁹. 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 time¹⁰.

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 26 Dec 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 per cent 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 <https://ntwc.ncep.noaa.gov/?page=tsunamiFAQ> (accessed Sep 20, 2019)

¹⁰ <http://www.unisdr.org/2006/pew/tsunami/what-is-tsunami/backinfor-brief.htm> (accessed Sep 20, 2019)

Snow Avalanches

Avalanches are blocks of snow or ice descending from the mountain tops at a rate like a speedy flow. They are extremely damaging and cause huge loss to life and property. In Himalayas, avalanches are common in Drass, Pir Panjal, 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 J&K, Ladakh, HP and Uttarakhand, especially Tehri Garhwal and Chamoli districts
- J&K and Ladakh – Higher reaches of Kashmir and Gurez valleys, Kargil, Ladakh and along some of the major roads
- HP – 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 2015b) 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. Broadly, drought is perceived as sharply felt water deficit caused by variations in the natural hydro-meteorological factors, agro-ecological conditions, moisture requirements of crops under prevailing cropping choices (systems, patterns).

The WMO considers drought as a slow creeping natural hazard that occurs in part due to the natural climatic variability. In recent years, concern has grown world-wide that droughts may be increasing in frequency due to climate change. Responses to droughts in most parts of the world are generally reactive in terms of crisis management and are known to be untimely, poorly coordinated and disintegrated. Conceptual definitions, formulated in general terms, help people understand the concept of drought. Conceptually, drought is characterised by a protracted period of deficient precipitation resulting in water deficits, extensive crop damage, resulting in loss of yield. Operational definitions help define the onset, severity, and end of droughts. No single operational definition of drought works in all circumstances, and this is a big part of why policy makers, resource planners, and others have more trouble recognizing and planning for drought than they do for other natural disasters. In fact, mostly, decision-makers/ planners now rely on mathematical indices to decide when to start implementing water conservation or drought response measures. To determine the beginning of drought, operational definitions specify the degree of departure from the average of precipitation or some other climatic variable over some period. This is usually done by comparing the current situation to the historical average, often based on at least a 30-years record.

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,

Madhya Pradesh (MP), Uttar Pradesh (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:

- a) Meteorological drought, defined as a situation when there is more than 25% decrease from the long-term average precipitation over an area
- b) Agricultural drought, signifying the situation when soil moisture and rainfall are inadequate to support healthy crop growth
- c) 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 both farm and non-farm sector. The direct impacts are usually visible in falling agricultural production and heightened food insecurity among poor and vulnerable sections; depleted water levels; higher livestock and wildlife mortality; cattle and animal migration; damage to ecosystem from indiscriminate exploitation; increased fire hazards etc. Indirect impacts of drought can be gauged from the reduction in incomes for farmers and agribusinesses, increased prices for food and fodder, reduction in purchasing capacity and slump in consumption, default on agricultural loans, distress sale of agricultural land & livestock, rural unrest, shrinkage in avenues for agricultural employment etc.

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:

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

The IMD recognizes five drought situations:

- a) 'Drought Week' when the weekly rainfall is less than half of the normal
- b) 'Agricultural Drought' when four drought weeks occur consecutively during mid-June to September
- c) 'Seasonal Drought' when seasonal rainfall is deficient by more than the standard deviation from the normal

- d) 'Drought Year' when annual rainfall is deficient by 20 per cent of normal or more, and
- e) 'Severe Drought Year' when annual rainfall is deficient by 25 to 40 per cent 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. It is essential that along with a drought monitoring system, medium and long-term area specific plans be prepared for drought proofing of susceptible areas. 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 are seasonal and localized hazards occurring only in the parts with 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.

Described below are the IMD definitions¹¹ for Cold Wave and Cold Day:

Wind chill factor plays an important role and brings down the actual minimum temperature depending upon the wind speed. The actual minimum temperature of a station should be reduced to "Wind Chill Effective Minimum Temperature (WCTn)" based on wind chill factor using the relevant WMO criteria. For declaring "Cold Wave" and "Cold Day" WCTn should only be used.

If WCTn is 10°C or less, then only the conditions for cold wave should be considered. There is a Cold Wave

- a) When normal minimum temperature is equal to 10°C or more; Cold Wave if the departure from normal is -5°C to -6°C and 'Severe Cold Wave' Departure from normal is -7°C or further

¹¹ <http://imd.gov.in/section/nhac/termglossary.pdf> (accessed Sep 20, 2019)

- b) When normal minimum temperature is less than 10°C; 'Cold Wave' – if the departure from normal is -4°C to -5°C and 'Severe Cold Wave' Departure from normal is -6°C or less.
- c) When WCTn is 0°C or less, Cold Wave should be declared irrespective of normal minimum temperature of the station. However, this criterion is not applicable for those stations whose normal minimum temperature is below 0°C

Cold Wave conditions for coastal stations: For coastal stations the threshold value of minimum temperature of 10°C is rarely reached. However, the local people feel discomfort due to wind chill factor which reduces the minimum temperature by a few degrees depending upon the wind speed. For coastal stations, the "Cold Day" concept may be used following the criteria given below:

- a) Actual minimum temperature of a station be reduced to WCTn
- b) This WCTn should be used to declare "Cold Wave" or "Cold Day"
- c) When minimum temperature departure is -5°C or less over a station, "Cold Day" may be described irrespective of threshold value of 10°C
- d) However, when a threshold of 10°C is reached "Cold Wave" be declared
- e) When a station satisfies both the Cold Wave and Cold Day criteria, then Cold Wave has a higher priority and must be declared

Cold Wave and Cold Day are area specific phenomena and may be ascribed for a Met Sub-division or a part thereof when at least two stations satisfy the criteria.

2.2.2.9 Thunderstorm, Lightning, Squall, Dust Storm, and Strong Wind

Thunderstorm/Lightning, Dust/Hailstorm, Squall, and Strong Wind are hazardous and cause risk to life and public property. These are potentially hazardous for aviation sector as well as to transport, power, communication and other socio-economic sectors. Thunderstorms have some important characteristic such as formation of Squall, strong updraft and down draft, towering cumulonimbus associated with turbulence and icing, in cloud electrification and associated lightning, localized heavy rain and hailstorm. As available data of last ten years, about 2,500 people died from lightning strikes and torrential rains in the country every year. India may also witness an increase in the severity and frequency of the dust storms and thunderstorms similar to what the northern Indian states experienced recently. Experts also believe that the severity and frequency of thunderstorm/dust storms is expected to rise in years ahead due to rising global temperature. The increase in occurrence and severity is a wake-up call for all agencies to take appropriate action for prevention, preparedness and mitigation in order to save lives, livestock, property and infrastructure.

Thunderstorms

Thunderstorms occur round the year in different parts of the country. However, their frequency and intensity is maximum in summer months (March to June). As the most important factor for occurrence of thunderstorm is the intense heating of the atmosphere at surface level and maximum heating takes place in summer months, the frequency of occurrence is maximum in summer months. A thunderstorm is said to have occurred, if the thunder is heard or lightening seen. Usually the thunder can be heard up to 40 km from the source of origin. Thunderstorms fall in the category of Meso-gamma weather systems with spatial extent of around 2~20 km and temporal scale of a few hours. Considering the intensity, the thunderstorms in India are categorised as moderate and severe thunderstorms as follows:

- **Moderate thunderstorm:** It is called as moderate thunderstorm, if there is loud peals of thunder with frequent lightning flashes, moderate to Strong rains and maximum wind speed 29 to 74 kmph
- **Severe thunderstorm:** It is called as severe thunderstorm, if there is continuous thunder and lightning, Strong rains and maximum wind speed ≥ 75 kmph

Squall

The frequency and intensity of squall are maximum over eastern and northeastern states. Comparing different seasons, the frequency of squall is maximum in pre-monsoon season (March-May) in different parts of the country. However, there is a secondary maximum in the winter season over the northwest India. The intensity of squall is maximum in the month of May followed by April. A squall is defined as a sudden increase of wind speed by at least 29 kmph (16 knots) with the speed rising to 40 kmph (22 knots) or more and lasting for at least one minute. The squalls are of two types:

- Moderate squall: It is called as moderate squall, if surface wind speed (in gusts) is less than 80 kmph
- Severe squall: It is called as severe squall, if surface wind speed (in gusts) is greater than 80 kmph

Dust Storm

The northwest India experiences convective dust storms called “aandhi” locally during the pre-monsoon season. The frequency of dust storm is maximum over Rajasthan followed by Haryana, Punjab and west UP. The dust storm mainly occurs in the pre-monsoon season and it is maximum in the month of May in terms of frequency and intensity. The dust storms are of three types:

- Slight when the wind speed is less than 41 kmph and visibility is 500 to 1000 metres
- Moderate when the windspeed is 42 to 79 kmph and visibility is 200 to 500 metres
- Severe when the surface wind speed (in gusts) more than 80 kmph and visibility is less than 200 metres

Lightning

Lightning is a high-current electric discharge that occurs in the earth's atmosphere and that has total path length of the order of few kilometers. The peak power and total energy in lightning are very high, the peak power that is dissipated by a lightning discharge is on the order of 100 million watts per meter of channel and the peak channel temperature approach 30,000 °C. Peak currents in a lightning discharge range from several to hundreds of kiloamperes (kA), with typical value being 40 kA. Prediction of lightning as to the precise time and location is very difficult. In the atmosphere, three types of discharges take place: a) Thundercloud (intra-cloud), b) One cloud to another (inter-cloud) and c) Cloud to ground (CG). Aircrafts can be hit by first two while the third type takes a toll on life and property on the ground.

2.2.2.10 Cloudburst and Hailstorms

Cloudburst¹²

A cloudburst is an extreme amount of precipitation in a short period, sometimes accompanied by hail and thunder, that can create flood conditions. It is not, as is sometimes understood, the breaking open

¹² This section relies on publications (reports, circulars, research papers) of IMD and NCMRWF.

of a cloud resulting in the release of huge amounts of water. According to the IMD, if rainfall of about 100 mm or above per hour is recorded over a place that is roughly less than 100 sq.km area, it is classified as a cloudburst event. By this definition, 50 mm rainfall in half an hour would also be classified as a cloudburst. To put this in perspective, India, in a normal year, gets about 1160 mm annual rainfall. A cloudburst would therefore account for 10-12 per cent of the annual rainfall of that area in just an hour. At times, a large amount of runoff from higher elevations is mistakenly conflated with a cloudburst. They are difficult to forecast because they occur over a very small area. Forecasts for a very small area are difficult to predict. However, using Doppler radars it is possible to forecast the possibility of cloudbursts about six hours and sometimes 12-14 hours in advance.

However, cloudbursts are infrequent as they occur only via orographic lift, i.e., occasionally when a warm air parcel mixes with cooler air, resulting in sudden condensation. Cloudbursts do happen in plains as well, but there is a greater probability of them occurring in mountainous zones; it has to do with the terrain. Hilly terrains aid in heated air currents rising vertically upwards, thereby, increasing the probability of a cloudburst situation. The rainfall itself does not result in the death of people, though sometimes, the raindrops are big enough to hurt people in a sustained downpour. It is the consequences of such heavy rain, especially in the hilly terrain, that causes death and destruction. Landslides, flash floods, houses and establishments getting swept away and cave-ins lead to the deaths. There is a paucity of past data on cloudbursts; in addition, since only some of them get counted – only those that result in death and destruction – there is a problem of accuracy as well. Under global climate change scenarios, the frequency of high intensity rainfall events is expected to increase and consequently frequency of cloudburst events may also increase.

Hailstorm¹³

India is among the countries in the world with the highest frequency of hail. There are about 29 hail days per year of moderate to severe intensity. The hailstorm activity that occurs usually in the months of April and May occurred during February-March in 2014. About 25% of total occurrence in the past recorded hailstones of 3-cm or more diameter. The hailstorms are mainly observed in the winter and pre-monsoon seasons with virtually no events after the onset of the southwest monsoon.

Hail is a solid, frozen form of precipitation that causes extensive damage to property and crop. Hot, humid afternoon hours during the summer are the most congenial for development of hailstorms, which usually form over a relatively small area and pass over within a very short period. At times, it can cause considerable crop damage in brief spell lasting a few minutes. Hail is often associated with thunderstorm activity and changing weather fronts. This is formed in huge cumulonimbus clouds, commonly known as thunderheads. The IPCC reports caution that there are indications that a warming climate would favour an increase in the intensity and frequency of extreme events such as heat waves and precipitation extremes. Hail and thunderstorms are extreme forms of weather events that deserve special attention in view of climate change. Hailstorms are of three types:

- Slight, when it is sparsely distributed, usually small in size and often mixed with rain
- Moderate, when it is abundant enough to whiten ground
- Strong, if it includes at least a proportion of large stones

As a thunderstorm moves along, it may deposit its hail in a long narrow band (often several kilometres wide and about 10 kilometres long) known as a hail-streak or hail-swath. If the storm should remain almost stationary for some time, substantial accumulation of hail is possible. Its size and shape depend on how fast the storm is moving and how strong the updrafts are inside the storm. A typical hail-streak is about 1.5 km wide and 8 km in length. However, these may vary from a few acres to large belts,

¹³ This section relies largely on Bal et al 2014

about 16 km wide and 160 km long. The volume of hail reaching the ground falls at a speed of about 40 m/sec and is usually less than one-tenth the volume of rain produced by a thunderstorm.

The hail-related damage depends on the size of hailstones and number that fall per unit area during a hail fall, the wind force during the event and the type of area where it falls. The extent of crop-hail damages also varies depending on the stage of occurrence of hail during the crop growing season. Even a short episode of hail can cause severe injury to crops, fruit trees, both downgrading the quality and causing subsequent losses due to diseases like blight, mould, canker and fruit rots. One among the world's deadliest hailstorms recorded in history occurred on 30 Apr, 1888 in Uttar Pradesh killing at least 230 people, and over 1600 sheep and goats. According to the Commissioner of Agriculture, Maharashtra, the hailstorms damaged various horticultural crops over approximately 16 lakh acres.

Hail being a very short term and localized phenomena, its prediction well in advance to inform all stakeholders for adequate preventive measures is a major challenge for even the most technologically advanced and hail-prone countries like the USA. India, being situated in the tropical and subtropical region, the frequency is less compared to the mid-latitude and temperate countries. However, with climate change, the instances of severe weather aberrations are increasing.

2.2.2.11 Glacial Lake Outburst Flood (GLOF)

A Glacial Lake Outburst Flood (GLOF) is a type of flood occurring when water dammed by a glacier or a moraine is released. When glaciers melt, they sometimes form lakes on mountaintops. The water in these glacial lakes accumulates behind loose naturally formed 'dams' made of ice, sand, pebbles and ice residue. Glacial lake volumes vary, from several MCM to hundreds of MCM of water. But these are inherently unstable and disturbances such as avalanches, falling boulders, earthquakes, or even simply the accumulation of too much water can breach the 'dam', unleashing sudden, potentially disastrous floods in nearby communities. A catastrophic failure of the containing ice or glacial sediment can release this water over periods of minutes to days. Peak flows as high as 15,000 cubic metres per second have been recorded in such events. GLOF events have killed thousands in many parts of the world and some of the largest events occurred in the Himalayas.

The Indian Himalayan Region (IHR), with geographical coverage of over 5.3 lakh kilometre square, extends over 2,500 kilometres in length between the Indus and the Brahmaputra river systems. While glacial lake hazards and glacial lake distributions are investigated in many glaciated regions of the world, relatively, there has been less attention to these in the Indian Himalayas. In physiographic terms, the IHR extends from the foothills in the south (Siwaliks) to Tibetan plateau in the north (Trans-Himalaya). Three major geographical entities, the Himadri (Greater Himalaya), Himanchal (Lesser Himalaya) and the Siwaliks (Outer Himalaya), extending almost uninterrupted throughout its length, are separated by major geological fault lines. The National Mission for Sustaining the Himalayan Ecosystem (NMSHE), one of the eight missions under the National Action Plan on Climate Change (NAPCC) is dedicated to sustainable development of the region, understanding climate change impacts and examining adaptation strategies for the region. The Himalayan states/UTs include—J&K, Ladakh, HP, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and two partial hill states, namely Assam and West Bengal.

The climatic change/variability in recent decades has made considerable impacts on the glacier lifecycle in the Himalayan region. Scientific studies have noted glacier retreat occurring in most parts of the Hindu Kush Himalaya, which has given rise to the formation of numerous new glacial lakes. Glacial lakes are an indirect indicator of glacier change and unstable lakes can present hazards to downstream locations. The Geological Survey of India (GSI) lists 9,575 glaciers in IHR, of which 267 are over 10 sq.km. One of the pioneering regional glacial lake inventories has provided a qualitative

classification of 251 glacial lakes greater than 0.01 km² in area. These glacial lakes are present in J&K, Ladakh, HP, Uttarakhand, Sikkim and Arunachal Pradesh. Many of these glacial lakes present moderate to severe risks to the downstream locations. The hazard of Glacial Lake Outburst Flood (GLOF) can get aggravated in case of cloud burst situation in the area.

In Sikkim Himalaya many glacial lakes are in the process of formation. There are high chances of bursting of these lakes due to their formation in weak moraine structures. It may cause huge devastation in the downstream in the case of bursting. The GLOF hazard from South Lhonak glacial lake, located in the extreme North-western part and one of the fastest growing lakes in Sikkim Himalaya, is of particular concern. The lake is fast increasing in its size in an extremely abnormal way due to the melting of the South Lhonak glacier attached with the lake and addition melt water from adjoining North Lhonak glacier and main Lhonak glacier. The study of past satellite data of Lhonak glacier lake area revealed that the area of the lake has increased from 0.18 km² in 1976 to 1.26 km² by 2013¹⁴. The abnormal growth of the volume of the lake greatly increases the risk a GLOF event. Based on the current inventory and recognising the risk of GLOF events in the IHR, the CWC is monitoring 467 glacial lakes and water bodies with water spread area more than nearly 0.4 Sq.km (Singh and Gupta 2017).

2.2.2.12 Heat Wave

Heat wave is a period of abnormally high temperatures that leads to physiological stress, which sometimes can claim human life. The World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius. Different countries define heat wave differently in context of their local conditions. Heat Waves typically occur between March and June, and in some rare cases even extend until July. Heat waves are more frequent over the Indo-Gangetic plains of India. On an average, 5-6 heat wave events occur every year over the northern parts of the country. In the northern plains of the country, dust in suspension occurs in many years for several days, bringing minimum temperature much higher than normal¹⁵ and keeping the maximum temperature around or slightly above normal.

Heat wave and Hot Day are area specific phenomena and may be ascribed for a Met Sub-division or a part thereof, when at least two stations satisfy the criteria. According to revised terminology of the IMD applicable from January 2016¹⁶, in India, it will be considered as heat wave if the maximum temperature of a met-sub-station reaches at least 40°C or more in the plains, 37°C or more in coastal areas and at least 30°C or more for hilly regions. IMD defines heat wave¹⁷ when departure from Normal is 4.5°C to 6.4°C and Severe Heat Wave when departure from normal is >6.4°C. Similarly, for the plains heat wave is when actual maximum temperature $\geq 45^{\circ}\text{C}$ and Severe Heat Wave when actual maximum temperature $\geq 47^{\circ}\text{C}$. To declare a heat wave, the condition should be recorded in at least at two stations in a Meteorological sub-division for at least two consecutive days. A heat wave will be declared on the second day.

Higher daily peak temperatures and longer, more intense heat waves are becoming increasingly frequent globally due to climate change. India too is feeling the impact of climate change in terms of increased instances of heat waves that are more intense in nature with each passing year and have a devastating impact on human health thereby increasing the number of heat wave casualties. The

¹⁴ Based on information posted on NMSHE website, http://knowledgeportal-nmshe.in/programme_details.aspx?C=57569ABD-ECC5-48B3-8F99-C0EBD6DFDC9F (accessed Sep 20, 2019)

¹⁵ Normal is the long term (over 30 years) annual average

¹⁶ Forecasting Circular No. 5/2015 (3.7), applicable from 1-Jan-2016

¹⁷ Guidelines for preparation of Action Plan Prevention and Management of Heat Wave, NDMA, 2017

health impacts of Heat Waves typically involve dehydration, heat cramps, heat exhaustion and/or heat stroke. The signs and symptoms are as follows:

- Heat Cramps: Edema (swelling) and Syncope (Fainting) generally accompanied by fever below 39°C (102°F)
- Heat Exhaustion: Fatigue, weakness, dizziness, headache, nausea, vomiting, muscle cramps and sweating
- Heat Stroke: Body temperatures of 40°C (104°F) or more along with delirium, seizures or coma, which is a potentially fatal

This unusual and uncomfortable hot weather can impact human and animal health. It can cause major disruption in community infrastructure such as power supply, public transport and other essential services. Heat wave is considered a “silent disaster” as it develops slowly.

2.2.3 Human-induced Hazards

2.2.3.1 *Chemical (Industrial) Disasters*

With rapid economic development, there has been spread of industries from small to large across the country. There is relatively higher presence of industrial sector along the west coast, largely due to the proximity to raw materials and ports. The states with very large number of chemical industries are Gujarat, Maharashtra, Uttar Pradesh (UP), Tamil Nadu (TN), MP, and Punjab. Due to the regional concentration of chemical companies in certain pockets, the chemical hazard has increased many folds. The growth of industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM) and hazardous materials (HAZMAT)¹⁸. These events occur due to mishaps or failures in industry and negligence in following international codes and standards for chemical handling which affects the industrial functioning, and productivity. While the common causes for chemical accidents are deficiencies in safety management systems or human errors, 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. The suggestions from several industry associations have recommended the implementation of the updated and relevant International Organization for Standardization (ISO) and Occupational Health and Safety Assessment Series (OHSAS) standards to production and storage of chemicals. There are specific norms applicable to industries producing, storing or handling hazardous chemicals.

2.2.3.2 *Nuclear and Radiological Emergencies (NRE)*

A nuclear disaster is construed as potentially a low probability event, however very high in damage impact, could be caused by detonation of nuclear warhead or explosion of an Improvised Nuclear Device (IND) with associated release of large amounts of devastating energy due to Blast, Thermal and Radioactive material. Secondary effects occurring later might result in fall out of radioactive dust. The nuclear and radiological emergencies could be due to accidents at operating nuclear facilities / incidents in public domain that could potentially release radioactive materials. The cause of these events could potentially arise from nuclear facility/ malicious acts of radioactivity dispersal by explosion of Radiological Dispersal Device (RDD). The occurrence of these kinds of emergencies could be of probability marginally higher but based on the scale of the accident/ incident, the potential impact of damage will be restricted to less domain.

¹⁸ National Disaster Management Guidelines – Chemical Disasters, NDMA (2007)

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, exceeding the respective permissible limits (see NDMA's guidelines for NRE¹⁹). These emergencies are classified into five broad groups as follows:

- 1) 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
- 2) 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
- 3) An accident involving radioactive material package during its transportation
- 4) The malevolent use of RDD or IND by terrorists
- 5) 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) A nuclear emergency refers to a 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). These covers accidents in nuclear reactors, 'criticality' situations in fuel cycle facilities, nuclear explosions, etc.
- b) All other emergency situations which have the potential hazard of radiation exposure due to decay of radioisotopes, are classified as radiological emergencies.

While the overall objective is to prevent NRE, there is also the need to adequately prepare for such emergencies. An 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 NRE²⁰ for a brief description of each):

- 1) Accidents in Nuclear Power Plants and other facilities in the Nuclear Fuel Cycle
- 2) 'Criticality' Accidents

¹⁹ National Disaster Management Guidelines – Management of Nuclear and Radiological Emergencies, NDMA (2009)

²⁰ ibid

- 3) Accidents during transportation of radioactive materials
- 4) Accidents at facilities using radioactive sources
- 5) Disintegration of satellites during re-entry
- 6) Nuclear/Radiological terrorism and sabotage at nuclear facilities
- 7) State-sponsored nuclear terrorism
- 8) Explosion of nuclear weapons

2.2.3.3 Biological and Public Health Emergencies (BPHE)

Disasters related to this sub-group are biological emergencies and epidemics, pest attacks, cattle epidemics and food poisoning. Biological emergency is one caused due to natural outbreaks of epidemics or intentional use of biological agents (viruses and microorganisms) or toxins through dissemination of such agents in ways to harm human population, food crops and livestock to cause outbreaks of diseases. This may happen through natural, accidental, or deliberate dispersal of such harmful agents into food, water, air, soil or into plants, crops, or livestock. Apart from the natural transnational movement of the pathogenic organisms, their potential use as weapons of biological warfare and bioterrorism has become far more important now than ever before. Along with nuclear and chemical agents, many biological agents are now considered as capable of causing large-scale mortality and morbidity.

Handling exotic pathogens warrants suitable infrastructure, notably, high containment laboratories of bio-safety levels 3 and 4; recruitment of highly committed, dedicated and trained professionals; continuous availability of diagnostic reagents; enhancement of skills at various echelons of health professionals in early identification of such infections, investigation of outbreaks and institution of specific control measures. Current system of surveillance and mechanism to control the outbreak of endemic diseases are through the National Programme for Surveillance of Communicable Diseases.

Natural outbreaks of disease may become epidemics and assume disastrous proportion if not contained in the initial stages. Pest infestations have recurred as major disasters for the agrarian economy of India since time immemorial. Locust swarms coming from Central Asia used to be a major cause for concern. Besides such consolidated events, infestation of localized pests is a threat to plant as well as human life. A major factor responsible for deterioration and the loss of food grains, their products and the economic losses besides health hazards is the contamination caused by rodents and insects. Pest control is achieved primarily through chemical methods subject to safety standards and regulatory norms for the safe use of such chemicals.

The growth of human society has rested largely on the cultivation of crops and domestication of animals. As crops and animals became necessary to sustain a divergent social structure, the depletion of these resources had far-reaching consequences. Along with the growth of societies, crop and animal diseases acquired more and more importance. Infectious agents are constantly evolving, often acquiring enhanced virulence or epidemic potential. As large number of people now travels within and across national boundaries, the likelihood of fast global spread of epidemics has increased dramatically making localised outbreaks into national epidemics and global pandemics. As our society is in a state of flux, novel pathogens emerge to pose challenges not only at the point of primary contact but also in far removed locations. The increased interaction between humans and animals has increased the possibilities of zoonotic diseases emerging in epidemic form. The Biological DRR covers the legal frameworks and institutional aspects needed for addressing safety and security of microbial agents, managing epidemics, containing biological terrorism (BT), managing threats to livestock, and all forms of agriculture.

Desert locusts fly with the wind and can travel 100-150 km in a day. The Bombay locust (*Nomadacris succincta*) was a major pest in India and South-Eastern Asia in the 18th and 19th centuries but has seldom swarmed since the last plague in 1908. The desert locust swarms from as far as Africa sometimes can reach India and Pakistan crossing the Indian Ocean. The Locust Control and Research Division under MAFW keeps constant vigil through field surveys to prevent crop losses due to locust attack in approximately two lakhs sq.km of Scheduled Desert Area in the States of Rajasthan and Gujarat. Locust Watch under FAO monitors the locusts worldwide and issue early warnings to countries about locust swarms. After receiving warning, Government takes urgent measures for monitoring and control.

Direktorate of Plant Protection Quarantine and Storage under the MAFW with sub-offices across India, is the apex organization responsible for taking measures related to plant protection. Such measures are important in the overall crop production programmes for sustainable agriculture. Plant protection activities encompasses activities aimed to minimizing crop losses due to pests through integrated pest management, plant quarantine, regulation of pesticides as well as locust warning and control.

To effectively tackle the issue of livestock health, the Department is supplementing the activities of the State Governments/ Union Territories through 'Livestock Health & Disease Control Scheme', which has the following components:

- 1) Assistance to States for Control of Animal Diseases
- 2) Professional Efficiency Development
- 3) National Project on Rinderpest Surveillance and Monitoring
- 4) Foot and Mouth Disease Control Programme
- 5) National Animal Disease Reporting System
- 6) Peste des Petits Ruminants Control Programme
- 7) Brucellosis Control Programme
- 8) Establishment and Strengthening of existing Veterinary Hospitals and Dispensaries
- 9) Classical Swine Fever Control Programme

2.2.3.4 Accidents – Rail, Air, Road and Water

The fast pace of development brings with it increasing frequency of various types of accidents as more and more people are involved in diverse economic activities. The number of air accidents, cases of boat capsizing, building collapses, fires in built environments – residential, commercial and industrial, festival related incidents involving large number of people, forest fires, emergencies in mines (flooding, collapse, etc.), oil spills, rail accidents, road accidents, stampedes, transportation of hazardous material (HAZMAT) related accidents etc. are increasing. While all these are matters of utmost concern, not all of them fall within the purview of the NDMP. Certain specific agencies such as the Indian Coast Guard have the primary responsibility of addressing incidents of oil spills and ships in the coastal waters. While the cases of fires in the built environment and forests are included in the plan, local authorities address them in accordance with the relevant emergency management systems. The primary way to reduce risks is through mainstreaming risk reduction in development and governance. As part of the overall DRR plan, systems for disaster preparedness and response are being strengthened at all levels, which in turn will help in reducing the number of accidents and improve the capacity to respond.

2.2.3.5 Emergencies Associated with Mass Gatherings

Throughout the country, frequently, there are various kinds of events that attract crowds large and small, at varying types and styles of venue. The degree and quality of preparedness to cope with

expected or unforeseen emergencies arising from such events vary greatly. Inadequate planning can increase risks associated with insufficient or ineffective spectator management or service provision. The evidence lies in the large number of public events where multiple injuries, illness and deaths have occurred. Emergencies and disastrous incidents associated with mass gatherings is a world-wide phenomenon.

During festivals or events attracting mass gathering - railways, roadways and airways etc. may experience unexpected temporary surge in number of people at such locations. Agencies responsible for operation and management at such places would need to include "crowding" and 'crowd behaviour' as hazard risk while formulating strategic plan for public safety. Accordingly, it will be necessary to pay attention to implementing special arrangement necessary for managing the crowds and crowd behaviour. For the benefit of the state governments, local authorities and other agencies, NDMA has published a guideline on mass gatherings²¹.

Depending on the event, there could be surge in number of people at railway stations, bus terminals and airports. Framework suggested in this document paves way in formulating public safety plan by agencies like railways, bus transport and airways. These plans are to be developed in consultation with local authorities and event administrator/ organiser. As crowd disasters are local events, disaster management is primarily the responsibility of the organizers and local/district administration with support, guidelines from the state and the national authorities.

While planning events, organisers tend to overlook likely emergencies that could arise or fail to consider major emergencies and the worst-case scenarios. It is necessary to recognise that such risks are inevitably associated with large events, and therefore call for appropriate planning and preparation. Planning for public events requires cooperation between event organisers and relevant government, private and community organisations. Quite simply, the decisions of one party in the planning stage can have an impact on the preparedness of another, so a sharing of knowledge and information is imperative prior to the event. While event promoters or managers have primary responsibility for planning and preparation, the involvement of health professionals and emergency managers in the pre-event planning phase may contribute to a safer, and therefore more successful, event.

The NDMA guideline lists six major causes and triggers for crowd disasters which are summarised below, but are described in detail in the guideline:

1. Structural – The infrastructure, conditions and arrangements at the venue may not be adequate (collapse of barricades, fencing, temporary structures, insufficient exit, difficult terrain, slippery/muddy roads, etc.)
2. Fire/Electricity – Risky practices involving fire and electricity ranging from makeshift facilities, shops, cooking, careless use of easily inflammable materials, non-availability or malfunctioning fire extinguishers, illegal electric connections, and many such possibilities
3. Crowd Control – Crowds exceeding the capacity of the venue, poor management resulting in confusion and failure of all orderliness, not having enough emergency exits, inadequacy of systems to effectively communicate with the crowd and similar problems
4. Crowd Behaviour – There are numerous issues known to be associated with the behaviour of crowds which is different from what is expected from an individual that tend to worsen emergency situations that may include unruly, irresponsible and angry responses.

²¹ Managing crowd at events and venues of mass gathering, NDMA, 2014.

5. Security – Under deployment of security personnel to regulate to control crowd, flaws in the planning of security arrangements
6. Lack of Coordination between Stakeholders – Significant coordination gap between agencies associated with the organising of the event and authorities

The experience shows that there is need for properly integrated approach for the crowd management which the state and local authorities must recognise and implement. The state governments must review existing norms and regulations and amend them if required to manage the emergencies arising from mass gatherings.

2.2.4 Fire Risk

2.2.4.1 Fires in Built Environment

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 guideline²² on fire services notes that the Standing Fire and Advisory Council (SFAC) has stressed the urgent need to strengthen the Fire and Emergency Services (F&ES) and overcome major shortcomings in the response and its capabilities.

2.2.4.2 Forest Fire Risk

India is one of the richest areas of biodiversity in the world having nearly seven lakh square kilometres of forest cover. Increasing human interference is a major cause for the incidents of the forest fires²³. Despite its natural and essential roles, fire has negative consequences when it conflicts with the public interest. Examples of negative impacts include loss of homes, property and critical infrastructure, damage to domestic watersheds and destruction of commercially valuable timber. Smoke from forest fires can also interfere with road and air transportation, inhibit tourism, and cause serious public health problems. It is also a threat to human settlements dwelling within or adjacent to the forests.

Forest fires in India are generally ground fires. As per Forest Survey of India (FSI), which has been conducting field investigations since 1965, human activities trigger nearly 95 per cent of the forest fires in India. Forest fire is a major cause of injury and loss to forests. Area affected by forest fire annually is nearly 35 million hectares. In general, all over the world the main causes of forest fires are anthropogenic. The data on forest fires in India is very weak and needs to be improved. FSI's 1995 data considers nearly 50 per cent of the forest areas as fire prone with 43 per cent having occasional fire incidents. According to this assessment, very high, high, and frequent forest fires occur in 0.84 per cent, 0.14 per cent and 5.16 per cent of the forest areas respectively. The states with frequent

²² NDMA Guideline on Scaling, Type of Equipment and Training of Fire Services

²³ Satendra and Kaushik (2014) This section is based largely on this document.

occurrence of forest fires are: 1) Andhra Pradesh 2) Himachal Pradesh 3) Karnataka 4) Manipur 5) Madhya Pradesh 6) Nagaland 7) Orissa 8) Rajasthan 9) Telangana 10) Uttar Pradesh and 11) Uttarakhand.

The moist deciduous forest is the most vulnerable to fire in India. Nearly 15 per cent of this ecosystem is frequently disturbed by fire and 60 per cent is occasionally affected. In the case of wet/semi-evergreen forests, fire occurs somewhat frequently in nine per cent, and occasionally in additional 40 per cent. In the North-Eastern region of India, recurrent fires annually affect up to 50 per cent of the forests. The coniferous forests in the Himalayan region are also very fire-prone with many wildfires occurring during the winter drought. The proportion of the forest areas prone to forest fire ranges greatly across different states.

The traditional view of fire as a destructive agent requiring immediate suppression has given way to the view that fire can and should be used to meet land management goals under specific ecological conditions. The impact of the fire is diverse on the forest ecosystem. Besides directly damaging the forest, the fire also adversely affects forest regeneration, microclimate, soil erosion, and wildlife etc. In most of the cases, the forest fire causes retrogression of forest vegetation. Forest fire is one of the major degenerating factors, which extensively damages the growing stock and its generations and makes area vulnerable to erosion. It has wide-ranging adverse ecological, economic and social implications.

2.3 Regions/Areas Involving Multiple States Requiring Special Attention

While suggesting a holistic approach to DM, the High Power Committee²⁴ 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 a 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:

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

2.3.1 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 (see also the description in section 2.2.2.11). 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

²⁴ 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.

unpredictable depending on the nature, intensity, and frequency of the disturbance to natural ecosystem.

2.3.2 Coastal Areas

India has a coastline encompassing the mainland and various islands exceeding 7,500 km. Natural disasters, primarily cyclones usually accompanied by storm surges as well as coastal shoreline changes affect the coastal tracts, regularly inflicting widespread miseries. 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. 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. Often coastal disasters affect more than one state at a time and the response can be considerably improved by proactive inter-agency cooperation among centre and the affected states.

2.3.3 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 food shortages 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:

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

Disaster situations involving major rivers affect more than one state at a time and the response can be considerably improved by proactive inter-agency cooperation among centre and the affected states, which may require a river-basin oriented approach. Heavy rainfall and floods have underscored the importance of multi-agency cooperation, need for reliable flood forecasting, ability for making reasonably accurate quantitative rainfall forecast, information at the river basin level and modern MIS for all major dams.

2.3.4 North East Region (NER)

North East Region of India is highly prone to earthquake, floods and landslide. Some areas are also vulnerable to forest fire. The 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 (MDONER) 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 per cent 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 considering the special conditions.

2.3.5 Union Territories, Islands and Marine Assets

The UTs, islands and marine assets pose challenges in disaster governance somewhat different from that of the states having a SDMA. The nine UTs governed almost directly by the Union Government, without the administrative system characteristic of a full-fledged state in the Indian Union are:

1. Andaman and Nicobar Islands
2. Chandigarh
3. Dadra and Nagar Haveli
4. Daman and Diu
5. Jammu & Kashmir (J&K)
6. Ladakh
7. Lakshadweep
8. National Capital Territory of Delhi
9. Puducherry

Out of the UTs, J&K, Puducherry and the National Capital Territory 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 UTs without own legislatures. The UT Division of the MHA is responsible for all the legislative and constitutional matters in the 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 UT, 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.

2.3.6 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 tracts²⁵. 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,

²⁵ Hydrology and Water Resources Information System for India , <http://117.252.14.242/rbis/rbis.htm> (accessed Sep 20, 2019)

Haryana, Punjab, UP, and MP. The second tract comprises the regions east of the Western Ghats up to 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.

2.4 Climate Change

2.4.1 Climate and Human-Induced Climate Change

For a sufficiently large geographic region, the term climate, as defined by the World Meteorological Organization, may be understood as the average weather for the region, or more rigorously in terms of the statistical properties (mean and variability) of relevant weather-related variables, with the period for averaging being 30 years or more. Climate projections relate to the slow evolution of the coupled systems of atmosphere, ocean, land, and cryosphere. They are usually expressed in probabilistic terms (e.g. probability of warmer or wetter than average conditions) usually for months or seasons. The climate projections never forecast specific weather events. The term "normal" used in climate are the averages or expected values typical of a region primarily based on analysis of historical data (i.e., long-term data).

The term climate change relates to significant deviations seen in long-term averages of the weather variables in a region (or the whole Earth). In the absence of human-induced changes to the Earth's atmospheric system, such changes are not expected to occur over a short period as has been observed. In fact, if at all such patterns as global studies show are to happen through natural climate variability alone, that could take hundreds or perhaps millions of years. The anthropogenic activities such as industrialization, urbanization, deforestation, agriculture, change in land use pattern and other changes cause emission of greenhouse gases which hastens the rate of climate change. The United Nations Framework Convention on Climate Change (UNFCCC) makes a distinction between Global Anthropogenic Climate Change (GACC) attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes. The UNFCCC in its Article 1, defines GACC as²⁶:

'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'.

Anthropogenic drivers for climate change are now widely recognised among the scientific community as playing the major role in magnifying the disaster risks globally. The knowledge and understanding on climate change hold the key to the unprecedented changes in the disaster risk scenarios facing the world today. A changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather

²⁶ United Nations Framework Convention on Climate Change <http://unfccc.int/cop4/conv/ftconv.html> (accessed Sep 20, 2019)

and climate events. Extreme and non-extreme weather or climate events affect vulnerability to future extreme events by modifying resilience, coping capacity, and adaptive capacity.

The year 2016 made history, with a record global temperature, exceptionally low sea ice, and unabated sea level rise and ocean heat, according to the World Meteorological Organization (WMO). Extreme weather and climate conditions have continued into 2017. WMO issued its annual statement on the State of the Global Climate ahead of World Meteorological Day on 23 March which stated that the globally averaged sea surface temperatures were the warmest on record, global sea levels continued to rise, and Arctic sea-ice extent was well below average for most of the year. Because of climate change, the occurrence and impact of extreme events has risen. ‘Once in a generation’ heatwaves and flooding are becoming more regular. Sea level rise has increased exposure to storm surges associated with tropical cyclones.

2.4.2 IPCC Fifth Assessment Report

According to IPCC's Fifth Assessment Report²⁷ (AR5) based on many independent scientific analyses, new evidence, theoretical studies and computer simulations, there is greater certainty that the build-up of Greenhouse Gas in Earth's atmosphere is changing the world's climate and creating increasingly extreme and unpredictable weather. Because of these changes, the probability of extreme weather events is increasing. According to AR5, the computed linear trend of the globally averaged combined land and ocean surface temperature data show 0.85°C [0.65°C to 1.06°C]²⁸ warming over the period 1880 to 2012, when multiple independently produced datasets exist. In the period 1901-2012, climate has shown a warming of 0.89°C [0.69°C to 1.08°C], which is mainly attributed to anthropogenic activities (IPCC 2013). Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the case of India, increasing temperature trends of the order of 0.60°C during last 112 years (IMD 2012, Rathore et al. 2013) and increase in heavy rainfall events and decrease in low and medium rainfall events (Goswami et al. 2006) have been observed.

A world with 4°C rise in temperature would be one of unprecedented heat waves, severe drought, and major floods in many regions, with serious impacts on ecosystems and associated services. Deltaic regions and coastal cities are particularly exposed to compounding climate risks resulting from the interacting effects of increased temperature, growing risks of river flooding, rising sea-level and increasingly intense tropical cyclones, posing a high risk to areas with the largest shares of poor populations. As per India's National Action Plan on Climate Change, parts of Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Northern Karnataka, Northern Andhra Pradesh, and Bihar are likely to be more vulnerable in times of extreme events.

As a component of the fifth assessment cycle, the IPCC Special Report (SREX) on Managing the Risks of Extreme Events to Advance Climate Change Adaptation (IPCC 2012) provides projections on changing weather and climate extremes. Severe risks, such as flooding, and drought may increase significantly due to small increments in annual average temperature. With extremes of rainfall and drought projected to increase with warming, these risks are expected to be much higher in a 4°C world as compared to the 2°C world. In a 2°C world, the river basins dominated by a monsoon regime, such as the Ganges and Nile, are particularly vulnerable to changes in the seasonality of runoff, which may have large and adverse effects on water availability (IPCC 2012). The AR5 states that changes in cases of extreme weather and climate events have been observed since about 1950. The data indicates that globally, while the number of warm days and nights has increased, that of cold days and nights has decreased. Besides, the frequency of heat waves appears to have increased in large parts of Europe,

²⁷ IPCC (2013)

²⁸ The estimated values have 90 per cent likelihood of being within the uncertainty intervals given in square brackets, which is not always symmetric about the reported best estimate.

Asia and Australia. There are more land regions where the number of heavy precipitation events has increased than where it has decreased.

The climate change actions and DRR share common goals, with both aiming to reduce the vulnerability of communities. The global climate change alters the frequencies, geographic distribution and intensities of almost all the hydro-meteorological hazards such as floods, cyclones, droughts, cold wave, and heat wave in unpredictable ways aggravating the existing uncertainties associated with these hazards. While it is not possible to establish direct one to one functional relationship between specific extreme weather events and any of the specific climate change parameters expressed in global terms (deviations long-term global averages), it is certain that the global climate change does increase disaster risk significantly, although not amenable to precise forecasts. That emphasises the need for more comprehensive approach to DRR.

2.4.3 India and Climate Change

Over a century of observations on atmospheric parameters (like temperature and precipitation), and relatively recent observations on cyclones and sea-level show significant climate anomalies over the Indian region. These changes are likely to increase the frequency of extreme weather events and worsen the hydro-meteorological hazards. Apart from the observed trends, significant climatic anomalies are also projected over Indian region in terms of temperature, precipitation, storms, cyclones, sea-level rise and coastal inundation. An all-round warming over the India sub-continent associated with increasing greenhouse gas scenario. The annual mean surface air temperature rise is expected to range between 1.7 – 2 °C and the seasons may get warmer by around 2°C towards 2030's. The variability of seasonal mean temperature may be more in winter months. The warming in night temperatures is expected to be more over south peninsula, central and northern India, whereas that of daytime warming is expected to be more over central and northern India. This section is based on the several official studies and reports, notably:

- a) India's submission of NDC to the UNFCCC in accordance with Article 4, paragraph 12 of the Paris Agreement, 2015²⁹
- b) India's Progress in Combating Climate Change - Briefing Paper for UNFCCC COP 20 Lima, PERU
- c) IMD Report of 2013 (ESSO/IMD/EMRC/02/2013) - State level climate change trends in India. (Rathore et al. 2013)
- d) INCCA Report #2 – Climate Change and India: A 4x4 Assessment - A Sectoral and Regional Analysis for 2030s

A World Bank report (2012) – ‘Turn Down the Heat’ – warns that parts of South Asia have become drier since the 1970s with an increase in the number of droughts. Droughts are expected to be more frequent in some areas, especially in north-western India, Jharkhand, Orissa and Chhattisgarh. Crop yields are expected to fall significantly because of extreme heat by the 2040s. One of the notable changes in the rainfall pattern is the increase in the frequency of high intensity rainfall events. It has been noted that most Himalayan glaciers - where a substantial part of the moisture is supplied by the summer monsoon - have been retreating over the past century. These changes can have

²⁹ Interim NDC Registry - <http://www4.unfccc.int/ndcregistry/Pages/Party.aspx?party=IND> (accessed Sep 20, 2019)

consequences on the flows of the Indus, Ganges, and Brahmaputra rivers, which in turn could significantly impact irrigation.

The sub-continent is expected to see relatively larger rise in sea levels than higher latitudes and India being close to the equator this has ramifications for the coastal regions of India. Sea-level rise and storm surges would lead to saltwater intrusion in the coastal areas, impacting agriculture, degrading groundwater quality, contaminating drinking water, and possibly causing a rise in diarrhoea cases and cholera outbreaks, as the cholera bacterium survives longer in saline water. Seasonal water scarcity, rising temperatures, and intrusion of sea water would threaten crop yields, jeopardizing the country's food security.

2.4.4 Temperature

Indian annual mean temperature showed significant warming trend of 0.51°C per 100 years, during the period 1901-2007 (Kothawale et al., 2010). Accelerated warming has been observed in the recent period 1971-2007, mainly due to intense warming in the recent decade 1998-2007. This warming is mainly contributed by the winter and post-monsoon seasons, which have increased by 0.80°C and 0.82°C in the last hundred years respectively. The pre-monsoon and monsoon temperatures also indicate a warming trend. Mean temperature increased by about 0.2°C per decade (i.e. 10 years) for the period 1971-2007, with a much steeper increase in minimum temperature than maximum temperature. In the most recent decade, maximum temperature was significantly higher compared to the long-term (1901-2007) mean, with a stagnated trend during this period, whereas minimum temperature showed an increasing trend, almost equal to that observed during 1971-2007.

The all-India mean annual maximum and minimum temperatures increased by 0.71°C and 0.27°C per hundred years (1901-2007) respectively. Additionally, warmer nights have increased, and colder nights have decreased almost over the entire country. The number of cold days and nights has been decreasing and that of hot days and nights have been increasing almost over all the regions of the country. Significant influence of El Niño Southern Oscillation events on temperature anomalies observed across India.

State wise averaged annual mean maximum temperature time series has shown increasing trends over many States/UTs of India except Bihar, Chhattisgarh, Delhi, Haryana, J&K, Ladakh, Meghalaya, Punjab, Tripura and UP (Rathore et al, 2013). The increasing trends were significant over Andaman and Nicobar, AP, Arunachal Pradesh, Assam, Goa, Gujarat, HP, Jharkhand, Karnataka, Kerala, Lakshadweep, MP, Maharashtra, Manipur, Mizoram, Orissa, Rajasthan, Sikkim, TN and Uttarakhand.

2.4.5 Impact on Indian Monsoon

Extreme rainfall amounts are increasing at many places in India. Majority of the locations have reported highest 24-hour rainfall during 1961-1980 with an alarming rise in their intensity during 1980-2009. Many stations have experienced 40-370% rise in their rainfall intensities. All-India monsoon rainfall series based on 1871-2009 indicates that the mean rainfall is 848 mm with standard deviation of 83 mm (MOEFCC 2010). The Indian monsoon shows well defined epochal variability with each epoch of approximately 3 decades. Though it does not show any significant trend, however, when averaged over this period, a slight negative trend i.e. -0.4mm/year is seen. The all-India, northwest, west coast and peninsular India monsoon rainfall shows a slightly higher negative trend, though not significant, than for the total period. However, pockets of increasing/ decreasing trends in 36 meteorological sub - divisions over India are seen (MOEFCC 2010).

For the Indian Summer Monsoon Rainfall (ISMR), i.e., the monsoon season (June to September), Rajeevan et al. (2008) showed that extreme rain events have an increasing trend between 1901 and 2005, but the trend is much stronger after 1950. Sen Roy (2009) investigated changes in extreme hourly rainfall in India, and found widespread increases in heavy precipitation events across India, mostly in the high-elevation regions of the north-western Himalaya as well as along the foothills of the Himalaya extending south into the Indo-Ganges basin, and particularly during ISMR between 1980 and 2002. Heavy precipitation increased in India (Rajeevan et al., 2008) especially during the monsoon seasons (Sen Roy, 2009; Pattanaik and Rajeevan, 2010).

The state/area-specific average annual rainfall show increasing trend over AP, Bihar, Gujarat, Haryana, J&K, Ladakh, Jharkhand, Lakshadweep, Manipur, Meghalaya, Mizoram, Orissa, Rajasthan, TN, Tripura and West Bengal during 1951-2010 (Rathore et al, 2013). However, annual rainfall has decreased over Andaman and Nicobar, Arunachal Pradesh, Assam, Chhattisgarh, Delhi, Goa, H P, Karnataka, Kerala, MP, Maharashtra, Nagaland, Punjab, Sikkim and UP. The highest increase and decrease in annual rainfall were observed over Meghalaya (+14.68 mm/year) and Andaman and Nicobar (-7.77 mm/year) respectively. However, annual rainfall trends have been significantly increasing over West Bengal (+3.63 mm/year) and significantly decreasing over Andaman and Nicobar (-7.77 mm/year) and Uttar Pradesh (-4.42 mm/year).

2.4.6 Storm and Cyclones

The storm frequency has decreased despite higher sea surface temperature in the past century. 1961 onwards, the cyclone frequency shows a significant decreasing trend for all the months and seasons (except post-monsoon period) over the Indian region (MOEFCC 2010). Cyclone intensity however is seen to be increasing during this period which may have significant implications. Cyclonic disturbances over Arabian Sea may be less in future as compared to the present simulations. However, such systems are expected to be more intense in the future under global warming. The frequency of cyclones during the post-monsoon season in future (2071-2100) could be much higher than that during the baseline period (1961-1990).

2.4.7 Sea-Level Rise

Global average sea-level rose at an average rate of about 1.8 and 3.1 mm/year over 1961-2003 and 1993-2003, respectively (MOEFCC 2010). Between 1993 and 2003, the sea level rose by 0.33 m with an uncertainty of ± 1 mm/year. Over the Indian region sea -level rise is less understood. The mean sea-level rise along the Indian coasts (on an average) based on observations is estimated to be about 1.3 mm/year. Global average sea level rise at the end of the 21st century (2090 –2099) for different climate scenarios is expected to be 0.18 - 0.59 m which may be used as first approximation of seal level rise along the Indian coast for nest few decades and towards the end of the century.

2.4.8 Coastal Inundation due to Sea Level Rise

Coastal inundation due to sea level rise is a concern for several locations along the Indian coasts. The east coast of India is more vulnerable than the west coast, because the former is low-lying and more prone to the occurrence of cyclones than the latter (MOEFCC 2010). The central west coast of India is least vulnerable, by virtue of a steep onshore topography and low occurrence of cyclones. Coastal areas projected to be highly vulnerable to inundation due to sea-level rise include the Nagapattinam and Paradip areas along the east coast and the Kochi areas along the west coast.

2.4.9 Integrating DRR and Climate Change Adaptation (CCA)

DRR focusing on adaptation and CCA focusing on risk reduction is pertinent for effective and sustainable DRR as well as CCA. The paradigm shift in DRR towards disaster preparedness and mitigation requires futuristic planning. The SFDRR targets on reducing disaster “mortality”, “affected people”, “economic loss” and “damage”, and increasing availability and access to ‘multi-hazard early warning systems’ and “disaster risk information”, also requires futuristic DRR. However, disaster management in India has been majorly based on observational data that has limited scope for futuristic DRR. Therefore, it is necessary to have reliable projections on disaster risks considering the climate change impacts. The broader goal of developing synergy between Sustainable Development Goals, Paris Agreement and SFDRR can also be achieved by having futuristic DRR and CCA planning. The DRR and CCA integration need that is being recognized at all forum and scales across the country is pertinent to such planning. It becomes imperative to define concrete ways of making DRR and CCA futuristic. Additionally, such integration will enhance effective resource utilization through combined efforts of different stakeholders in the areas of DRR and CCA.

2.5 Livestock – DRR Challenges

2.5.1 Background

In India, livestock are an integral part of the household economy, and contribute significantly to family subsistence, livelihood and well-being. Livestock production and agriculture are intrinsically linked and mutually dependent to a degree, and both are crucial for overall food security. It is an important sub-sector of the agriculture of Indian economy. It forms an important livelihood activity for most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and finally being a dependable “bank on hooves” in times of need. It acts as a supplementary and complementary enterprise. Livestock production and agriculture are intrinsically linked, each being dependent on the other, and both crucial for overall food security. According to estimates of the Central Statistics Office (CSO), the value of output livestock sector at current prices was about Rs 5.92 lakh-crore (5.92 trillion) during 2015-16 which is about 28.5% of the value of output from agricultural and allied sector or nearly 29% at constant prices.

The total livestock population consisting of cattle, buffalo, sheep, goat, pig, horses & ponies, mules, donkeys, camels, mithun³⁰ and yak in the country is 512.05 million as per the 19th livestock census of 2012³¹. The total bovine population (cattle, buffalo, mithun and yak) is nearly 300 million of which the milch animals (cows and buffaloes) is 118.6 million. The total sheep was 65.1 million and goats 135.2 million. Besides, there are 0.63 million horses and ponies, 0.2 million mules, 0.32 million donkeys, 0.4 million camels, 10.3 million pigs, 11.7 million dogs and over 729 million poultry. The provisional figure of disaster loss in 2017-18 (by Dec 31, 2017) was 46,488 cattle³². Given the very large numbers of livestock, the DRR for livestock is a huge challenge, although the losses seem very low at the national level.

³⁰ Also called gayal and mountain cattle; Scientific name: *Bos frontalis*

³¹ <http://dahd.nic.in/documents/statistics/livestock-census> (accessed Sep 20, 2019); 20th Livestock Census is in progress

³² MHA Annual Report 2017-18

2.5.2 Global Approaches in Livestock Emergencies

When animals are lost, injured or debilitated by a disaster, and/or the resources and services that support them are disrupted, there is a serious impact on communities. In emergency situations, specific, livestock-targeted interventions are required to help households survive the immediate crisis and to support communities in rebuilding their livelihoods. Livestock interventions typically cover provision of animal health services, emergency feeding and water supplies, shelter provision, destocking and restocking. The type of intervention will depend on the nature of the emergency, the local context and the phase of the emergency (i.e. ongoing, immediate aftermath, recovery or rehabilitation). Based on good practices from various parts of the world and to ensure effective DRR in the livestock sector, the Food and Agriculture Organisation (FAO), which is part of the United Nations, supported the development of 'Livestock Emergency Guidelines and Standards'³³ (LEGS). The FAO also developed a manual³⁴ – 'Livestock-Related Interventions During Emergencies – The How-To-Do-It Manual' – that complements LEGS. It provides specific and technical "How-to-do-it" guidance for the most common livestock emergency interventions.

These two documents address the important global need for pertinent guidance on livestock emergencies. These are extensive documents that deal with all aspects of diverse kinds of livestock emergencies. Overall approach presented in these documents is presented here.

The guidelines recognise that livestock constitute a crucial livelihood asset – many of whom are poor and vulnerable to both natural and human-induced disasters – and that livestock support is an important component of emergency aid programmes. This guidelines and standards help in designing, implementing, and evaluating livestock interventions in emergencies. The approach supports the saving of both lives and livelihoods through two key strategies:

- Identifying the most appropriate livestock interventions during emergencies
- Providing Standards, Key actions, and Guidance notes for these interventions based on good practice

The approach places emphasis on three livelihoods objectives:

- a) To provide rapid assistance
- b) To protect livestock assets, and
- c) To rebuild the livestock assets of disaster-affected communities

2.5.3 Key Interventions

In most disasters and emergencies affecting livestock, the following set of interventions are applicable, depending on the situation:

- Destocking is a measure resorted to particularly in case of creeping disasters like droughts, usually involve the sale of livestock in anticipation of or during emergency well before the animals are affected by the disaster, which helps improve liquidity needed to support livelihoods all through the crisis.
- Animal rescue involves making all possible efforts to save animals and treat the injured, where possible
- Veterinary support to prevent sickness and death and help maintain the value of the surviving animals
- Provision of feed and water for the animals in the affected area, to the extent possible

³³ LEGS (2014) Livestock Emergency Guidelines and Standards

³⁴ FAO (2016) Livestock-Related Interventions During Emergencies – The How-To-Do-It Manual

- Livestock shelters – may be required in many situations for the protection from extreme weather, predation, and/or theft, depending on the local conditions
- Additional sanitation and other measures to prevent epidemics
- Safe removal and disposal of carcasses of animals killed in the disaster
- Provision of livestock or financial support for restocking to households to replace, subject to conditions, usually partially, animals lost in a disaster with the objective of helping to rebuild livelihoods

In addition, there is a timing factor to consider. Some interventions are more appropriate at certain stages in the disaster cycle than others. For example, a restocking programme would logically be in the recovery, rather than the alert phase of a disaster. It is also likely that a combination of different interventions over time will be a more effective way to safeguard the livelihoods of the beneficiaries.

2.5.4 Risk Management and Insurance

Recognising the need for risk management, the Government of India had initiated a centrally sponsored scheme for livestock insurance which was implemented initially on pilot basis during the tenth five-year plan (2002-07). From 2008-09 onwards, the scheme became a regular scheme. National Livestock Mission (NLM) has been launched during Twelfth Five Year Plan (2012-17). The goal of NLM is sustainable livestock and poultry for nutritional security and economic prosperity. One of its sub-missions is on 'Risk Management and Insurance' (NLM-RMI).

The objective of the NLM-RMI is to address the challenges of managing uncertainties and risks by promoting protection mechanisms against likely loss of animals through livestock insurance schemes. The NLM-RMI is applicable across the country and the implementation began from May 2014 covering all animals. The benefit of subsidy has been enhanced and is restricted to five cattle unit per beneficiary per household, in case of goat, sheep, pigs and rabbit one cattle unit is equal to ten animals instead of two milch animals per household earlier. By the middle of 2017, the insurance scheme covers over 3.6 million animals³⁵.

The livestock insurance schemes are at a very early phase and as they become adopted by more farmers, the schemes will have to introduce different risk cover products addressing different types of risks in key geographies. In addition to the conventional insurance products, indexed options will have to be considered, in which pay-out calculated will be according to what is usually an independently verified proxy (index), rather than the actual damage to specific livestock holdings.

2.6 Environment and Wildlife Conservation

2.6.1 Background

Sound environmental management is proven to be integral to disaster risk reduction. Healthy ecosystems not only play an important role in supporting recovery and reconstruction after a disaster, but in reducing future disaster risk. Yet the same time, disasters also pose significant risks to the ecosystems and could pose threat to the populations of endangered species, disrupt wildlife conservation or ecologically important habitats. The agreements on Sendai Framework, SDG and the COP21 Climate Change bring disaster risk management and environmental professionals closer. It is important to also pay some attention to environment, ecologically important areas and wildlife

³⁵ Press Release, MAFW, 13-Jul-2017. <http://pib.nic.in/newsite/PrintRelease.aspx?relid=167397> (accessed on 15-Dec-2017)

conservation areas/ protected areas even though the approach to DRR will have to quite different. The Sendai framework states that strengthening of environmental resilience is one of the strategies required for preventing the creation of risks³⁶ and notes the importance of preserving ecosystem functions that help to reduce risks while promoting the mainstreaming of DRR³⁷.

Many conceptual frameworks place emphasis on the need for incorporating both disaster risk reduction and securing ecosystem functions in development planning. However, DRR frameworks for integrating disaster risk management and addressing environmental change synergistically are only beginning to emerge and have not yet been widely adopted. The UNISDR Working Group on Environment and Disaster Risk Reduction, for instance, is developing an analytical framework that explores the interlinkages between environmental change and disaster risk based on five inter-related assertions:

- a) Natural hazards are physical processes that can be directly affected by social processes
- b) Healthy ecosystems often provide natural defenses
- c) Degraded ecosystems reduce community resilience
- d) Although the environment itself is often well-adapted to natural hazards (with timescales for recovery varying significantly), disasters can lead to secondary environmental impacts
- e) Environmental degradation itself magnifies risk and becomes a hazard

Protected areas, ecosystems restoration and natural resource management that do not incorporate disaster risk reduction objectives represent a missed opportunity. Failures to identify the mutual benefits of environmental management, risk reduction and climate change adaptation are lost opportunities to protect lives and promote human well-being. Two key areas of environmental management for disaster risk reduction are:

- Environmental Monitoring and Assessment
- Protected Area Management and Ecosystem Rehabilitation

2.6.2 Environmental Monitoring and Assessment

Environmental monitoring and assessment play an important role in generating relevant information that assists environmental and disaster managers in identifying risks, vulnerabilities and opportunities to promote community resilience. Monitoring and observing environmental factors that signal the onset of a hazard are fundamental to early warning systems. Environmental monitoring systems also track trends in environmental degradation, such as deforestation, that underlie a local area's exposure to risk. Mapping hazard risk and exposure is another function of environmental monitoring. In addition to identifying hazard risk (flood, landslide, seismic activity, etc.), some environmental authorities also map environmentally sensitive areas. Environmental assessments produce targeted environmental analyses by reporting on current and anticipated future environmental conditions and identifying drivers of environmental change. These include post-disaster assessments that identify environmental damages and needs, as well as strategic environmental assessments that determine potential environmental consequences of development plans and policies.

2.6.3 Protected Areas, Ecosystem Rehabilitation

Environmental conditions not only modify the frequency of hazard events, but ecosystems also serve as natural barriers that can moderate the effects of a hazard and protect communities. According to

³⁶ Sendai Framework for DRR, Section 27(b)

³⁷ Sendai Framework for DRR, Section 30(g)

the Millennium Ecosystem Assessment (MA 2005), an ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit, which could range from relatively undisturbed areas such as natural forests, landscapes with mixed land-use patterns, to areas intensively managed by humans, such as agricultural land and urban areas. Ecosystems are socio-ecological systems and managing ecosystem services is highly relevant for the purposes of disaster risk reduction. Biodiversity including rare wildlife and their habitats are included in these. Global climate change awareness has spurred a new drive to better manage protected areas and reduce deforestation. Protecting and preserving the natural position and trajectory of wetlands and other water resources has received increasing support, given the risks from their alteration, elimination or loss for developmental purposes.

Ecosystem rehabilitation or restoration entails a wide array of activities, including post-disaster clean-up, e.g. after an oil spill, as well as replanting of forests or mangroves. Restoring ecosystems following natural and human-made disasters can work to reduce the underlying risk factors and mitigate future disaster impacts. Decisions at the field level require detailed knowledge of local environmental conditions (e.g. planting regimes, species choices) and competing community needs. There are several examples of protected areas management, ecosystem restoration and natural resource management showing how decisions need to balance livelihood priorities with environmental sustainability concerns. Pro-actively managing natural areas can ensure protection of the environment and reduce underlying risk factors for disaster by maintaining the resilience inherent in ecosystems. Community participation in forest and fire management has also played an important role in reducing risk of devastating wildfires. Fuel reduction employing both the use of mechanical means as well as controlled (prescribed) fire contributes to a reduction of wildfire hazards and the risk of high-severity wildfires. Appropriate management of coastal forests protect local communities from coastal hazards while helping to conserve biodiversity.

2.6.4 India and Biodiversity Conservation

From a global biodiversity perspective and climate change risks, India is one among the seventeen recognized mega-diverse³⁸ countries of the world, harbouring nearly 8% of the recorded species of the world and representing four of the thirty-four globally identified biodiversity hotspots. It has around 8% of all mammals, 13% of birds, 8% of reptiles, 6% of amphibians and 6% of all plant species population³⁹. Most of them are found in tropical rain forest, Western Ghats and forests of the Himalaya. India is also a vast repository of traditional knowledge associated with biological resources. So far, over 91,200 species of animals and 45,500 species of plants have been documented in the ten biogeographic regions of the country. Inventories of floral and faunal diversities are being progressively updated with several new discoveries through the conduct of continuous surveys and exploration.

Along with species richness, India also possesses high rates of endemism. In terms of endemic vertebrate groups, India's global ranking is tenth in birds, with 69 species; fifth in reptiles with 156 species; and seventh in amphibians with 110 species. Endemic-rich Indian fauna is manifested most prominently in Amphibia (61.2%) and Reptilia (47%). India is also recognized as one of the eight Vavilovian centers of origin and diversity of crop plants, having more than 300 wild ancestors and close relatives of cultivated plants, which are still evolving under natural conditions. Unfortunately, many

³⁸ The term megadiverse country refers to any one of a group of nations that harbour most of Earth's species and high numbers of endemic species. Conservation International identified 17 megadiverse countries in 1998. Many of them are located wholly or partially in tropical or subtropical regions

³⁹ Most of the data is from India's country profile posted on the official website of the international Convention on Biodiversity (CBD). <https://www.cbd.int/countries/profile/default.shtml?country=in#facts> (accessed Sep 20, 2019)

species are facing the threat of extinction due to multiple impacts of habitat degradation, development, climate change and disasters.

The protected area network in India has been used as a tool to manage natural resources for biodiversity conservation and for the well-being of resource-dependent populations. So far, India has established a network of 764 Protected Areas (PAs), extending over 1.6 lakh sq.km comprising 103 National Parks, 543 Wildlife Sanctuaries, 26 Community Reserves and 66 Conservation Reserves⁴⁰ (Table 2-3). In addition to the PA network, the managed forests under the State Forest Departments (SFDs) are also contributing towards wildlife conservation. India has over 20% of the total geographical area under effective wildlife conservation. Protected Areas (PAs) are clearly defined geographical spaces, recognized, dedicated and managed through legal and other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Table 2-3: Status of the PA Network in India (July 2017)

Protected Area	Number	Total Area (sq.km)
National Parks	103	40,500
Wildlife Sanctuaries	543	118,917
Conservation Reserves	73	2,547
Community Reserves	45	60
Total Protected Areas	764	162,024

Source: ENVIS Centre on Wildlife & Protected Areas, Wildlife Institute of India, MOEFCC

The National Forest Policy states that for the conservation of total biological diversity, the network of national parks, sanctuaries, biosphere reserves and other protected areas should be strengthened and extended adequately. The protected areas include 50 Tiger Reserves and 32 Elephant Reserves. In addition, there are seven Natural World Heritage Sites within UNESCO's framework, 107 Important Coastal and Marine Biodiversity Areas (ICMBA) and 467 Important Bird Areas (IBA). Floods, wind hazards, forest fires, coastal hazards and improperly planned development projects may pose serious threat to the wildlife in the PAs and the survival of many species on the verge of extinction depends on proper management of the PAs.

2.6.5 DRR and Climate Change in Wildlife Action Plan

The Third National Wildlife Action Plan (2017-2031) is based on the premise that essential ecological processes that are governed, supported or strongly moderated by ecosystems, are essential for food production, health and other aspects of human survival and sustainable development. And maintenance of these ecosystems which can be termed as 'Life Support Systems' is vital for all societies regardless of their stage of development. It also emphasizes on other two aspects of living resource conservation viz. preservation of genetic diversity and sustainable utilization of species and ecosystems which has direct bearing on our scientific advancements and support to millions of rural communities.

The Third Wildlife Action Plan (WAP-3) has adopted a landscape approach in conservation of all uncultivated flora and undomesticated fauna that has ecological value to mankind irrespective of where they occur. It accords special emphasis to rehabilitation of threatened species of wildlife while conserving their habitats which include inland aquatic, coastal and marine eco-systems. It also takes note of concerns relating to climate change on wildlife by integrating it into wildlife management Planning. It underlines the fact that the national development policies need to take serious note of

⁴⁰ Source: ENVIS Centre on Wildlife & Protected Areas, Wildlife Institute of India, MOEFCC
http://www.wiienvis.nic.in/Database/Protected_Area_854.aspx (accessed Sep 20, 2019)

adverse ecological consequences of reduction and degradation of wilderness areas from the pressures of population, commercialization and development projects. Accordingly, the plan draws attention to the alarming erosion of India's natural heritage comprising of rivers, forests, grasslands, mountains, wetlands, coastal and marine habitats arid lands and deserts.

The WAP-3 calls for the integration of various site-specific strategies climate change adaptation (CCA), climate change mitigation (CCM) and DRR. It stresses the need to have plans for effective coordination with the authorities/agencies responsible for DRR at the appropriate levels – from the national down to Panchayat Raj Institutions (District, Block and Village levels). It emphasizes that plans for coordination with DM authorities/agencies at the different levels should be in readiness for implementation as situations that need such response are likely to develop. The WAP notes that effective plans for DRR and CCA are necessary for biodiversity conservation. Ecosystems provide numerous benefits and services which are underpinned by biodiversity. Climate change has increased vulnerability and reduced resilience of ecosystems globally with potentially far reaching impacts on human well-being. There is, therefore, a need to foster a greater understanding of the links between biodiversity conservation, ecosystem services, climate change and other disasters risks to enhance leadership at all levels. The following measures have been suggested in the WAP-3:

- The Environmental Impact Assessment (EIA) process needs to integrate the issues concerning CCA and DRR
- Improving collection and collation of data on hazards
- Sound integration of DRR, relief, rehabilitation with CCA
- Integrating CCA and DRR with shared responsibility into all PA plans taking account PA-specific data
- Integrate CCA and DRR with shared responsibility in all sectors into the action plans
- Involving local communities respecting their knowledge and capacities
- Suitably integrate CCA and DRR into management plans for Coastal and Marine Protected Areas (CMPA)
- Develop synergy between CCA and DRR in the state coastal zone management plan (SCZMP) prepared under CRZ provisions, with participation of all stakeholders
- Develop knowledge base and expertise in addressing wildlife conservation challenges in the context of climate change and projected increase in extreme weather events as well as natural disasters
- Upgrade syllabi of various wildlife degree and training programmes (diploma, undergraduate and post-graduate) to cover conservation of the full range of biodiversity.

2.7 Disaster Management for Cultural Heritage Sites, their Precincts and Museums

Cultural heritage has only recently been recognised as a key aspect within overall frameworks of disaster risk reduction. A general lack of awareness and a lack of prioritisation of heritage is one of the key challenges in this area. The relevant DM guidelines published by NDMA are, a) cultural heritage sites and precincts and b) museums. Museums are repositories of diverse heritage, both natural as well as cultural, and as institutions they make significant contributions to the socio-cultural development of a community. Museums, through the objects and collections they house and display, contribute to regional, state and national identities. Over centuries, the scope and nature of museums expanded from presentation of private collections of artefacts and oddities to institutions that promoted learning through objects collected and presented with a meaningful narrative.

The apex body for the conservation and protection of cultural heritage is the Ministry of Culture (MOCU), which acts through the Archaeological Survey of India. Several national legislations apply to cultural heritage such as:

- Ancient Monuments and Archaeological Sites and Remains (AMASR) ACT 2010, 1958
- Ancient Monuments and Archaeological Sites and Remains Rules, 1959
- Antiquities and Art Treasures Act, 1972 and The Antiquities and Art Treasures Rules, 1973
- State legislations applicable to State Archaeology Monuments and Sites.

With respect to cultural heritage sites and precincts, a localised hazard may also cause an emergency that is beyond the identified coping capacity. Disaster may severely impact the emergency infrastructure and response, which may affect the response for protecting the heritage site or precinct. Therefore, building capacity within the site or precinct is an important aspect of disaster risk reduction.

The framework for disaster risk reduction comprises of a four-pronged approach, a) Elimination or prevention of the hazard b) Reducing vulnerability c) Reducing exposure and d) Building Capacity. With respect to disaster risk reduction for cultural heritage sites and precincts, certain aspects need to be considered: a) Preserving and retaining cultural heritage values b) Retaining authenticity c) Using traditional technologies and skill and indigenous knowledge systems d) A degree of acceptable risk should be established for the cultural heritage site or precinct and such a threshold should inform risk reduction interventions.

2.8 Global Catastrophic Risks

A global catastrophic risk comes from very rare event that will have severe impacts on a global scale, even crippling or posing a threat to the whole of humanity (GCF 2018). An event that could cause human extinction or permanently and drastically curtail humanity's potential is known as an existential risk. Potential global catastrophic risks include anthropogenic risks, caused by humans (technology, governance, climate change), and non-anthropogenic or external risks. Examples of anthropogenic risks are global war including nuclear holocaust or the failure to manage a natural pandemic. Examples of non-anthropogenic risks are an asteroid impact event or a super-volcanic eruption. The 1815 eruption of Mount Tambora was the most powerful in human recorded history. The ash released dispersed around the world lowering global temperatures in an event sometimes known as the Year Without a Summer in 1816. This brief period of significant climate change triggered extreme weather, harvest failures and food shortages in many areas around the world. Several climate forcings coincided and interacted in a manner not reported earlier after any other large recorded volcanic eruption. One of the dangers, is that such events could cut food supplies drastically and countries must be prepared for feeding the survivors. While there are some discussions on the global catastrophic risks, there is not much clarity on preparing for such situations. India too needs to closely follow the global initiatives.

3

Coherence and Mutual Reinforcement of Three Post-2015 Global Frameworks for DRR

3.1 Background

The Post-2015 goals and agenda are set forth in the three landmark global agreements reached in 2015 – the Sendai Framework for Disaster Risk Reduction (Sendai, Japan, March 2015), Sustainable Development Goals (UN General Assembly, New York, September 2015) and Climate Change Agreement (Conference of Parties, COP21, Paris, December 2015). The three documents set the stage for future global actions on DRR, sustainable development and climate change. These three agreements have created a rare but significant opportunity to build coherence across different areas having several shared or overlapping concerns. Taken together, these frameworks represent a nearly complete agenda for building resilience, as that requires action spanning development, humanitarian, climate change impacts and disaster risk reduction. India is committed to these global frameworks and the government of India has taken various measures for realization of the goals through involvement of government, private sector and the non-government organisations.

The agreements represent a major turning point in the global efforts to tackle existing and future challenges in all countries. Specific emphasis is apparent to support resilience-building measures, and a shift away from managing crises to proactively reducing their risks. The agreements have varying degrees of emphasis on sustainable development, DRR, resilience and climate change. An important element in the Sendai Framework is to mutually reinforce with the other post-2015 global agendas by deliberately pursuing coherence across and integration of DRR, sustainable development, responses to climate change and resilience. In keeping with the global trends and priorities, the NDMP has also been restructured to ensure coherence and mutual reinforcing of the national initiatives in the domains of DRR, sustainable development and the responses to meet challenges of global climate change.

3.2 Sendai Framework for DRR

3.2.1 New Emphasis on Disaster Risk Management

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations from July 2014 to March 2015, supported by the United Nations Office for Disaster Risk Reduction at the request of the UN General Assembly. The foreword to the Sendai Framework describes it as “the successor instrument” to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters.

The Sendai Framework for DRR (SFDRR or Sendai Framework), the first international agreement adopted within the context of the post-2015 development agenda, marks a definitive shift globally towards comprehensive disaster risk management aimed at disaster risk reduction and increasing

disaster resilience going far beyond disaster management. This approach calls for setting the overall goal as that of preventing new and reducing existing disaster risk through the implementation of integrated measures. The goal now is on DRR as the expected outcome, setting goals on preventing the creation of new risks, reducing the existing ones, and strengthening overall disaster resilience. In addition, the scope of DRR has been broadened significantly to focus on both natural and human-induced hazards including various related environmental, technological and biological hazards and risks. The Sendai Framework acknowledges the interlinkages between climate change and disaster risks. Disasters that tend to be exacerbated by climate change are increasing in frequency and intensity.

The SFDRR is a non-binding agreement, which the signatory nations, including India, will attempt to comply with on a voluntary basis. India will make all efforts to contribute to the realization of the global targets by following the recommendations in the Sendai Framework and by adopting globally accepted best practices. Building on the Hyogo Framework for Action, the outcome that Sendai Framework aims to achieve globally over a span of 15 years by 2030 is 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.” To attain the expected outcome, Sendai Framework seeks to pursue the following goal: “Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.”

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 centre 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, it is necessary to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing relevant information. The framework notes that, to cope with disasters, it is “urgent and critical to anticipate, plan for and reduce disaster risk”. 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.

3.2.2 Four Priorities; Seven Targets

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. India will make its contribution in achieving the seven global targets set by the Sendai Framework (Fig 3-1):

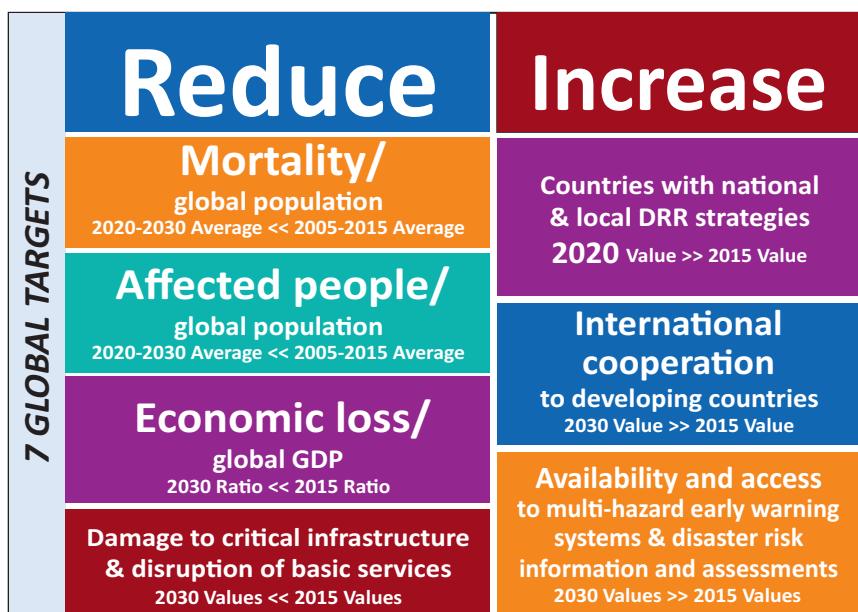


Figure 3-1: Sendai Framework for Disaster Risk Reduction - 7 Global Targets

- 1) Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rates 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.

On 2 February 2017, the United Nations General Assembly endorsed the Report of the Open-ended Intergovernmental Expert Working Group (OIEWG) on Indicators and Terminology Related to Disaster Risk Reduction and the recommendations for indicators and terminology relating to disaster risk reduction (UNISDR 2016). The report of OIEWG is meant to help countries operationalise the 38 global indicators for measuring the progress towards realising global targets for DRR along with targets of other major Post-2015 global frameworks (Annexe-III). The list as applicable to India will be used to monitor the progress of Ministries / Departments and States/ UTs towards achievement of targets set under the framework, by way of periodic reporting. As part of this effort, all ministries, departments, states and UTs will compile data in accordance with the indicators for the base line period of 2005 to 2015 and on an ongoing basis from 2015 onwards.

3.3 Sustainable Development Goals (SDG) and Disaster Resilience

The Sustainable Development Goals (SDGs), adopted by the UN General Assembly on 25 September 2015, consisting of 17 Global Goals (Fig. 3-2) and 169 targets, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The 17 Goals build on the successes of the Millennium Development Goals (MDGs), while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.

Sustainable development (SD) and disaster risk reduction (DRR) are closely interlinked. A single major disaster or “shock” incident (i.e. a rapid onset disaster like an earthquake, storm, tsunami or landslide) can undo hard-won development progress and set back development by years. A “stress” incident (i.e. a slow onset disaster like drought, sea level rise, and salinity intrusion into groundwater stocks) can also cause long-term socio-economic harm. Climate change aggravates impacts from both natural hazards and human-induced vulnerabilities by acting as a threat multiplier. Driven by climate change, there is increase in the frequency and severity of extreme weather events (including storms, droughts, heat waves and cold “snaps”). Such events multiply the risks that people living in areas prone to natural hazards already face.



Figure 3-2: Seventeen Sustainable Development Goals Source: UNDP⁴¹

The possibilities of attaining SDGs are jeopardized because disasters undermine economic growth and social progress. No country or sector is immune to the impacts of natural hazards, many of which – the hydro-meteorological – are increasing in frequency and intensity due to the impacts of climate change. While necessary and crucial, preparing for disasters is not enough, to realise the transformative potential of the agenda for SDGs, all stakeholders recognize that DRR needs to be its integral core. Progress in implementing the Sendai Framework contributes to the progress of attaining SDGs. In turn, the progress on the SDGs helps to substantially build resilience to disasters. There are several targets across the 17 SDGs that are related to DRR. Conversely, all seven global DRR targets of the Sendai Framework are critical for the achievement of the SDGs.

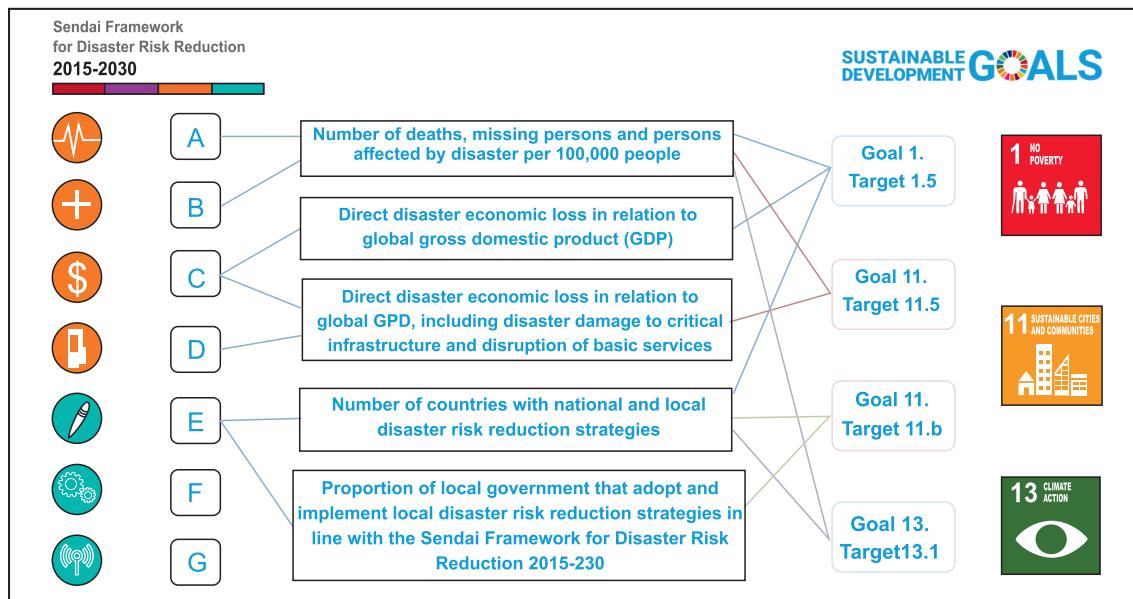


Figure 3-3: Coherence and mutual reinforcement of SDGs and Sendai Framework

Source: preventionweb.net⁴²

⁴¹ UNDP, Sustainable Development Goals, , <https://www.undp.org/content/undp/en/home/sustainable-development-goals.html> (accessed Sep 20, 2019)

⁴² Integrated monitoring of the global targets of the SFDRR and SDGs, <https://www.preventionweb.net/sendai-framework/sendai-framework-monitor//common-indicators>

Resilience is acknowledged both explicitly and implicitly in the SDG targets. The vision set out in the SDGs – for people, planet, prosperity and peace – will inevitably fail if shocks and stresses are not addressed. The pledge that ‘no one will be left behind’ requires a specific focus on the poorest and most vulnerable people, which is a key challenge: up to 325 million extremely poor people are likely to be living in the 49 most hazard prone countries by 2030. A focus on strengthening resilience can protect development gains and ensure people have the resources and capacities to better reduce, prevent, anticipate, absorb and adapt to a range of shocks, stresses, risks and uncertainties. Fig. 3-3 depicts how the coherence and mutual reinforcement of the SDGs and Sendai Framework are reflected in outcomes and targets.

3.4 COP21 Paris Agreement on Climate Change Action and Disaster Risk Reduction

The Paris Agreement was adopted on 12 December 2015 at the Twenty-first session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris from 30 November to 13 December 2015. The agreement builds upon the UNFCCC and brings together all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so (Fig. 3-4). The agreement aims at “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”. Article-7 dwells on establishing “the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change”⁴³.

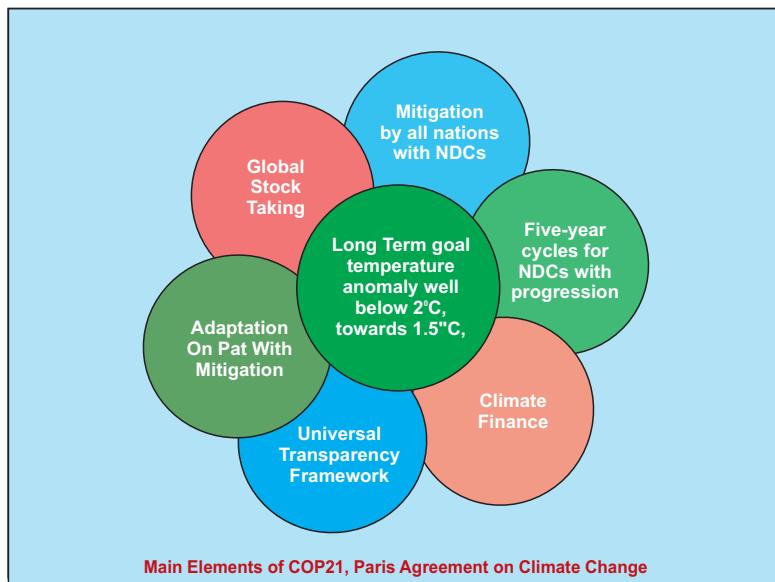


Figure 3-4: Main elements of the COP21, Paris Agreement on Climate Change

The major goals adopted in the agreement are:

- i) A consensus on adopting the long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels

⁴³ Paris Agreement, COP21/UNFCCC https://unfccc.int/sites/default/files/english_paris_agreement.pdf (accessed Sep 20, 2019)

- ii) Aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change
- iii) Accepting the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and
- iv) To undertake rapid reductions of emissions in accordance with the best available science

There is significant convergence between the problems that disaster risk reduction and climate change adaptation seek to address (Fig. 3-5). The regions already exposed to climate-related hazards and effects will be at greater risk due to a projected increase in the frequency and/or intensity of those hazards and effects because of global climate change.

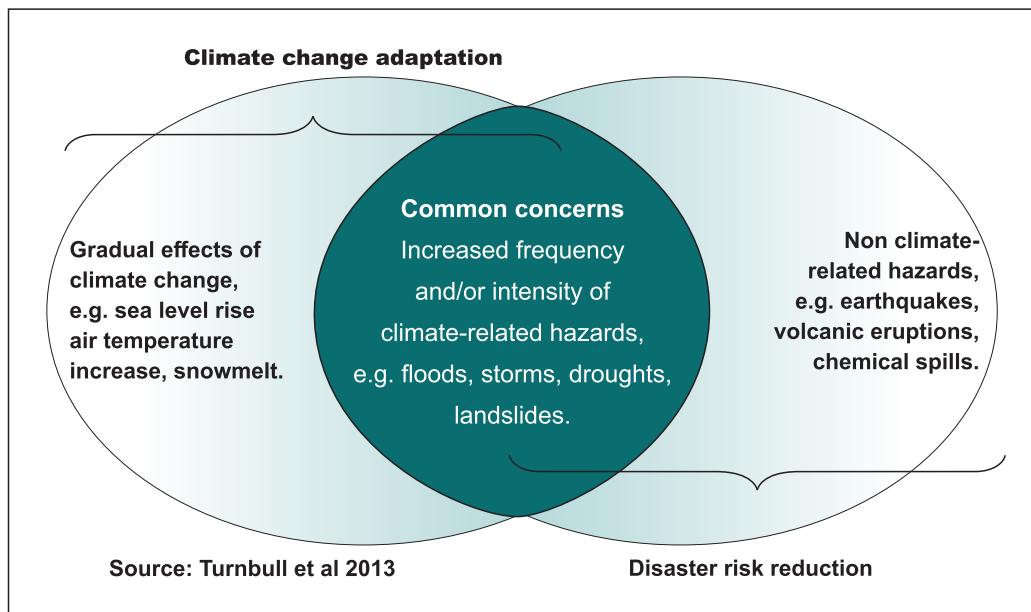


Figure 3-5: Common concerns of climate change adaptation and disaster risk reduction

The agreement aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives. The agreement also provides for enhanced transparency of action and support through a more robust transparency framework. It requires all signatories to make the best efforts through “Nationally Determined Contributions” (NDC) and to strengthen these efforts in the years ahead.

The NDC includes requirements that all Parties report regularly on their emissions and on their implementation efforts. In 2018, Parties will take stock of the collective efforts in relation to progress towards the goal set in the Paris Agreement and to inform the preparation of NDCs. There will also be a global stock-taking every five years to assess the collective progress towards achieving the purpose of the Agreement and to inform further individual actions by Parties. The agreement entered into force on 4 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the depositary. India has ratified the agreement and submitted her NDC along with the plan for mitigation and adaptation strategies and actions. India is committed to engaging actively in multilateral negotiations under the UNFCCC in a positive, creative and forward-looking manner. India's objective is to establish an effective, cooperative and equitable global architecture under the UNFCCC based on climate justice

and the principles of equity and common but differentiated responsibilities and respective capabilities.

3.5 Coherence and Mutual Reinforcement—Thematic Area for DRR

The presence of risk multipliers is a threat to the success of all development frameworks and coping with risks is a central to sustainable development. Given the changes in human demographics and trends in development, impact of climate change (which disproportionately affects the poorest and most vulnerable people), and increasing exposure to disaster risks, there has never been a greater need to enhance coherence and coordination among all the major global initiatives to reduce risks, vulnerability to hazards and enhance resilience. This coherence will serve to strengthen existing frameworks to cope with risks and enhance the resilience for multiple hazards. It will promote governance systems to manage disaster risks aggravated by climate change impacts and make development resilient to various disaster risks.

Effective reduction of losses and risks from natural hazards and climate extremes requires integrated actions at different levels of governance. One of the greatest challenges is of creating institutional convergence that integrates global goals emanating from these agreements. Disaster risk reduction (DRR) and Climate Change Adaptation (CCA) are part of key agendas being considered in all these recent global agreements. All three agreements share a common aim of making development sustainable. Strong commitment to ambitious goals and accelerated implementation of these international agreements must be a global priority. Given the complementarities between the post - 2015 agendas, leveraging the total impact of these instruments creates shared value. Efforts must be deployed to ensure that each of them do not build in “policy risks” or, contradictory policies, that generate more - rather than less - risk in development. Taken together, the different priorities, targets and actions in the three frameworks constitute a more comprehensive resilience agenda than when implemented independently without mutual reinforcement because building resilience requires action that spans the multiple domains of development, humanitarian initiatives, responding to climate change and disaster risk reduction.

On 2 February 2017, the UN General Assembly adopted resolution A/71/644, which states the necessary indicators to measure global progress in reducing loss attributed to disasters⁴⁴. Through collection of the information of these indicators, UN Member States can measure their progress in disaster risk reduction efforts by 2030 against the seven global targets defined in the Sendai Framework, including: mortality, persons affected, economic loss, and damage to critical infrastructure and disruption of basic services. Synergies with the monitoring of these international frameworks are already recognised by the international community. The UN Statistical Commission has adopted indicators developed by the Inter Agency and Expert Group on the Sustainable Development Goals, and this process is closely coordinated with the Sendai Framework. A global indicator framework has been adopted by the UN General Assembly on July 6, 2017⁴⁵.

The NDMP has tried to envisage coherence across the national efforts for DRR, sustainable development, and the actions in response to climate change (mitigation and adaptation). The NDMP

⁴⁴ UN General Assembly Resolution, 71/644, Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, A/71/644

⁴⁵ UN General Assembly Resolution, A/RES/71/313, Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development

identifies mutually reinforcing measures in these three domains. The mainstreaming of DRR can be synchronized with the initiatives for sustainable development and the steps taken to address climate change impacts as an inherent part of the development agenda. Many of the additional challenges emerging from climate change impacts that act as hazard risk multipliers and must be integrated into the implementation of the NDMP.

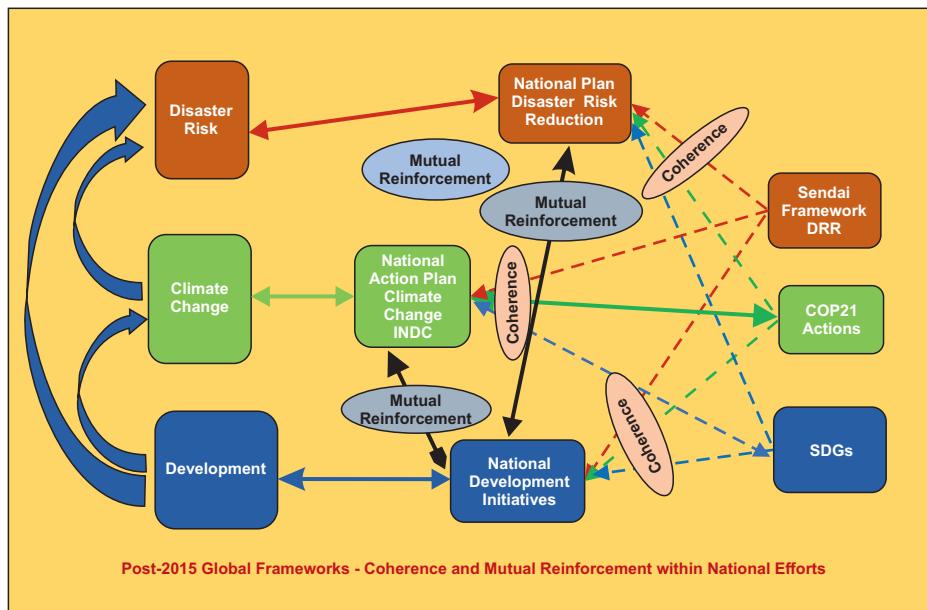


Figure 3-6: Post-2015 Global Frameworks—Coherence and Mutual Reinforcement within National Efforts

Ideas on ensuring coherence and mutual reinforcement across the global frameworks on development, disasters and responding to climate change covering almost every aspect of society and all sectors of economy are at an early and incipient phase. Enhancing resilience is the overarching theme as far as disaster risk reduction is concerned. All these discussions make it quite clear that these tasks cannot be separated from the mainstreaming of risk reduction although it is an idea that predates the concepts of coherence and mutual reinforcement across the global frameworks. The ideas of coherence and reinforcement across frameworks expand the scope of mainstreaming beyond how it was envisaged earlier (Fig. 3-6). The ways in which coherence and mutual reinforcement are envisaged for SDGs and Sendai Framework is depicted in Fig. 3-7. Similarly, that for SDGs and COP21 Paris Agreement on climate change actions is depicted in Fig. 3-8. The measures envisaged for ensuring coherence and reinforcement will be discussed in the chapter on mainstreaming. The India's national initiatives relevant for DRR across the three Global Frameworks are summarised in Table 3-1.

**Figure 3-7: Envisaging coherence and Mutual Reinforcement of SDGs and Sendai Framework**Source: UNISDR⁴⁶⁴⁶ UNISDR, Implementing the Sendai Framework to achieve the Sustainable Development Goals.http://www.unisdr.org/files/50438_implementingthesendaiframeworktoach.pdf (accessed Sep 20, 2019)



Figure 3-8: Envisaging coherence and mutual reinforcement of SDGs and COP21 for climate change action

Source: Climate Diplomacy⁴⁷ and adelphi

Table 3-1: India's national initiatives relevant for DRR across the three Global Frameworks

	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	National Initiatives Relevant to DRR
1	Substantially reduce global disaster mortality by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 2, 11, 13	<ul style="list-style-type: none"> Changes in the pattern of extreme events require enhanced disaster resilience and adaptation Addressing GACC risks is crucial for eliminating poverty and reducing economic losses from disasters 	Multiple schemes and initiatives for DRR, economic development, GACC mitigation and adaptation.
2	Substantially reduce the number of disaster-affected people by 2030 (2020-2030)	SDG 1, 11, 13	Stresses the need for accelerated action to build resilience through risk-sensitive planning and implementation of DRR	<ul style="list-style-type: none"> Allocation of resources and funds for disaster prevention and to develop capacities for DRR Strengthening of the DRR at all levels

⁴⁷ <https://www.climate-diplomacy.org/publications/infographic-making-development-sustainable-through-climate-action> (accessed Sep 20, 2019)

	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	National Initiatives Relevant to DRR
	compared to 2005-2015)			<ul style="list-style-type: none"> • Promoting disaster-resilient development • Mainstreaming DRR and adaptation to GACC in development
3	Substantially reduce direct disaster economic loss	SDG 1, 11	The Paris Agreement aims to hold global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C, recognizing that this would significantly reduce the risks and impacts of climate change	<p>National commitment to DRR evident from the PM Ten Point Agenda for DRR</p> <p>National commitments for mitigation of and adaptation to GACC as per Intended Nationally Determined Contributions (INDC)</p>
4	Substantially reduce damage to critical infrastructure and disruption of basic services (health, education, etc.)	SDG 1, 4, 9, 11,	Global adaptation goals for enhancing adaptive capacity, strengthening resilience and reducing vulnerability to ensure adequate adaptation response in the context of the global temperature goal	Enhance the resilience of national health systems by integrating DRR into primary, secondary and tertiary health care, and by promoting and enhancing training capacities in the field of disaster medicine. The substantial reduction of disaster damage to critical infrastructure and disruption of basic services is essential to ensure healthy lives and promote well-being.
5	Substantially increase disaster risk reduction strategies	SDG 1, 3, 6, 11, 13,	Addressing GACC risks that are crucial for reducing economic losses from disasters along with a well-integrated approach to adaptation, sustainable development, environmental management and disaster risk reduction	<ul style="list-style-type: none"> • NAPCC for mitigation of and adaptation to GACC • National Mission on Sustainable Agriculture (NMSA) • National Initiative on Climate Resilient Agriculture (NICRA)
6	Substantially increase international cooperation to complement national actions	Close international cooperation to achieve SDGs	Firm commitments by countries to the global response to GACC based on INDCs and international cooperation for	India is a pro-active member in the implementation of the Post-2015 and other global frameworks

	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	National Initiatives Relevant to DRR
			achieving the COP21 goals	
7	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments	SDG 3, 13	Emphasis on improving early warning systems, risk assessment and management	National investments to improve the early warning and information systems in different sectors and for multi-hazards.

Note: All the central ministries have specific responsibilities in accordance with achieving the national targets relevant to the global frameworks.

For monitoring the progress of Sendai Framework, under seven targets of Sendai, a set of 38 indicators (Annexe-III, same as in 3.2.2) have been listed that must be measured against the time period of Hyogo Framework for Action, i.e., 2005-15, in terms of the percentage change with respect to the baseline. This sectoral segregated baseline data for the period of 2005-15 will be collated by the central Ministry/ Department and States/UTs. Meanwhile, NITI Aayog has adopted a National Indicator Framework (NIF) comprising 306 national indicators for monitoring the progress of 17 SDGs having 169 targets. As SFDRR and SDGs have clear cut established linkages, this NIF, besides others, includes national indicators for targets 1.5.1, 1.5.2, 11.5.1, 11.b.1 and 11.b.2 focusing specifically on DRR. The time frames used in the NDMP are co-terminus with the post-2015 global frameworks, ending in 2030.

4

Social Inclusion in Disaster Risk Reduction

4.1 Background

Disaster situations raise many questions on normative social order and structural inequalities which need to be reckoned with for an inclusive disaster response. Disaster management tend to view the affected people as a homogenous group – as internally undifferentiated ‘victims’ or ‘survivors’, particularly in the relief and recovery processes. This leads to an inherent inability to address the existing disparities and inequities across gender, caste, or class (Fordham 1999). While hazards do not discriminate, people do. Disaster management could become unfair by being blind to prevailing inequities. Existing socio-economic conditions mean that disasters can lead to dissimilar outcomes even for what may seem demographically similar communities. Inevitably, the most vulnerable groups suffer more than others. This chapter emphasizes the importance of DRR to address unequal disaster coping capabilities by recognizing that due to inequalities and social exclusions some sections suffer more than others in extreme events and disasters because of their place within the social system. Addressing the enormous challenges of social marginalization, social exclusion and other inequities are beyond the domain of DRR. However, DRR must take cognizance of social realities to ensure that every possible effort is made to make DRR as socially inclusive as possible.

The Disaster Management Act 2005 (Chapter 11, Section 61) prohibits all forms of discrimination – be it based on sex, caste, community, descent or religion – in any activities related to disaster risk reduction, disaster relief or humanitarian assistance to the affected people. The preamble of National Policy of Disaster Management 2009 notes that the economically weaker and socially marginalized sections, women, Scheduled Castes and Scheduled Tribes tend to suffer more during disasters. A community’s vulnerability to disaster depends on the social, cultural, economic and political environment. A cycle of deprivation not only increases their vulnerability but also slowly alienates them from the decision-making process denying accessibility to the basic entitlements.

There are numerous definitions and concepts of social inclusion, and despite many debates, there is no consensus on a definition. The World Summit for Social Development, Copenhagen held in 1995 defines an inclusive society as a society for all, in which every individual, each with rights and responsibilities, has an active role to play. An inclusive society is based on the fundamental values of equity, equality, social justice, human dignity, human rights and freedoms, as well as on the principles of embracing diversity. Social inclusion reflects, on the one hand, an individual’s experience of and possibilities for self-actualization, and on the other hand, societal capacities to eliminate causes of exclusion and ensure equal opportunities for all (UNDESA, 2008).

The term social exclusion signifies all experiences of discrimination, deprivation and denial be it based on any attribute, be it caste, gender, differences in abilities, ethnicity, creed, religion, sexual orientation or any other attribute. The practices and manifestations of social exclusion are deeply ingrained in a rigid social stratification system influenced by caste, religious affinities, gender bias, prejudices towards people with disabilities and so on. Social exclusion is understood as the condition (barriers and process) that impede social inclusion. Social exclusion is a process through which individuals or groups are wholly or partially excluded from fully participating in all aspects of life of the society, in which they live, on the grounds of their social identities, such as age, gender, race, ethnicity, culture or language, and/or physical, economic, social disadvantages.

Exclusion is often most acute when people suffer multiple layers of discrimination and they are embedded in unequal relations of power. To make matters worse, they often remain ‘invisible’ in disaster reduction or emergency response programs, even in many cases where they constitute a significant proportion of population. The socially excluded groups have context specific and differentiated needs before, during and after a disaster, which are not taken into consideration in DMPs. Inclusive Disaster Risk Management is about equality of rights and opportunities, dignity of the individual, acknowledging diversity, and contributing to resilience for everyone, not leaving aside members of any community based on age, gender, disability or other. In the Indian context, the added emphasis on social inclusion in the NDMP for DRR will be on the following:

1. Gender-based Vulnerabilities
2. Scheduled Castes and Scheduled Tribes (SC&ST)
3. Elderly
4. Children and
5. Persons with Disabilities (PWD)

4.2 Gender Perspective and DRR

4.2.1 Gender-based Vulnerabilities

In general, gender concerns arise from a complex mix of dynamic factors that include differentiated roles and responsibilities, skills and capabilities, vulnerabilities, power relations, institutional structures, and long-standing traditions and attitudes. The specificities of gender relations may vary depending on the socio-cultural values of a society. However, the fundamental gender-based divisions of roles, responsibilities and identities are prevalent in varying degrees throughout the world. Within gender relations there are many imbalances (gender gaps) between men and women, which have historically been favourable for men within an overwhelmingly patriarchal society. All these prevent women from enjoying equal-rights and equal-partner status in DRR as policy makers, contributors to and beneficiaries of development and DRR processes.

Gender refers to the social attributes and opportunities associated with being male and female and the relationships between women, men, girls and boys, as well as the relations between women and between men. These attributes, opportunities and relationships are socially constructed, learned, and changeable over time. Gendered disadvantages – unequal access to resources, legal protection, decision making and power, their reproductive burden and their vulnerability to violence – consistently render women more vulnerable than men to the impacts of disasters. Disasters reinforce, perpetuate and increase gender inequality, making bad situations worse for women. The potential contributions that women can offer to the disaster risk reduction are often overlooked and female leadership in building community resilience to disasters is frequently disregarded.

A gender perspective to DRR helps focusing attention on the distinct gender-specific capacities and vulnerabilities to prevent, prepare, confront, and recover from disasters (WCDRR 2015). Post-disaster reconstruction programs could render women more vulnerable when compared to the pre-disaster situation, defeating the very objective of building back better. An increase in violence against women, domestic violence and divorce rates have been reported in the aftermath of disasters (Fothergill 1998). They become more vulnerable to abuse in disaster situations. They face difficulty in accessing sanitation facilities. There is lack of privacy and increased risk of sexual assault. In some situations,

there are risk of girls and young women being ensnared by traffickers or an increase in early marriages. There is a tendency to leave out women from accessing relief and recovery as they do not have control over resources and institutions (Parkinson 2011). Women headed households, single women, and widows find it difficult to access information and necessary financial help for recovery and reconstruction.

Following a disaster, there are many situations in which there is likelihood of women becoming victims of domestic and sexual violence. There are cases women avoiding using shelters for fear of being sexually assaulted. Women are more likely to suffer from malnutrition because they have specific nutritional needs when they are pregnant or breast feeding. During drought, in food scarcity situations, women are the first ones to compromise on their food intake. They are usually overburdened with many household tasks such as fetching drinking water and firewood walking long distances. Women and girls are usually denied the opportunity to acquire lifesaving skills such as swimming because of gender bias rendering them less capable of coping with hazards. Their traditional gendered role as caretakers and nurturers intensifies in post disaster situations having to take care of the injured and sick when they themselves are injured.

During post-disaster planning, relief and recovery needs of women and girls tend to be overlooked because the disaster management is almost entirely male dominated with hardly any participation of women. They are often ignored during compensation proceedings. While most women do not possess formal ownership of either movable or immovable properties (land or assets), even those who have ownership find it difficult to complete the formalities due to various pressures at home and the lack of gender sensitivity in the proceedings. Their losses usually remain undervalued and uncompensated.

It is necessary to adequately understand how the disaster risks tend to be amplified by the pre-existing social vulnerabilities and socio-economic stress. Often, unknowingly, due to social conditioning and gendered roles, women tend to demand less in the reconstruction process. Many barriers inhibit women's participation in the decision-making and rebuilding processes. Yet, disasters do provide opportunities for improving women's status by altering the gender relations and by facilitating social and behavioural changes. Post disaster recovery presents opportunities to empower women. Despite these formidable challenges, amidst gender bias and inequality, some of the reconstruction programs undertaken in India have tried to empower women, taking advantage of the window of opportunity opened by the disaster.

Post-disaster reconstruction is expected to "present opportunities for new and more progressive gender roles and relationships to emerge and provide opportunities to rebuild in a way that is inclusive of women and girls and provide opportunities for women to assume leadership roles and better influence the direction of development patterns" (UNISDR 2015a). A gender perspective to DRR helps focusing attention on the distinct gender-specific capacities and vulnerabilities to prevent, prepare, confront, and recover from disasters (WCDRR 2015). Disaster impacts are not gender neutral, hence adequate attention must be paid to promote gender justice and equity in post disaster recovery programs.

In the disaster situations, women need to be centrally involved in planning and implementation process with the key principle of active contributors in building resilience. The Sendai Framework emphasizes the need not only to address the issues related to women in post-disaster reconstruction but also envisages a lead role for women in post-disaster reconstruction: Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction.

To promote gender equity, the reconstructed houses need to be registered in the joint names of husband and wife. Widows and single women, who do not have land titles, should not be left out from receiving shelters. Women feel more secure, confident and feel that they will never be without a roof over their head in their life. Owner Driven Reconstruction (ODR) can be followed where women can take leadership role in monitoring implementation of safe housing technology. Programs shall be designed and aimed at empowering women through access to social security measures and income generation activities. Women Self Help Groups can be formed for livelihood opportunities. It needs to go beyond traditional income generating activities and aim at enhancing skills as masons, carpenters, trading of local products, developing local shops for housing, sanitation and other materials, etc.

4.2.2 Sexual and Gender Minorities

To be truly gender-sensitive, it is necessary to address the concerns of persons of various sexual orientations including transgender⁴⁸ persons. Transgender people are at a disadvantage in accessing resources, services and opportunities. In addition to social and economic vulnerabilities, the stigma and discrimination that they are subjected to, deprives them of many disaster mitigation/response programmes, hampering their ability to overcome the negative effects of a disaster. The approaches to disaster risk management, however, tend to overlook the needs and place of sexual and gender minorities. The institutional and legal frameworks geared towards reducing the risk of disasters are usually silent on such sections. It is only recently that a handful of case studies have highlighted the fate of sexual and gender minorities in disaster. Most of the research on disaster-related vulnerabilities faced by the sexual and gender minorities concur that they are often more severely affected by disasters because they face barriers or lack of access to the means of protection available to others. The highly marginalized conditions of sexual and gender minorities in everyday life thus places them at higher risk when confronted with disaster situations. Their vulnerabilities will be aggravated if DRR policies and practices remain blind to the social realities. There is greater likelihood of addressing the concerns of a marginalized group like transgenders in disaster situations when they are specifically accounted for during implementation. For example, the need for ensuring inclusion of all such sections could be emphasized in the different phases of DRR.

4.3 Scheduled Castes and Scheduled Tribes

Certain castes and tribes – the scheduled castes and tribes – are recognized in the Indian Constitution as historically disadvantaged people and listed in two Schedules of the constitution for affirmative policies and actions. The First Schedule lists 1,108 castes across various states and the Second Schedule 744 Tribes for affirmative policies and actions. The castes listed are known as Scheduled Castes (SC) and the tribes listed are known as Scheduled Tribes (ST). As per 2011 Census, the SC and ST comprise about 16.6% (20.14 Cr) and 8.6% (10.43 Cr), respectively, of India's population.

In acknowledgement of the marginality of tribal communities, several Committees and Commissions have been constituted over the years by the government to examine the problems faced by these communities, apart from numerous other bodies which have examined the status of tribes as part of broader thematic investigations. The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989 and the related rules notified in 1995 have been amended to make them more effective.

⁴⁸ The word “transgender” or “trans” covers persons whose gender identity is different from the sex assigned at birth. That includes LGBTQ+ (Lesbian, Gay, Bisexual, Transgender, Queer or Questioning , and Intersex plus several others)

The amended Prevention of Atrocities Act, 2015 has brought in clarity on some sections, clearly defined certain offences, fixed roles and responsibilities of the authorities and has clear timelines regarding investigation and judicial handling of atrocity cases.

4.3.1 Scheduled Castes

Caste based discrimination is a historical legacy for India. In the hierarchical caste society, the Schedule Castes often face social exclusion, untouchability and many forms of overt as well as covert discrimination. Recognizing this, the Constitution of India, under Article 15, provides for 'prohibition of discrimination on the grounds of religion, race, caste, sex or place; and under Article 17 provides for 'abolition of untouchability', making it a punishable offence. Acknowledging the marginalization of Schedule Caste communities, the National Commission for Schedule Caste has been constituted to safeguard the provisions under the constitution and inquire into specific complaints. The Schedule Caste and Schedule Tribe Prevention of Atrocities Act 1995 and subsequent amendment in 2015 provide legal protection against atrocities and discrimination. Efforts must be made to ensure there are no discriminatory practices in any DRR activities or while providing humanitarian assistance. The DRR efforts should also specifically recognize caste-related challenges and should not adopt caste-blind approaches.

Most of the SC and ST communities tend to be poor living on marginal lands that are also highly hazard prone, such as floodplains, unsafe coastal tracts and unstable hillsides. The dwellings of scheduled caste and tribal communities are usually on the margins - be it in urban or rural areas. These settlements tend to be in the less served areas with poor availability of accurate information, lack of access to basic amenities and inadequate disaster resilient infrastructure. The housing is usually unsafe and of poor quality. In the urban areas they are usually on unsecure land tenure - often unauthorized slums. Combined with hazardous living conditions, chronic poverty and lack of amenities they are most likely to suffer the outbreak of diseases in times of disaster. For women from the SC and ST communities, the gender-based discrimination and violence become intensified and more difficult to counter due to the caste-based social marginalization.

It must be ensured that in post disaster situations and in disaster mitigation planning and implementation activities full attention should be provided to ensure social inclusion practices in early warning, evacuation, relief support, rehabilitation and any other process so that the inherent systemic prejudices do not increase their vulnerability. For example, special efforts should be made to ensure that there are no instances of discriminatory practices in evacuation, distribution of relief material, damage assessment, allocation of housing plots, etc.

4.3.2 Scheduled Tribes

The Constitution of India has created Schedule V and VI to protect the identity, traditions and customs of the tribal communities without neglecting their development. This has been further articulated in the Panchayats Extension in Schedule Areas (PESA), 1996. Tribal communities tend to remain marginalized due their geographical location as well as due to social exclusion. Tribal communities are simple societies endowed with socio-cultural cohesion, traditional knowledge, social relations around the forest and natural ecosystem and community governance based on their tradition. Tribal communities have very close interdependent relation with their natural resources and environment. Some of tribal groups have never moved out of the natural habitat in the forest areas.

The basic thrust of mitigating the impact of natural disaster should be of two-fold: a) make the tribal people self-reliant by restoring the natural resource base and b) post-disaster, provide timely and appropriate relief and rehabilitation packages. The Tribal Development Ministry and the State Departments in consultation with the tribal leaders and experts shall develop the package of interventions. Efforts must be made so that there is community participation and ownership over the interventions. The tribal villages should be able to customize their plans in accordance with PESA disaster preparedness, relief and rehabilitation plans.

4.4 Children

The United Nations Convention on the Rights of the Child adopted in 1989 (UN 1989) became the first legally binding international convention to affirm human rights for all children. It stipulates that children have the right to adequate food, water, shelter and education. In disaster situations they ought to be free from abuse, neglect, sexual exploitation or trafficking, and should be able to grow up in a safe and supportive environment. Children are vulnerable due to their age and immature psycho-social understanding of the surrounding.

The chaos and erosion of support for care and protection during a disaster could heavily affect their physical and psychological health causing children to be traumatized. Given their vulnerability, children require special support and attention during crisis situations to provide basic needs and ensure that their rights are not violated. The UN Convention on the Rights of the Child and the Juvenile Justice (care and protection of children) Act 2000 (JJ Act) states that children have the right to protection from abuse, neglect and exploitation.

In situations of emergency children face isolation, anxiety, trauma, some get separated from their families, loose their parent(s), face gender violence and trafficking. Some face the risk of getting recruited as child labourers. During disaster, children's bodily integrity is at risk when widespread and/or systematic violence occur. The children often face apathy leading to severe interruption of education and recreation, poor access to food and nutrition. In the post disaster situations, the *Anganwadi* and schools must open as soon as possible. In case of damage to the structures, temporary/ emergency provision must be created allowing children to access the services. The state governments may increase the food supplies so that the nutrition support can be doubled in the *Anganwadis* and primary schools. Many state governments have been doing this for a limited duration in disaster situations.

The JJ Act, 2000 provisions for care, protection and rehabilitation of children ensuring setting up of Child Protection Units. Such units must be set up at village and block level so that children have access to nutrition, child friendly spaces for recreation, protection against violence and trafficking, restoration of children to their biological families, promote community-based rehabilitation of the orphan and children of single parent not in a position to provide care and protection making use of State specific foster parent support services/ schemes. The Ministry of Women and Child Development (MWCD) and Ministry of Social Justice and Empowerment (MSJE) and the Ministry of Human Resource Development (MHRD) along with the National Commission for Protection of Child Rights (NCPCR) and the State counterpart (usually, State Child Protection Society – SCPS) under the Protection of Child Rights Act, 2005 may develop support mechanisms and periodically oversee the status of care and protection of children in all major disasters and recommend for timely action.

4.5 Elderly

The world is ageing. Globally, approximately 700 million people or 10 per cent of the world's population is already over the age of 60, and by 2030, there will be more people over 60 than under 10. While this represents a triumph of development, the combination of more extreme climate and disaster events coupled with the failure to adapt DRR responses to the ageing demographic trend has the potential to increase older people's vulnerability to risks and disasters. Yet, the specific requirements and strengths of older people are often not given appropriate consideration in DRR. A report of the Government of India, 'Elderly in India' (CSO 2016), presents detailed statistical profile of the elderly population based on various official data. The report states that like other nations, India too has undergone changes in the age structure of the population with the proportion of older persons increasing due to increased life expectancy brought about by combination of many factors such as reduction in mortality rates, lower morbidity, better quality of life, and better health care. This phenomenon, called population ageing, is a demographic trend all over the world.

According to national Census 2011, there are nearly 104 million elderly persons (aged 60 years or above); 53 million females and 51 million males. Both the share and size of elderly population is increasing over time. From 5.6% in 1961 the proportion has increased to 8.6% in 2011 (men 8.2%, women 9.0%). In terms of rural and urban distribution, 71% of the elderly are in rural and 29 % is in urban areas. As per Census 2011, the sex ratio among elderly is 1033 women per 1000 men. The life expectancy at birth is 69.3 years for females and 65.8 years for males. At 60 years of age, the average remaining length of life is likely to be about 18 years (16.9 for men and 19.0 for women). At age 70, it was less than 12 years (10.9 for men and 12.3 for women). The old-age dependency ratio is 14.2%, as per Census 2011 (females 14.9%, males 13.6%). Most common disability among the aged persons was locomotor disability and visual disability.

According to Helpage India, during disasters the elderly are usually the last in the line, likely to be lost in the crowd, and highly vulnerable⁴⁹. The greater vulnerability of the elderly compared to others during disasters needs to get more attention in all phases of disaster risk management. The elderly needs to be treated as priority group by proper design in the disaster management plans. The DRR planning needs to pay special attention to psychological vulnerabilities, impaired physical mobility, diminished sensory awareness, poor health conditions as well as weak social and economic limitations that severely limit the capacity of the elderly to prepare for disasters, hinder their adaptability and constrain their ability to respond.

The UN Charter 14 (UNISDR 2014) for older people in DRR focuses on three key principles of an inclusive approach to DRR and there are fourteen minimum standards which underpin these key principles. The three principles are:

1. In need: Older people have specific requirements which must be understood and responded to within all DRR activities.
2. Invisible: Older people's vulnerabilities and capacities are often overlooked; the collection of data on people's age and sex is essential to ensure older people and other people at risk are visible and supported in DRR.

⁴⁹ Helpage India, <https://www.helpageindia.org/our-work/welfare-development/disaster-management/> (accessed Sep 20, 2019)

3. Invaluable: Older people have years of knowledge, skills and wisdom which are invaluable assets in DRR and must be acknowledged, valued and engaged by supporting older people to participate in DRR.

The Charter calls for stronger commitment from governments, donors and organizations to act on the shortcomings in DRR policies, strategies and practices that often insufficiently respond to older people's disaster risks. They must acknowledge and fulfil older people's rights and engage older people's capacities and contributions. This charter has been developed through consultations with governments, NGOs, DRR and ageing experts as well as older men and women. The Maintenance and Welfare of Parents and Senior Citizens Act, 2007 provides legal framework for the wellbeing of senior citizen lacking any support from family or close relatives.

In post disaster situations, it is essential that the needs of elderly are considered separately, rather than clubbing them with others keeping in mind the specific concerns applicable to them. It is preferable to have community-based senior-citizen support mechanisms so that the senior citizens are not uprooted from their immediate surrounding. This should include efforts to educate local communities about how they can help senior citizens and raise their awareness about supporting the elderly. The district DRR plan may prepare a list of senior citizens living without any family support. In the post disaster situation, looking at the gravity of the situation, the District Collector may take a call to set up temporary arrangements for the elderly and to take care of the personal needs such as food, medicine, shelter and other requirements. Special arrangements could be made to protect the property and assets of senior citizens if required.

4.6 Persons with Disabilities (PWD)

Disability is a contextual and evolving concept. The UN Convention on the Rights of Persons with Disabilities (UNCRPD) states in its first article: "Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others". The Convention, in its articles 11 and 32, requires that persons with disabilities benefit from and participate in disaster relief, emergency response and disaster risk reduction strategies. The Adoption of the Dhaka Declaration on Disability and Disaster Risk Management, in December 2015, acknowledges: "the importance of linking disability inclusive Disaster Risk Management (DRM) with the Sustainable Development Goals (SDGs) on the understanding that inclusion builds the resilience of the whole of society, safeguards development gains and minimizes disaster losses".

The population of PWD in India, as per census 2011, is 2.68 Cr, which is 2.2% of the population. Of these 56% are males and 44% are females. In the total population, the male and female population are 51% and 49% respectively. Majority of the PWD (approx. 69%) live in rural areas, which is nearly same the share of rural population. A global survey by UNISDR⁵⁰ in 2013 among 5,717 persons living with disabilities in 137 countries and eight non-self-governing territories examined why the number of the dead and injured PWD are disproportionately high in conflict, disasters and other emergency situations. The survey showed that 72.9% of PWDs have no personal preparedness plans. PWDs across the world say they are rarely consulted about their needs. The survey found that in the event of a sudden disaster, only 20% of PWD could evacuate immediately without difficulty, while the majority would have some level of difficulty or not be able to evacuate at all. A Handicap International study

⁵⁰ <https://www.unisdr.org/archive/35032> (accessed on Sep. 20, 2019)

in 2015 (HI 2015) found that 75% of people with disabilities believe they are excluded from humanitarian responses to emergencies like natural disasters and conflict.

It has been observed that persons with disabilities (PWD) are often overlooked and thus not only excluded in risk reduction and disaster response measures but are also subject to at higher risk than others. The NDMA has brought out relevant guidelines⁵¹ which must be consulted. Neglected throughout the DRM cycle, concerns about inclusion relate to limited social participation in DRR activities, poor access to information and services, poverty, invisibility during relief operations, response to basic needs not adapted and specific needs ignored. The most common priority identified by PWDs in the UNISDR survey of 2013 for improving inclusiveness of PWD in disaster risk reduction is for the involvement of PWD in DRR-related activities. The survey also emphasized the need for supportive policies, laws and promotion of support systems involving neighbours and local community.

DRR efforts must specifically address the vulnerabilities of PWD among the affected population , rather than clubbing them with others. Special attention must be paid to ensure that no PWD is abandoned after a disaster. Local community -based efforts and support system including promoting a buddy-system whereby each PWD have one or more persons in the neighbourhood who are responsible to act as a buddy to assist. The neighbours must be made aware of how they can help the PWD and provided training. The PWD must also make pro-active efforts to identify people in the neighbourhood whom they can rely upon for assistance in emergencies. It is good to have more than one "buddy", particularly in different areas where the PWD spend more time, such as workplace, home, or school. The more people who can assist are there so much the better. It is also important for PWD to keep their helpers or buddies well informed about their special needs and for the helpers to remain in regular touch with those they are responsible for. A detailed disaster response planning at the local level must include lists of PWD in need special care. In the post disaster situation, the agencies responsible for disaster management may set up temporary facilities that are barrier-free and friendly to PWD. The administration can provide special arrangements to protect the property and assets of PWD, if required.

4.7 Making Disaster Risk Management Inclusive

At each level, stage and step, DRR efforts need to be guided by the Article 1 of the Universal Declaration of Human Rights that states:

“All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.”

The DRR efforts must take up social inclusion as challenge recognizing its complex and diverse nature. A social inclusion strategy must identify a series of practical objectives and actions that can significantly decrease or eliminate social exclusion in all aspects of DRR. The DRR efforts need to design local strategies to promote inclusion. All agencies involved in DRR – government, non-government or international – must make special efforts to properly assess the needs of all the marginalized sections and particularly vulnerable groups and to ensure full compliance with prescribed standards for assistance. Care must be taken to ensure that the vulnerability mapping exercises are able to identify properly all relevant factors. Efforts must be made to facilitate the realization of rights and entitlements of all socially excluded sections. A potential path forward in promoting social inclusion is

⁵¹ National Disaster Management Guidelines on Disability Inclusive Disaster Risk Reduction, NDMA, 2019.

to encourage community participation as inclusion depends crucially on active involvement of diverse sections of society.

Social inclusion is theme cutting across all aspects of DRR. While this chapter provides an overall perspective on the significance of social inclusion in DRR, its importance is given additional emphasis in different sections and related responsibility frameworks. Despite social inclusion being a cross-cutting feature, it is added as a distinct Thematic Area for DRR in the responsibility framework along with indicative Sub-Thematic Areas.

4.8 Responsibility Framework—Social Inclusion

Social inclusion being a cross-cutting Thematic Area for DRR relevant to all types of hazards and disasters, the responsibilities rest with every agency. However, for clarity the lead agencies relevant to each Sub-Themes have been mentioned.

Central / State Agencies and their Responsibilities					
	Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
1	Gender	Lead Agencies: MSJE and MWCD	<ul style="list-style-type: none"> • Guidance and support for gender sensitive DRR approaches • Studies and research • Support for review and changes in existing regulations, norms and directives⁵² • Promote insurance/ risk transfer; encourage gender-sensitive products/ campaigns from insurance providers 	Lead Agencies: DSJE, DWCD	<ul style="list-style-type: none"> • Ensure that special efforts are made to make DRR gender inclusive and to ensure participation of women • Ensure that there are no discriminatory practices that marginalise sexual and gender minorities at any stage of DRR, • Recognise the additional vulnerabilities of sexual and gender minorities such as transgenders • HRVCA - Risk Assessment to take care of women and transgender vulnerabilities • Use of Information and Data Management to support gender sensitive approach - DDMA and SDMA
		Agencies with major roles: NHA, NDMA, NIDM, MHFW		Agencies with major roles: SDMA, DMD ⁵	<ul style="list-style-type: none"> • Convergence of concerned departments to ensure gender sensitive DRR • Shelters/ Temp Shelters/ Relief Camps - provision for specific needs • Enabling Environment
		Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> • Guidelines, IEC, mass media campaigns • Capacity development guidelines • Inclusion of gender concerns of DRR in curriculum development 	Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> • Review and changes in existing regulations, norms and directives to make them gender sensitive

⁵² Refers to prevailing rules and norms with respect to ownership, tenancy rights, tenurial rights and any other rules/ norms that are relevant to ensure inclusive DRM

Central / State Agencies and their Responsibilities				
Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
		<ul style="list-style-type: none"> • Guidance on preventing, checking and investigating discriminatory practices, violence and abuse • Inter-agency support to prevent and stop trafficking • Support from central institutions for gender-sensitive psycho-social support, post-disaster rehabilitation (economic, social etc.) 	<ul style="list-style-type: none"> • Training, Awareness, Mock drills, Vocational Training / Skill development • Empowering, especially leadership in DRR • Curriculum Development with gender sensitive approach • Specific knowledge products • Promoting insurance • Gender audit of DRR measures with the assistance of the State Women's Commission • Ensure joint ownership in the name of husband and wife of houses reconstructed and assets provided under post-disaster recovery assistance 	
2	<p>Scheduled Castes (SC) & Tribes (ST)</p> <p>Lead Agencies:</p> <p>MSJE, MTRA</p> <p>Agencies with major roles:</p> <p>MHA, NDMA, NIDM, MORD, MHUA, MHRD, MOEF</p>	<p>Lead Agencies:</p> <ul style="list-style-type: none"> • Guidance and support • Promote studies and research on DRR challenges for SC communities • Promote studies and research on disaster response and mitigation strategies appropriate and acceptable to the tribal communities • Review and amendment of existing regulations, norms and directives to make them consistent with needs of DRR 	<p>Lead Agencies:</p> <p>DSJE, DTWD</p> <p>Agencies with major roles:</p> <p>SDMA, DMD^s</p>	<ul style="list-style-type: none"> • HRVCA – Risk Assessment to specifically include SC/ST vulnerabilities (locational, existing discriminatory practices, if any, creating hindrances in DRR, access to information, access to risk reduction resources) • Protecting the tribal identity, traditions and customs in post-disaster situations in different phases of DRR • Ensure steps taken for DRR do not cause irreversible damage to the community's culture, tradition, habitat and ecosystem • Use of Information and Data Management to support relevant issues - DDMA and SDMA

Central / State Agencies and their Responsibilities					
	Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
		Supporting Agencies: <i>All Agencies Associated with DRR directly or indirectly</i>	<p>Promote insurance/ risk transfer</p> <ul style="list-style-type: none"> • Guidelines, IEC, mass media campaigns • Capacity development guidelines • Inclusion of the concerns of SC/ST about DRR in curriculum development 	<p>Supporting Agencies: All Agencies Associated with DRR directly or indirectly</p>	<ul style="list-style-type: none"> • Convergence between concerned departments in schemes meant for SC/ST for DRR • Shelters/ Temp Shelters/ Relief Camps – non-discriminatory • Ensuring enabling environment for participation • Review and amendment of existing regulations, norms and directives to address requirements of implementing DRR in SC/ST settlements (e.g. retrofitting, social housing, hazard resistant construction) • Training, Awareness, Mock drills, Vocational Training / Skill development • Empowering, especially leadership in DRR • Curriculum development with focus on issues of SC/ST communities • Specific knowledge products • Promoting insurance products/ campaigns • Include non-discriminatory implementation of DRR in Social audit
3	Children	Lead Agencies: MWCD, MHRD, MOL, NCPCR	<ul style="list-style-type: none"> • Guidance and support for various DRR initiatives for children • Review regulatory and institutional needs for the 	Lead Agencies: DWCD, EDD, SCPS	<ul style="list-style-type: none"> • Make special arrangements for disaster preparedness and safety of various children's institutions⁵³ • Regulatory measures for ensuring school safety and disaster preparedness in schools

⁵³ This includes all private and public institutions dedicated for children – foster care centers, kindergartens, pre-schools, facilities for care of children with special needs, orphans, children's homes, shelter homes, etc. and all institutions designated for the care and protection of children under juvenile justice system.

Central / State Agencies and their Responsibilities				
Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
	Agencies with major roles: MHA, NDMA, NIDM Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> protection and safety of children Supervision and monitoring of DRR initiatives for children – pre-school, school-going and children not in school Support for implementing measures for proper protection and care of disaster affected children Mobilizing support to disaster-affected children from national and international agencies working for children's welfare Guidance and support from NPCR for care and protection of children immediately after a disaster and during PDR 	Agencies with major roles: SDMA, DMD ⁵ , HD Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> Regular mock drills and other preparedness measures in all schools and children's institutions Pay special attention to children's institutions after early warning and post-disaster Ensure that in post disaster situations children do not face isolation, anxiety, trauma, separated from their families or parent(s) Take adequate measures to prevent and stop child abuse and maintain strict vigil against child trafficking Take measures to prevent and stop child labour in post disaster situation Sensitize all agencies and key personnel associated with protection of child rights and safety, including those connected with juvenile justice such as police, CWC, JJB, CARA and DCPU Promote community-based care and protection of the affected children. SCPs should initiate steps to monitor post-disaster threats to children and take counter measures along with the nodal agency at the state/UT for child rights and protection
4	Elderly	Lead Agencies: MHFW, MSJE	<ul style="list-style-type: none"> Guidance and support to address DRR needs of the elderly 	Lead Agencies: HFWD, DSJE

Central / State Agencies and their Responsibilities				
Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
	Agencies with major roles: MHA, NDMA, NIDM Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> Promoting awareness of the challenges faced by the elderly in disasters Promoting agencies and organisations working for the welfare of the elderly to develop expertise for supporting DRR efforts for the elderly Mobilizing support to the elderly in disaster-affected areas from national and international agencies working for the wellbeing of the elderly 	Agencies with major roles: SDMA, DMD\$ Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> Make special arrangements for disaster preparedness and safety of various institutions for the elderly such as old age homes, retirement homes and shelter homes for the elderly Linking organisations working for the welfare of elderly with community initiatives for DRR Preparing lists of all the elderly persons living without adequate support, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support In the risk season or after early warnings, take measures to ensure that the elderly is informed and prepared Involve elderly in disaster preparedness and planning to the extent they can contribute Assess medical and health support needs of the elderly in each area and maintain stocks of crucial items Special attention to the protection of property and assets of the elderly after evacuation or post disaster situations
5 Persons With Disabilities (PWD)		Lead Agencies: MHFW, MSIE	Lead Agencies: DSJE	<ul style="list-style-type: none"> Sensitizing local communities about the PWD living in the community and their special needs particularly during disasters Promote neighbourhood groups assist PWD or ensure a Personal Support Network consisting of at least three persons who are trusted for each PWD

Central / State Agencies and their Responsibilities				
Sub-Thematic Area for DRR	Centre (Lead Agencies)	Responsibility - Centre	State (Lead Agencies)	Responsibility – State
	Agencies with major roles: MHA, NDMA, NIDM Supporting Agencies: <i>All Agencies Associated with DRR directly or indirectly</i>	<ul style="list-style-type: none"> Promoting agencies and organisations working for the welfare of PWDs to develop expertise in DRR Mobilizing support to the PWDs in disaster-affected areas from national and international agencies working for the wellbeing of the PWDs Encourage technological support and innovations for the benefit of the PWDs in DRR 	Agencies with major roles: SDMA, DMD ^{\$} , HFWD Supporting Agencies: <i>All Agencies Associated with DRR directly or indirectly</i>	<ul style="list-style-type: none"> Make special arrangements for disaster preparedness and safety of various institutions for the PWD such as school for the blind, hostels for PWD and any facilities dedicated to PWD Linking organisations working for the welfare of PWD with community initiatives for DRR Preparing lists of all PWD, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support In anticipation of a hazard or after early warnings, take measures to ensure that all PWDs are properly informed and prepared Involve PWDs in disaster preparedness and planning as equal participants Special attention to the protection of property and assets of the PWDs after evacuation or post disaster situations

(*) Applicable only to cases where shelters are relevant. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

5

Mainstreaming Disaster Risk Reduction

5.1 Background

A disaster sets back development of the affected region and at times beyond, depending on its scale. It can suddenly reverse decades or more of accumulated developmental gains. The impact can be minimised or reduced significantly if the affected community had incorporated adequate risk reduction measures into the development. The losses to multiple sectors of a disaster-affected region disrupts almost every sector of the economy and the quality of life of the people making it difficult to attain development goals set prior to the disaster because considerable expenditure must be made on humanitarian assistance and for recovery. Investment in DRR is required for protecting assets, properties, development opportunities and outcomes against disasters. According to an UNDP document every dollar invested into DRR could save seven dollars in disaster aftermath (UNDP 2012). The process of development, and the kind of development choices made could enhance disaster risks - the existing or by creating new.

As per the provisions of the DM Act, all ministries, states, UTs, departments and agencies must have their own DM Plan. Unlike other components of a DMP, mainstreaming DRR must be incorporated into the overall plans, policies and programs rather than as a subcomponent of the DMP. DRR must become an integral part of every development plan and the DMP must provide indications how that will be accomplished in the DMP. At present there is, perhaps, some lack of clarity on this and this chapter provides both the perspective and a summary of how the practice of mainstreaming is evolving. Mainstreaming, by its very concept, is not a sub-component of a disaster-specific plan but an approach that must be woven into all developmental plans to reduce risks from disasters.

Development without adequate incorporation of DRR could worsen existing risks and has the likelihood of introducing new risks, increasing the negative impact of potential disasters. Extensive and sound integration of DRR into development can enhance disaster resilience, reduce losses and hasten the progress towards development goals. Thus, it is desirable that the development initiatives and DRR are dealt with concurrently in a seamless manner into all the relevant policies, planning and implementation. The climate change impacts act as risk multipliers worsening uncertainties associated with almost every hydro-meteorological hazard. Therefore, all development initiatives must factor in the likelihood of greater risks and increase in climate change-induced vulnerabilities. This requires incorporation of risk management and climate adaptation as an intrinsic feature of all developmental efforts, especially in the areas where hazards are known to be high. Such an approach, which internalises DRR within development in a closely integrated manner is called mainstreaming DRR. It means radically expanding and enhancing DRR so that it becomes a normal practice, fully institutionalised within each agency's regular planning and programmes in addition to the preparedness for disaster response.

For over two decades, there has been increasing attention on the need to 'mainstream' disaster risk reduction into development. This prompted many nations address risks from natural hazards within their development frameworks in various ways and at different levels - spanning the legislative, institutional, sectoral strategies and financial planning (Benson and Twigg, 2007). Development do not necessarily reduce disaster risk. It can unwittingly create new risks or exacerbate the existing ones, with disasters likely to be both a cause and a product of development. The experiences from across

the world have highlighted the crucial importance of social inclusion in DRR. Social exclusion adversely affects both development and the capacity to cope with disasters. In addition to the special emphasis on making DRR socially inclusive, the mainstreaming of DRR must also make social inclusion one of the intrinsic features.

The Oslo Policy Forum (2008) concluded that rather than reducing disaster risk, development processes are in many cases giving rise to new forms of vulnerability impeding efforts to reduce poverty and promote growth. ‘Win–win’ solutions for securing sustainable development, reducing poverty and strengthening hazard resilience therefore need to be explicitly and actively sought, particularly as climate change is likely to increase the extreme weather events (Benson and Twigg, 2007). This process should take account of the impact of climate change on the intensity and frequency of hydro-meteorological events in the future, as well as historical hazard records. The recognition of close linkages between development, disaster risk reduction and global climate change have resulted in all the major global frameworks having a shared emphasis on building resilience. The concept of coherence and mutual reinforcement of the diverse initiatives to achieve the national goals and those of the major global frameworks has also emerged. Given the highly cross-sectoral nature of these challenges, it is evident that they are naturally inseparable and almost indistinguishable from mainstreaming.

5.2 Mainstreaming—Sub Thematic Areas for DRR

The strategic objective of mainstreaming is of ensuring that DRR within the ongoing development initiatives lead to integration of DRR into poverty reduction efforts and sustainable socio-economic development by covering all aspects – institutional, legislative, judicial and development policies. The key sub-thematic areas for mainstreaming DRR and creating the enabling environment for it emerging from the global discussions are:

1. Improving awareness and understanding of disaster risk
2. Enhanced legal support and better disaster governance
3. Effective disaster risk transfer and risk management
4. Ensuring social inclusiveness in disaster risk management
5. Enabling coherence and mutual reinforcement of initiatives under the major global frameworks for enhancing disaster resilience
6. Institutional arrangements and capacity development (institutional, human, community, technology, etc.) for DRR
7. Intra-government horizontal and vertical integration
8. Budget allocations for integrating DRR concerns into development programs
9. Changes in project appraisal, scrutiny of development plans, better land-use regulations, insistence on multiple hazard resilient infrastructure
10. Setting targets, timeframes, indicators and monitoring mechanisms

These broad themes need to be incorporated into the policies, plans and programs of government agencies at all levels as an integral part of their general plans, while their DM Plans will provide an outline or broad indication of how it will be done. These are ideas and concepts that need to be developed further in operational terms and all agencies must explore ways to incorporate mainstreaming DRR in their regular planning and formulation of programmes.

5.3 Improving the Awareness and Understanding of Risk

Increasing the awareness of disaster risk, ways to reduce it as well as manage it is an important element of mainstreaming DRR. It may be noted in this context that the Sendai Framework emphasises the role of improving the understanding and awareness of risk. The DRR policies and practices must be based on improved understanding of disaster risk in all its dimensions and communities made aware of various aspects of disaster risk so that they are able to proactively take preventive measures. Such awareness is most critically essential on the part of key line agencies, local authorities and communities in high-risk areas. Disaster risk has a cascading nature with decisions in one sector potentially changing disaster risk in another. Therefore, decision-makers across diverse sectors and levels of government as well as the private sector and civil society also must recognise the importance of considering disaster risk as an intrinsic part of all projects, programmes and initiatives.

5.4 Legal Support and Disaster Governance

Adequate and appropriate legislative arrangements for disaster risk management, including the mainstreaming of DRR into development, form a key component of an enabling environment. Revision of land-use regulations and building codes and introduction of judicial and other measures will be required to ensure enforcement. As a continuous effort, it is necessary to improve and strengthen various laws having a bearing on DRR. DRR responsibilities must be explicitly incorporated in the duties of all branches of government. There is need to strengthen the vertical and horizontal integration of DRR plans between different levels of government, various line agencies and neighbouring local bodies. What this implies is the integration of DRR into all the norms, regulations, approval and monitoring relating to development through periodic reviews and amendments in addition to those specific to disaster.

5.5 Disaster Risk Transfer

A comprehensive disaster risk management strategy, actively involving stakeholders at all levels of government as well as the private sector, local communities and civil society, is required to implement the legislative framework and to provide coordination and monitoring mechanisms and arrangements. Individual disaster risk reduction actions and programs need to be located within this strategy, rather than treated as discrete, individual measures. Moreover, the strategy needs to indicate specific entry points and mechanisms for mainstreaming disaster risk reduction concerns into both the broader development agenda and the design and implementation of individual development initiatives.

The emphasis now is on managing risks going beyond disaster and emergency management, which tends to be concerned mainly with management of disaster events rather than risk. The risk management processes are continuous and embedded within the broader development framework. There are various options for financing disaster risk management, i.e., Disaster Risk Financing Instruments (DFRI). DRFI are commonly classified as ex post (e.g., budget reallocations, loan conversations, borrowing) or ex ante (accumulated reserves, precautionary savings, contingent credit, risk transfer/insurance). Insurance is a type of ex ante financing, in which an at-risk party cedes all or some of its risk exposure to a third party in return for a premium payment. However, none of these are standalone or universal solutions for DRR. For example, insurance is not a sufficient instrument

for achieving effective disaster risk management and disaster risk reduction at a societal level. At -risk parties, whether individuals, businesses or governments, must decide when insurance is appropriate and what other tools to use when it is not. It must be noted that not all perils can be insured against. Various risk financing instruments must be integrated within an overall DRR strategy, enabling policies and supporting legal framework.

The processes to facilitate and promote risk transfer involve identifying aspects such as, a) various layers of disaster risk, b) who bears each level of risk and c) possible risk transfer instruments available to each layer (Le Quesne et al 2017). As part of risk layering, financing instruments must be selected based on the frequency and severity of disasters. Risks with high frequency and low severity (e.g., floods) can be self-financed by the insured party (government or affected populace). Disaster reserve funds or budgetary allocation would be appropriate instruments in this case. On the other hand, risks with low frequency and high severity are likely to cause extensive damage and should be transferred to better-equipped third parties. Integrating risk transfer mechanisms into disaster risk informed development is challenging for policy-making and planning.

5.6 Ensuring Social Inclusiveness in Disaster Risk Management

Importance of social inclusion for DRR was discussed earlier in considerable detail. Inclusive DRR is about equality of rights, equal opportunities and the dignity of the individual irrespective of social background, community, age, gender or disability. Social inclusion is also a cross cutting theme that needs to be an integral part of the mainstreaming efforts. A detailed list of Sub-Thematic Areas for DRR and responsibility framework has been provided in the chapter on social inclusion. Mainstreaming social inclusion in DRR must be based on the approach discussed in detail there and it is not necessary to reiterate it here.

5.7 Enabling Coherence and Mutual Reinforcement of Initiatives under the Major Global Frameworks for Enhancing Disaster Resilience

The process of defining the 2030 global agenda inevitably showed there is much to be gained from aligning plans, targets, actions and indicators across the separate but interlocking agreements. It was evident that there is significant potential for designing financing mechanisms, policies and programmes that can deliver on more than one set of targets or frameworks. The very idea of coherence and mutual reinforcement implies concerted and mutually supporting efforts cutting across several ministries and sectors. The efforts to achieve national goals under different major global frameworks could be made to mutually reinforce each other, resulting in cost-effective, faster and efficient implementation. Given the way the ideas have emerged, coherence and mutual reinforcement goes beyond the usual formal inter-agency coordination to achieve common targets. Instead, it heralds a new approach in which measures taken under one framework strengthens goals in all the three frameworks. The three global frameworks and the importance of coherence and mutual reinforcement have been elaborated in a separate chapter. It is evident from the very nature of coherence and mutual reinforcement that it can be implemented only by making it integral to the mainstreaming. To realise it, however, there is need to go beyond the conventional coordination and

planning mechanisms. From the perspective of DRR, some indicative areas where a beginning can be made are:

- Improving the understanding of disaster risk – both natural and those introduced or increased by developmental actions – in all its dimensions is an effort that must be integral to all development initiatives by understanding risks in a broader sense, i.e., risks from hazards and those newly created
- Understand the cascading nature of risk, of how decisions in one sector alters disaster risk in another in a cascading manner
- Understand not only vulnerabilities from cascading risks, but also better assess the capabilities to resist, absorb, and accommodate risks
- Recognise disaster risk as an intrinsic part of all projects, programmes and initiatives (by all decision-makers and at all levels – Govt., private sector and civil society)
- Aligning the risk management approaches
- Improving horizontal and vertical integration for DRR within government by making use of decision-making tools and information technology
- Setting targets, timeframes, indicators and monitoring mechanisms to facilitate consolidation of efforts across sectors to enhance disaster resilience

5.8 Institutional Arrangements and Capacity Development for Disaster Risk Management

DRR is a crosscutting responsibility that needs to be ‘owned’ by all government agencies rather than by a single nodal department or agency designated for it. That requires the institutions to explicitly recognise the DRR requirements and pay attention to implementing adequate institutional arrangements required for addressing relevant accountability and responsibility concerns. The nodal agencies at the national and state levels must provide leadership, determine broad disaster risk management policies, oversee implementation and advocate for the inclusion of disaster risk reduction concerns in broader development. The capacity development shall cover all aspects such as institutional, human, community and technology applications.

5.9 Intra-Government Coordination and Integration

Since there are multiple line agencies, sectors and levels of administration involved in development initiatives at national and state levels, mechanisms of inter-agency coordination and integration must be strengthened to ensure that locally identified needs are reflected in higher-level plans and strategies. The inter-departmental and inter-ministerial coordination or horizontal coordination is important given the crosscutting nature of DRR and the potential implications of one agency’s decisions on another.

5.10 Budget Allocations

Integration of disaster risk concerns into government budgets should be tackled from two angles, ensuring that levels of public expenditure on risk reduction are sufficient and that there are adequate financial arrangements to manage the residual risk. The presence of residual risk implies a continuing

need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socioeconomic policies such as safety nets and risk transfer mechanisms, as part of a holistic approach. While there are certain budgetary allocations to partially address requirements of relief (e.g., National Disaster Response Fund, State Disaster Response Fund), the mainstreaming of DRR requires each ministry, department and state/UT to make adequate provision for DRR as an integral part of the main budget by ensuring that all the major activities have incorporated DRR.

5.11 Changes in Project Appraisal

DRR consideration must become part of the appraisal processes of various development projects to ensure that development gains are sustainable and to ensure that DRR components and development components of projects are mutually reinforcing. There are some examples of how development projects have been implemented by properly recognising and without underestimating risks, thereby avoiding the creation of new risks (e.g., adequately factoring in seismicity, properly estimating flooding probabilities, ensuring restrictions against urban sprawl into industrial hazard-prone areas, strengthening land-use regulations by incorporating hazard risk adequately). The project evaluations at different stages from concept stage to detailed project report for implementation needs to be as much informed by hazard likelihoods as possible. The project appraisals and EIA should include DRR and climate change concerns a lot more systematically than is usually done currently in many parts of the world. Changes must be incorporated in the budget approval and financial sanctioning procedures employed by the Expenditure Finance Committee (EFC) and the Standing Finance Committee (SFC) to make DRR evaluation mandatory.

5.12 Setting Targets, Timeframes and Indicators

Capacity to monitor and evaluate disaster risk reduction initiatives, generate hard evidence on related inputs, outputs, results and impacts, and learn lessons for the future is an essential component of the enabling environment for mainstreaming. Although mainstreaming is essentially continuous and pervasive, it is necessary to set targets to achieve DRR outcomes along with appropriate timeframes, responsibility frameworks and measurable indicators. Again, it must be recognised that all these apply to all aspects and sectors of development and governance as mainstreaming will be an ongoing and unending process that would become more and more tightly interwoven into all developmental initiatives. Nevertheless, given the fact that DRR mainstreaming had a very slow start, it is necessary to proceed in a phased manner with the initial phase focussing on how to incorporate it into the overall plans, followed by the setting medium and long-term goals. Basically, the phasing should be consistent with the priorities set in the NDMP in terms of short, medium and long-term goals. What needs to be done by the centre, state and UTs are described in a broad manner in the chapter on the responsibility framework for building disaster resilience.

5.13 Implementation

Mainstreaming is the internalisation of risk awareness and incorporation of risk reduction measures into the main or the overall policies and programmes within and outside government. The NDMP can only provide broad perspective on mainstreaming DRR. Each ministry, department, state and agencies must review current programmes to include DRR to the extent possible cost effectively within their

main budget and ensure comprehensive appraisal of all new initiatives (policies, plans, programmes, projects, etc.) based on the perspectives provided in the NDMP. DRR is a common theme among the post-2015 global frameworks and NDMP emphasises the benefits of building coherence and mutual reinforcement among all national efforts associated with these frameworks, which involves many elements going beyond the NDMP into the domain of larger developmental efforts. The implementation of mainstreaming depends on how these considerations have been woven into the main activities as integral to them and not as separate components under the DMP of each. Therefore, it should be noted that NDMP as a standalone document cannot provide details of how different central ministries and state governments will be mainstreaming DRR, which will be through tight integration of DRR in their respective main plans. The NDMP provides in different sections and sub-sections, Thematic Areas and Sub-Thematic Areas relevant to mainstreaming of DRR.

6

Building Disaster Resilience – Responsibility Framework: Part-A, Prelude

6.1 Introduction

This chapter is essentially a prelude to the detailed responsibility framework for realising DRR and building resilience presented in the next chapter. This includes almost all aspects of pre-disaster risk management. The complex and extensive nature of the tasks is summarised in this chapter and the detailed responsibility framework described in the next chapter. The responsibility framework provides a brief description of actions, list of key agencies responsible from the centre and state and relevant time frames. Four categories of time frames, running concurrently in most cases, are:

- 1) Recurring/ Regular (day-to-day)
- 2) Short Term (T1, ending 2022)
- 3) Medium Term (T2, ending 2027)
- 4) Long Term (T3, ending 2030)

It must always be understood that the time frames T1, T2, and T3 run concurrently in most cases and not necessarily sequentially. Of course, there will be some tasks which can begin only when certain pre-requisites are satisfied or can be implemented sequentially in phases, while there are some which must be started at the earliest for it to be completed within the time frame. Many actions are ongoing and several are continuation of those in previous version of NDMP. The goal is to implement as many as possible by 2030. A starting year is not mentioned because many of the actions are ongoing and many were stated in the previous version of the NDMP.

After the paradigm shift from an approach to addressing disasters that weighed heavily on relief and response to a radically different one based on DRR and preparedness, there has been another major shift, partly incremental and partly dramatic, towards building disaster resilience. This global shift centres on disaster risk management rather than disaster management. The principal features of this trend are enhancing resilience through reducing risks, better preparedness, systematic understanding of hazards, minimising the creation of new risks as part of development, investing significantly in DRR, improving governance and mainstreaming DRR. The DM Act 2005 and the National Policy 2009 had made a paradigm shift towards proactive disaster management by laying emphasis on long-term DRR. The global frameworks – Hyogo (2005-15) and Sendai (2015-30) – signify calibrated shift towards internalisation of DRR and making it an integral part of development initiatives.

The DMP explicitly and implicitly incorporates the coherence among the major post-2015 global initiatives, the corresponding national efforts, new initiatives of the government, an emphasis on social inclusion and the mainstreaming of DRR, i.e., making DRR an integral feature of development. As mentioned in Chapter-1, all these constitute the five main pillars of NDMP (reiterated here for continuity):

- I. Conforming to the national legal mandates – the DM Act 2005 and the NPDM 2009
- II. Participating proactively to realise the global goals as per agreements to which India is a signatory – Sendai Framework for DRR, SDGs and COP21 (Paris Agreement) – consistent with the international consensus for achieving mutual reinforcement and coherence of these frameworks

- III. Prime Minister's Ten Point Agenda for DRR articulating contemporary national priorities
- IV. Social inclusion as a ubiquitous and cross-cutting principle
- V. Mainstreaming DRR as an integral feature

This chapter describes various Thematic Areas (TA) for DRR, the related Sub-Thematic Areas (sub-TA) and the responsibility framework envisaged for implementation. A major component of DRR, undoubtedly, is various types of mitigation measures. 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 cascading 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 focuses on enhancing the mitigation capabilities for multiple hazards, their likely cascading effects.

6.2 Thematic Areas for DRR

The DMP, incorporates key principles enunciated in the DM Act, National Policy, the three major post - 2015 global frameworks, the PM's Ten Point Agenda, a special focus on social inclusion and an emphasis on mainstreaming. 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 into the planning framework the key themes enunciated in the Sendai Framework and additional ones based on a broader approach to DRR elaborated earlier. These are grouped under the following six Thematic Areas for DRR:

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

Separate chapters (3, 4, and 5) have been devoted to the discussion of three crosscutting Thematic Areas—a) coherence and mutual reinforcement for DRR of the post-2015 global frameworks, b) social inclusion and c) mainstreaming DRR.

6.2.1 Understanding Risk

This Thematic Area focuses on understanding disaster risk, the Priority-1 in the Sendai Framework and the integration of numerous actions needed for strengthening disaster resilience. The Sub-Thematic Areas are: a) Observation Networks, Information Systems, Research, Forecasting, b) Zoning/ Mapping, c) Monitoring and Warning Systems, d) Hazard Risk, Vulnerability and Capacity Assessment (HRVCA), 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.

6.2.2 Inter-Agency Coordination

Inter-agency coordination is a key component of strengthening the disaster risk governance - Priority-2 of the Sendai Framework. The Sub-Thematic Areas for DRR 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 responsibility framework.

6.2.3 Investing in DRR – Structural Measures

Undertaking necessary structural measures is one of the thematic areas for DRR 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.

6.2.4 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) provide the legal regime that facilitates mainstreaming disaster risk reduction into development activities. It empowers authorities to enhance disaster resilience. The central and state governments will have to set up necessary institutional support for enforcement, monitoring, and compliance.

6.2.5 Capacity Development

Capacity development is a recurring theme in all DRR efforts. 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 capabilities to implement, enforce, and monitor various disaster mitigation measures must 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.

6.2.6 Climate Change Risk Management

Climate change significantly alters the geographic spread, frequency and intensity of hydro-meteorological extreme events. It can also exacerbate their impacts. Investments in DRR can play an important role in supporting communities to adapt to climate change. As the impacts of climate change are increasingly felt, more financial and technical resources will be needed to support vulnerable people to adapt to the negative impacts. Planning for DRR must be informed by the likely climate change impacts and scenarios. There are major knowledge and data gaps concerning climate change impacts, impact scenarios and its effects on various hydro-meteorological hazards, which need to be kept in mind while examining the time frames and actions listed under this Thematic Area for DRR.

7

Building Disaster Resilience – Responsibility Framework: Part-B

The complex and extensive nature of the task of building disaster resilience is presented in a concise form in this chapter along with the necessary detailed responsibility framework. The previous chapter provides a prelude to this chapter, which may be referred for brief discussion on the broader aspects related to the subject of this chapter. Managing disaster risk and building resilience requires the involvement of multiple agencies at different levels from the local administrative bodies and communities to the central ministries, departments and agencies. Different agencies must carry out not only their own responsibilities but also work in a well-coordinated way with several others. For the disaster risk management 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.

This chapter covers the hazards and disaster situations listed below:

1. Cyclone and Wind
2. Floods
3. Urban Floods
4. Seismic/ Earthquake
5. Tsunami
6. Landslides and Snow Avalanches
7. Drought
8. Cold Wave and Frost
9. Thunderstorm, Lightning, Dust, Squall and Strong Winds
10. Cloudburst and Hailstorm
11. Glacial Lake Outburst Flood (GLOF)
12. Heatwave
13. Chemical (Industrial) Emergencies
14. Nuclear and Radiological Emergencies
15. Biological and Public Health Emergencies (BPHE)
16. Fires
17. Forest Fire

The primary role of the central agencies in most disasters and emergencies is of providing various types of support to the disaster-affected State or the UT, usually in response to requests for assistance. However, in certain disasters or when the situation requires, the central agencies will play a pro-active role. In the domains of DM planning, preparedness, and capacity building, the central agencies will constantly work for to upgrade the DM systems and practices as per global trends. For each hazard, in the sub-sections that follow, themes for action are presented in a separate responsibility framework for each of the six Thematic Areas (TA) for DRR and related Sub-Thematic Areas.

7.1 Cyclone and Wind

7.1.1 Understanding Risk

Cyclone and Wind				Central/ State Agencies and their Responsibilities			Understanding Risk	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Recurring/ Regular (RR)	State [#]	Responsibility – State		
1	Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	MOES*, DOS, MOST, MOJS, MEITY, NLRTI, MOEFCC	<ul style="list-style-type: none"> Promote research and studies – both in-house and extra-mural by providing research grants to researchers and institutions Studies on ecosystem and shoreline changes Promote availability in public domain cyclone database and forecasts Short Term (T1) <ul style="list-style-type: none"> Enhancement of Observational Network Stations (ONS) Establishment of planned Automatic Weather Stations (AWS) and Rain-Gauge Network (RGN) Enhancement of a Doppler Weather Radar Network over coastal regions Integration of all ONS with AWS & RGN in one single platform Medium Term (T2) <ul style="list-style-type: none"> Modernization of observation network, equipment, systems, technology 	DMD [§] , SDMA, RD, SLRTI, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Support and coordination Sponsor studies, research and documentation Promote studies on socio-economic impacts of cyclone and wind hazards Short Term (T1) <ul style="list-style-type: none"> Constitute State Level Coastal Advisory Committees as per need Medium Term (T2) <ul style="list-style-type: none"> Studies on socio-economic on coping capabilities and impacts 			

Cyclone and Wind Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			Understanding Risk	
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
		<ul style="list-style-type: none"> Establishment of at least one High Wind Speed Recorder and one surge recorder for each coastal district, vulnerable to cyclones Aircraft Probing of Cyclones <p>Long Term (T3)</p> <ul style="list-style-type: none"> Land- and Ocean-based observation systems Research and studies to improve forecasts Augmentation of high-resolution vertical soundings and DWR network Airborne Doppler Weather Radar (ADWR) Airborne Laser Terrain Mapping (ALTM) Establish atmospheric observational network complimented by multi-platform satellite and aircraft-based profiler observations 				
2	Zoning/ Mapping	MOES*, DOS, MOEFCC, MOST, NLRTI		<p>Recurring/ Regular (RR)</p> <p>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</p>	SDMA, SLRTI, DDMA	<p>Recurring/ Regular (RR)</p> <p>Carry out the mapping and related studies</p>
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOES*, MOST, MOEFCC, MSJE, NLRTI, NDMA, NIDM		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects 	SDMA, DDMA, DMID ^{\$} , SLRTI, RD, DSJE, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <p>Undertake HRVCA as part of preparing and periodic revision of DM plans, and for development planning</p> <p>Short Term (T1)</p> <p>Constitute/ strengthen the mechanisms for consultation with experts and stakeholders</p>

Cyclone and Wind					Understanding Risk
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
4 Dissemination of warnings, data, and information	MOES*, MOIB, MEITY, MOST, MCOM	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Provide technical support and guidance for comprehensive HRVCA 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Quick, clear, effective dissemination among central and state agencies Deployment of communication equipment Warnings using all types of options, types of technologies, and media Providing weather information online and offline and interface with mobile network service Providing warnings on radio, TV, and cell phones <p>Medium Term (T2)</p> <p>Facilitating last-mile connectivity and access to disaster risk information</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Dissemination of warnings to all (including fishermen), down to the last mile – remote, rural or urban; Regular updates to people in areas at risk Warnings using all types of options, types of technologies, and media Monitoring compliance by various network operators and service providers <p>Short Term (T1)</p> <p>Establishing seamless interface between national and state networks</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Ensure facilities and infrastructure for the implementation of adequate access of information to communities at risk Deployment of communication equipment 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Dissemination of warnings to all (including fishermen), down to the last mile – remote, rural or urban; Regular updates to people in areas at risk Warnings using all types of options, types of technologies, and media Monitoring compliance by various network operators and service providers <p>Short Term (T1)</p> <p>Establishing seamless interface between national and state networks</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Ensure facilities and infrastructure for the implementation of adequate access of information to communities at risk Deployment of communication equipment
5 Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments Disaster Damage and Losses 2005-2015 baseline 	DMD ^{\$} , SDMA, all depts.	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments Disaster Damage and Losses 2005-2015 baseline 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.1.2 Inter-Agency Coordination

Cyclone and Wind				Inter-Agency Coordination		
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities		Responsibility – State
1	Overall disaster governance	MOES*	<u>Recurring/ Regular (RR)</u> Providing coordination, technical inputs, and support	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development 	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organising and coordinating the immediate response Coordinate with central agencies
2	Response	MHA				
3	Warnings, Information, Data	MOES*, MEITY, NDMA	<u>Recurring/ Regular (RR)</u> Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	<u>Recurring/ Regular (RR)</u> Coordination among state agencies for a)
4	Non-structural measures	MHA, NDMA, BIS	<u>Recurring/ Regular (RR)</u> Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Ensuring updated norms/ codes and their implementation, enforcement and monitoring	Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.1.3 Investing in DRR – Structural Measures

Cyclone and Wind				Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities	Central/ State Agencies and their Responsibilities	State [#]	State [#]	Responsibility – State
			Recurring/ Regular (RR)				Recurring/ Regular (RR)
1	Establishment/ Strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources	DMD [§] , SDMA, ULBs, PRIs	Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood		Short Term (T1) Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk Medium Term (T2) Construction of multi-purpose shelters in coastal villages/habitations prone to frequent cyclones Long Term (T3)
2	Multi-Purpose Cyclone Shelters	NDMA, MHUA, MOST	Recurring/ Regular (RR) Technical support	DMD [§] , SDMA, RD, DDMAs, PRIs, ULBs			Ensure compliance with relevant building codes
3	Social Housing Schemes	MORD, MHUA	Short Term (T1) Review all housing schemes to ensure that appropriate multi-hazard safety norms, including cyclone-resistant features are incorporated in all social housing schemes	DMD [§] , SDMA, DDMAs, PRIs, ULBs, DRD, UDD, PRD	Short Term (T1) Review all housing schemes to ensure that appropriate multi-hazard safety norms, including cyclone-resistant features are incorporated in all social housing schemes Medium Term (T2) Ensure that cyclone-resistant features are incorporated in planning and execution of social housing schemes Long Term (T3) Carry out retrofitting of social housing without multi-hazard, especially cyclone-resistant features incorporated in planning		

Cyclone and Wind				Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities	Central/ State Agencies and their Responsibilities		State [#]	
			Responsibility – Centre	State [#]		Responsibility – State	
			and execution of social housing schemes Long Term (T3) Carry out retrofitting of all social housing without multi-hazard, especially cyclone-resistant features				
4	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, MHUA, MOST	Recurring/ Regular (RR) Guidance and implementation	DMD ^{\$} , SDMA, DDMA, PRIs, UIBs	Recurring/ Regular (RR) Collaboration with technical agencies and implementation		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.1.4 Investing in DRR – Non-Structural Measures

Cyclone and Wind				Non-Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities	Central/ State Agencies and their Responsibilities		State [#]	
			Responsibility – Centre	State [#]	Responsibility – State	Recurring/ Regular (RR)	
1	• Laws • Regulations • Enforcement mechanisms • Techno-Legal regimes	MOES, MOEFCC, DOS, BIS, MFIN	Recurring/ Regular (RR) • Guidance and Support • Oversight and monitoring of compliance with coastal zone laws Short Term (T1) Review and Update relevant codes	DMD ^{\$} , SDMA, RD, Environment/ Forest Dept., DFIN	DMD ^{\$} , CZMA,	Ecologically sound land-use zonation Regulating aquaculture, and groundwater extraction Strengthen land-use planning	

Cyclone and Wind						Non-Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				
	Centre[#]	Responsibility – Centre	State[#]		Responsibility – State	Recurring/ Regular (RR)
	<ul style="list-style-type: none"> • Institutional Arrangements • Codes for disaster risk reduction • Compliance monitoring 		DDMA, PRIs, ULBs	Consider shoreline erosion, risk to structures, monitoring shoreline changes paying attention to the preservation of natural barriers		
			DMD ^{\$} , Forest Dept., UDD, DRD, CZMA, DDMA, PRIs, 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	Short Term (T1)	
			DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, Environment/ Forest Dept.	All coastal states and UTs will undertake the spread, preservation and restoration/regeneration of bio-shields	Recurring/ Regular (RR)	
	<p>MOES, MORD, MOEFCC</p>	<p>Promote coastal shelterbelts as a mandatory component under national afforestation programme</p>			Recurring/ Regular (RR)	
	CWC, All ministries and departments	<ul style="list-style-type: none"> • Guidance and Support for Formulating a regulatory framework for flood plain zoning and flood inundation management in cyclone-prone coastal areas • Promote risk insurance 	DMD ^{\$} , SDMA, RD, DDMA, IRD, PRIs, ULBs	Promote risk insurance Constitute task teams jointly with central agencies for implementing land-use regulation as per zoning guidelines	Recurring/ Regular (RR)	
	<p>MOES, NDMA, MCA*, MCF, MOCI, MPFI, MHFPE, MFIN</p>	<p>Recurring/ Regular (RR)</p> <p>Guidance</p>	DMD ^{\$} , SDMA, RD, DDMA	Promote private participation	Recurring/ Regular (RR)	
2	Public Private Partnerships				Recurring/ Regular (RR)	
3	Risk Transfer	MFIN*, NDMA, MHA, MAFW	DFIN*, DMD ^{\$} , SDMA, DAG	Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property	Recurring/ Regular (RR)	Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property

Cyclone and Wind				Non-Structural Measures	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			State[#]	Responsibility – State
	Centre[#]	Responsibility – Centre	Short Term (T1)	State[#]	Short Term (T1)
		Policy Framework			Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (S) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.1.5 Capacity Development

Cyclone and Wind				Capacity Development	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	State[#]	Responsibility – State	Recurring/ Regular (RR)	Recurring/ Regular (RR)
				Recurring/ Regular (RR)	Recurring/ Regular (RR)
	NIDM, NDMA, NLRTI, NDRF	DMD ^s , SDMA, DDMA, RD, SIDM, ATI, Technical Training Institutes, SIRD, Police Training Academies, AHD	Training and orientation programs for central govt. staff, SDRF, CDEF, Community, Volunteers, and other direct stakeholders	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	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
1 Training	NDMA, NIDM, NDRF, MYAS, MOD	DMD ^s , SDMA, DDMA, RD, SIDM, ATI	Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS	Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS	Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, protection of disaster-affected animals
	MHRD, UGC, NIDM, NLRTI	EDD, Professional Bodies and Councils in States	Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management	EDD, Professional Bodies and Councils in States	Medium Term (T2)
2 Curriculum Development	MHFW, NLRTI	HFWD, EDD	Introduction of Crisis Management, emergency medical	Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management	Medium Term (T2)
				Introduction of Crisis Management, emergency medical response/recovery and	Medium Term (T2)

Cyclone and Wind					Capacity Development
Sub-Thematic Area for DRR	Central/ State Agencies	Central/ State Agencies and their Responsibilities	State #	Responsibility – State	
Centre#	Centre#	Responsibility – Centre	State #	Responsibility – State	
		response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals		trauma management at Diploma /UG/ PG levels for Health Professionals	
	CBSE	Medium Term (T2) Introducing basic DM concepts in curriculum	State Education Boards	Medium Term (T2) Introducing basic DM concepts in curriculum	Recurring/ Regular (RR)
		<ul style="list-style-type: none"> Carry out mass media campaigns Promote attitude and behaviour change in the awareness campaigns/ IEC 		<ul style="list-style-type: none"> Carry out mass media campaigns Promote attitude and behaviour change in the awareness campaigns/ IEC 	Long Term (T3)
3	Awareness Generation	<p>NDMA, NDRF, CAPF, NIDM, MOES</p> <ul style="list-style-type: none"> Promote culture of disaster risk prevention, mitigation, and better risk management Promote use of insurance/ risk transfer Promote Community Radio Strengthening network of civil society organizations for awareness generation about DRR and DM 	DMD [§] , SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police	<ul style="list-style-type: none"> Promote culture of disaster risk prevention, mitigation, and better risk management 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 	Recurring/ Regular (RR)
4	Mock Drills/ Exercises	NDMA, NDRF, MOD, CAPF	Promote planning and execution of emergency drills by all ministries and in all States/JUTs	Joint planning and execution of emergency drills	Recurring/ Regular (RR)
5	Vocational Training/ Skill Development	NDMA, NIDM, MSDE, NSDA, NSDC, IIE, NIESBUD,	Promoting skill development for multi-hazard resistant construction in cyclone-prone areas for	<ul style="list-style-type: none"> Conduct training programmes Creating ToT teams for different trades relevant to cyclone-resistant construction 	Recurring/ Regular (RR)

Cyclone and Wind					Capacity Development
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
	MMSME, NLSDA		different types of housing and infrastructure		
Empowering women, marginalised communities, and persons with disabilities 6	MSJE, MWCD, NDMA, NIDM		Recurring/ Regular (RR) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	DMD ^{\$} , SDMA, DSIE, RD, SIDM, ATI, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
Community-Based Disaster Management 7	NDMA, NIDM, NDRF, MOD, CAPF, MORD, MHUA		Recurring/ Regular (RR) Promotion, Guidance, and Support	DMD ^{\$} , SDMA, RD, DDMA, SIDM, ATI, PRIs, ULBs	Recurring/ Regular (RR) Training for PRI, SHG, NCC, NSS, youth, local community organizations Short Term (T1) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.1.6 Climate Change Risk Management

Climate Change Risk Management				
Cyclone and Wind		Central/ State Agencies and their Responsibilities		
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		<p>Short Term (T1)</p> <ul style="list-style-type: none"> Develop GACC impact scenarios that have bearing on cyclonic activity and sea surges Studies on GACC driven ecosystem and shoreline changes Assess enhanced risks (economic, social, etc.) under different GACC impact scenarios Carry out risk zonation/mapping of climate change impacts considering various sea-level rise and shoreline change scenarios Research studies on mutual coherence and mutual reinforcement of GACC and risk management along the coast <p>Long Term (T3)</p> <ul style="list-style-type: none"> Develop Data base management system for GACC impacts Develop forecasting model for risks from GACC and its likely impacts 		<p>Medium Term (T2)</p> <p>Document state-specific GACC impacts and coping mechanisms</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards
2 Hazard Risk Vulnerability and Capacity Assessment (HRVCA)		<p>Long Term (T3)</p> <ul style="list-style-type: none"> Assess the changes in risk, vulnerability and capacities under GACC impact scenarios Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	DMD ^{\$} , SDMA, RD, EFD, AGD, FIHD, WRD DDMA, PRIs, ULBs, SLRTI	<p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on vulnerabilities, capacities and risks under GACC impact scenarios Assess GACC risks of vulnerable and marginalised sections

Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	Responsibility – State
		Recurring/ Regular (RR)	Recurring/ Regular (RR)
			<ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Medium Term (T2)</p>
3	Climate Change Adaptation (CCA)	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Understanding CCA needs Study GACC coping mechanisms Develop CCA mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote appropriate combinations of Green and Blue infrastructure approach Support the implementation GACC approach Promote adaptive measures in social protection programmes for the vulnerable groups 	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects <p>Long Term (T3)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Promote appropriate combinations of Green and Blue infrastructure approach Implementation of GACC adaptation programs Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, occasion and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.2 Flood

7.2.1 Understanding Disaster Risk

Flood		Understanding Disaster Risk			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		Recurring/ Regular (RR)	Responsibility – Centre		Recurring/ Regular (RR)
Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	MOES*, MOJS/CWC*, MAFW, DOS, MEITY, NLRTI	<p>Assessment, Monitoring, and Scientific studies</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Preparation of close contour and flood vulnerability maps Modernisation of flood forecasting and warning systems on a river basin basis Assist states/UTs in the identification of priority flood protection and drainage improvement works Monitoring of flood preparedness, river basin and reservoir management plans <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Studies and monitoring of rivers flowing from neighbouring countries Studies involving international cooperation for forecasting and cross border issues Implementation of the schemes for real-time collection of hydro-meteorological data on important rivers including the relevant rivers flowing from Nepal, Bhutan and China Specialized efforts for different types of floods and causes of flooding, including cloudburst 	DMD\$, IRD, WRD, SDMA, DDMA, SLRTI, PRIs, ULBs	<ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts for flood management Support local information systems and update data for better flood management <p>Short Term (T1)</p> <ul style="list-style-type: none"> Implementing and monitoring of flood preparedness, river basin and reservoir management plans including updating rule curves, improve system of water release from reservoirs Identification of priority flood protection and drainage improvement <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Studies on land use and hydrological changes relevant to flood management in river basins and reservoir command areas 	

Understanding Disaster Risk					
Flood	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
			<p>Long Term (T3)</p> <ul style="list-style-type: none"> Developing/ improving/ updating forecasting methods and models for quantification of inflows and storage of dams 		<p>Long Term (T3)</p> <p>Execution of flood protection and drainage improvement schemes</p>
2	Zoning, mapping, and classification flood prone areas	MOJS*, DOS, NLRTI	<p>Short Term (T1)</p> <p>Preparation of large-scale hazard maps of flood prone areas identifying areas of high vulnerability</p>	DMD\$, IRD, SLRTI, WRD, SDMA, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts
3	Research and Development	MOJS, DOS, MOST, NLRTI, Brahmaputra Board, Ganga Flood Control Commission	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Studies on support systems for people living in flood prone areas Evolving designs of shelters in flood prone areas Socio-economic impacts of flood <p>Medium Term (T2)</p> <ul style="list-style-type: none"> 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 Promote research and studies – both in-house and extra-mural by providing research grants to researchers and institutions <p>Long Term (T3)</p> <ul style="list-style-type: none"> Hydrological and morphological studies before undertaking major flood control or prevention measures 	DMD\$, IRD, WRD, SDMA, DDMA, SLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor/ carry out state-specific efforts in all these areas; support local efforts

Flood		Central/ State Agencies and their Responsibilities				Understanding Disaster Risk	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State			
		<ul style="list-style-type: none"> Developing/ updating forecasting methods and models for quantification of inflows and storage of dams 					R Recurring/ Regular (RR) Undertake HRVCA as part of preparing and periodic revision of DM plans
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	<ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	DMD\$, SDMA, DDMA, RD, IRD, DSJE				T1 Recurring / Regular (RR) Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
5	Dissemination of warnings, data, and information	<p>R Recurring/ Regular (RR) Quick, clear, effective dissemination among central and state agencies</p> <p>T1 <ul style="list-style-type: none"> Facilitate the distribution of necessary communication equipment, last-mile connectivity and access to disaster risk information International cooperation to share warnings about rivers flowing from neighbouring countries Promoting reliable networking systems for data and information sharing among central and state agencies Monitoring of landslides and blockages in rivers Warning systems Providing information in all possible ways and using all types of media Interface with mobile network service providers for warnings </p>	DMD\$, SDMA, RD, IRD, WRD, IPRD, DDMA, PRIs, ULBs				R Recurring/ Regular (RR) <ul style="list-style-type: none"> 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 Warnings using all types of options, types of technologies, and media Monitoring compliance by various network operators and service providers

Understanding Disaster Risk					
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	Responsibility – State [#]	Responsibility – State
6	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	<p>Recurring/ Regular (RR)</p> <p>Systematic data management of data on disaster damage and loss assessments</p> <p>Short Term (T1)</p> <p>Disaster Damage and Losses 2005-2015 baseline</p>	DMD\$, SDMA, all depts.	<p>Systematic data management of data on disaster damage and loss assessments</p> <p>Short Term (T1)</p> <p>Disaster Damage and Losses 2005-2015 baseline</p>
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.					
Inter-Agency Coordination					Inter-Agency Coordination
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Overall disaster governance	MOJS	<p>Recurring/ Regular (RR)</p> <p>Providing coordination, technical inputs, and support</p>	DMD\$, SDMA, RD, IRD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
2	Response	MHA	<p>Recurring/ Regular (RR)</p> <p>Organising and coordinating central assistance</p>	DMD\$, SDMA, RD, IRD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Organising and coordinating the immediate response Coordinate with central agencies

Flood					Inter-Agency Coordination		
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
3	Warnings, Information, Data	MOJS, IMD, DOS, MEITY, NDMA	Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	<u>Recurring/ Regular (RR)</u>	
4	Non-structural measures	MHA, BIS, NDMA	Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	<u>Recurring/ Regular (RR)</u>	
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.							
Flood					Structural Measures		
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
Establishment/ strengthening of Emergency Operation Centres		Relevant Central Ministries, MHA	Recurring/ Regular (RR) Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources	DMD ^{\$} , SDMA, ULBs, PRIs	Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood	<u>Recurring/ Regular (RR)</u>	
1	Flood control measures such as construction of embankments and levees	MOJS, NWDA, CWPRS, CBRI, SERC, IE(I)	Recurring/ Regular (RR) Technical support and studies	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Short Term (T1) Identification suitable sites for temporary shelters for people and livestock evacuated from localities at risk		

Flood		Structural Measures			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
					<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Construction of multi-purpose shelters in villages/ habitations prone to floods Proper monitoring and maintenance of river embankments
2	Social Housing Schemes	Relevant Central Government Ministries, MORD, MHUA	Recurring/ Regular (RR) Ensure that flood-resistant features are incorporated in planning and execution of social housing schemes	DMD ^{\$} , SDMA, RD, DRD, UDD, PRD, DDMA, PRIs, ULBs	Medium Term (T2) 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, MOJS, NBCC, BMTPC, CBRI, SERC, IE(I)	Recurring/ Regular (RR) Advisory	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Medium Term (T2) 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	MIRTH, MOD, NHAI, BRO	Recurring/ Regular (RR) Proper alignment and design	DMD ^{\$} , SDMA, RD, SPWD, DDMA, PRIs, ULBs	Recurring/ Regular (RR) 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	MOJS	Recurring/ Regular (RR) Advisories and guidance	DMD ^{\$} , SDMA, DDMA, RD, IRD, WRD	Recurring/ Regular (RR) <ul style="list-style-type: none"> 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

Flood		Central/ State Agencies and their Responsibilities				Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
6	Desilting/ dredging of rivers to improve flow; drainage improvement; floodwater diversion through existing or new channels	MOJS	Recurring/ Regular (RR) Advisories and guidance	IRD, WRD, SDMA, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Implementation as per norms		
7	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IELI), all relevant Ministries/ Departments	Recurring/ Regular (RR) Guidance and implementation	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Collaboration with technical agencies and implementation		
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.							
Flood		Central/ State Agencies and their Responsibilities				Non-Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
1	<ul style="list-style-type: none"> • Regulation and enforcement of laws, norms, regulations, guidelines including • Regulation for reservoir management • Integrated Water Resources Management (IWRM) 	<ul style="list-style-type: none"> IMD, DOS, MOJS, NWDA, DOS, MFIN 	<ul style="list-style-type: none"> Recurring/ Regular (RR) • Guidance and Support • Oversight and monitoring of compliance with coastal zone laws • Promote institutional mechanisms for sharing forecasts, warnings, data, and information 	<ul style="list-style-type: none"> DMD^{\$}, IRD, WRD, SDMA, DDMA, RD, DFIN 	<ul style="list-style-type: none"> Recurring/ Regular (RR) • 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 • Support and cooperate with central agencies; Sponsor state- 		

Flood	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				Non-Structural Measures
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
			<ul style="list-style-type: none"> Regulatory framework for flood plain zoning and flood inundation management <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Scheme of incentives and disincentives with respect to the central assistance to encourage the states for implementing flood plain zoning regulations Norms/ regulations applicable to buildings in flood-prone areas <p>Long Term (T3)</p> <p>Facilitate the implementation of IWRM in major river basins and their sub-basins</p>		<ul style="list-style-type: none"> Enforcing building codes and regulations Review and modification of operation manuals for all major dams/ reservoirs Prevention and removal of encroachment into the waterways and natural drainage systems <p>Short Term (T1)</p> <ul style="list-style-type: none"> Enforcing building codes and regulations Review and modification of operation manuals for all major dams/ reservoirs Prevention and removal of encroachment into the waterways and natural drainage systems <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Implementing regulatory framework for flood plain zoning and flood inundation management Implementing flood plain zoning regulations <p>Long Term (T3)</p> <p>Implementation of IWRM in major river basins and their sub-basins within each state/UT</p>	
2	Regulations to promote flood resilient buildings and infrastructure	NDMA, MOJS, MHUA, BIS	Recurring/ Regular (RR) Guidance and Support	DMD ^{\$} , SDMA, DDMA, RD, Local bodies	Medium Term (T2) Revise and implement the relevant rules in flood prone areas	
3	• Wetland conservation and restoration	MOEFCC	Recurring/ Regular (RR) Guidance and Support	SDMA, DDMA,		

Flood		Non-Structural Measures				
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
	<ul style="list-style-type: none"> Catchment Area Treatment/Afforestation 		<p>Centre[#]</p> <p>Responsibility – Centre</p>	DMD ^{\$} , RD, EFD, Local bodies	<p>Short Term (T1)</p> <p>Discourage reclamation of wetlands, natural depressions</p> <p>Medium Term (T2)</p> <p>Action plan managing wetlands and natural drainage systems for flood moderation</p> <p>Long Term (T3)</p> <p>Implementation of watershed management including catchment area treatment and afforestation programmes</p>	<p>Short Term (T1)</p> <p>Discourage reclamation of wetlands, natural depressions</p> <p>Medium Term (T2)</p> <p>Action plan managing wetlands and natural drainage systems for flood moderation</p> <p>Long Term (T3)</p> <p>Implementation of watershed management including catchment area treatment and afforestation programmes</p>
4	Public Private Partnerships	NDMA, MOJS, MCA*, MCF, MOCI, MPFI, MHYPE, MFIN	<p>Recurring/ Regular (RR)</p> <p>Guidance</p>	DMD ^{\$} , SDMA, DDMA, RD, DDMA	<p>Recurring/ Regular (RR)</p> <p>Promote private participation in disaster management facilities</p>	<p>Recurring/ Regular (RR)</p> <p>Promote private participation in disaster management facilities</p>
5	Risk Transfer	MFIN*, NDMA, MHA, MAFW	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>	DFIN*, DMD ^{\$} , SDMA, DAG	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.2.5 Capacity Development

Flood		Capacity Development			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Training	NIDM, LBSNAA, NIRM, NDMA, NDRF, NISA, and other training institutions for Indian Civil Services	Recurring/ Regular (RR) Training and orientation programs for central govt. staff, SDRF, CDEF, community, and volunteers	DMD ^{\$} , SDMA, DDMA, SDRF, ATIs, Engineering Training Institutes, SIRD, Police Training Academies	<ul style="list-style-type: none"> • Training and orientation programs for state govt. staff, professionals for veterinary care and support to disaster-affected animals • Training for CDEF, community, and volunteers
		NDRF, CAPF, MYAS, MOD	Recurring/ Regular (RR) Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides, NSS, SDRF, CDEF, Community, Volunteers	DMD ^{\$} , SDMA, SIDM, ATI DDMA, PRIs, ULBs	<ul style="list-style-type: none"> • Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, and for protection of disaster-affected animals • Training for CDEF, Community, Volunteers
2	Curriculum Development	MHRD, AICTE, IITs, UGC, NIIDM, Professional Bodies/ Councils	Recurring/ Regular (RR) Strengthen coverage of flood damage mitigation, flood tolerant designs/ crops, and construction techniques	Professional Bodies/ Councils	<p>Medium Term (T2)</p> <p>Update curriculum for undergraduate engineering courses to include topics relevant for flood Risk Management</p>
		MHFW	Recurring/ Regular (RR) Improve coverage of community health and epidemic management medical curriculum	Health Department	<p>Medium Term (T2)</p> <p>Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals</p>

Capacity Development					
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	Responsibility – State
		CBSE	<u>Recurring/ Regular (RR)</u> Include awareness about flood and some aspects of flood management in school and college teaching while reviewing the curriculum	Boards of Education	<u>Recurring/ Regular (RR)</u> Improving curriculum periodically using new technologies
3	Awareness Generation	NDMA, NIDM, MOJS, NIDM, MOJS, NDRAF, CAPF, NIDM, MOJS	<u>Recurring/ Regular (RR)</u> • 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 • Strengthening network of civil society organizations for awareness generation about DRR and DM and DM	DMD [§] , SDMA, RD, WRD, IRD, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> • 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 • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals Medium Term (T2) • Promote use of insurance/ risk transfer • Promote Community Radio
4	Mock Drills/ Exercises	NDMA, NIDM, MOJS, Line Ministries, Govt. Agencies, NDRAF, Armed Forces, CAPF			<u>Recurring/ Regular (RR)</u> Promoting the planning and execution of emergency drills by all ministries and in all States/UTs
5	Vocational Training/ Skill Development	NDMA, NIDM, MSDE, NSDA, NSDC, IIE, NIESBUD, MMSME, NLSDA		<u>Recurring/ Regular (RR)</u> Promoting skill development for multi-hazard resistant construction	<u>Recurring/ Regular (RR)</u> • Conduct training programmes

Flood				Capacity Development			
Sub-Thematic Area for DRR		Centre [#]		Central/ State Agencies and their Responsibilities		Responsibility – State	
				Responsibility – Centre	State [#]		
				in flood-prone areas for different types of housing and infrastructure			<ul style="list-style-type: none"> Develop at team of Trainer-of-Trainers for different trades relevant to flood-resistant construction
6	Empowering women, marginalised, and persons with disabilities	MSJE, MWCD, NDMA, NIDM		<u>Recurring/ Regular (RR)</u> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	DMD ^{\$} , SDMA, RD, SIDM, ATI, and other state-level institutions, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels	<ul style="list-style-type: none"> Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach Training for PRI, SHG, NCC, NSS, Youth, local community organizations
7	Community-Based Disaster Management	NDMA, NIDM, MORD, MHUA		<u>Recurring/ Regular (RR)</u> Promotion, Guidance, and Support	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Support national risk reduction efforts related to GACC	<ul style="list-style-type: none"> Support national risk reduction efforts related to GACC Coordination with central agencies

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.2.6 Climate Change Risk Management

Flood				Climate Change Risk Management			
Sub-Thematic Area for DRR		Centre [#]		Central/ State Agencies and their Responsibilities		Responsibility – State	
				Responsibility – Centre	State		
1	Research, Forecasting / Early Warning, Data Management, Zoning, Mapping	MOES, MOJS*, MAFW, MOEFCC, DOS		<u>Recurring/ Regular (RR)</u> Assessment, Monitoring, and Scientific studies	DMD ^{\$} , EFD, IRD, WSD*, SDMA, AGD, FIHD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Support national risk reduction efforts related to GACC	<ul style="list-style-type: none"> Support national risk reduction efforts related to GACC Coordination with central agencies

Climate Change Risk Management					
Flood	Sub Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	Responsibility – State	Responsibility – State
Centre [#]	Responsibility – Centre	Short Term (T1)	State	State	State
		<ul style="list-style-type: none"> Flood vulnerability maps under GACC scenarios Assessing GACC effects on catchments and river basins including trends over past decades. Assess enhanced economic and social risks under GACC scenarios <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Study GACC-related changes in the rivers flowing from trans-boundary rivers Develop Database management system relating to climate change impact on floods Prepare GACC scenario maps for all river systems Enhanced risks from GACC and on adaptations to change <p>Long Term (T3)</p> <ul style="list-style-type: none"> Improve the flood forecasting capabilities consistent with the anticipated GACC impacts on flood-prone areas Coordinate with all neighbouring countries to understand and monitor GACC impacts on major rivers associated with or flowing from neighbouring countries 	<ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Medium Term (T2)</p> <p>Document state-specific GACC impacts and coping mechanisms</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards 		

Climate Change Risk Management					
Flood		Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State	Responsibility – State	
Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NIDM, MOJS*, MOST, MOST, CSIR, DOS DST	<ul style="list-style-type: none"> Improve the understanding of the enhanced vulnerabilities of communities in flood-prone areas to extreme hydro-climatic events Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	State / UT, SDMA, DMD ^{\$} , RD, Irrigation Dept. / WRD	<u>Recurring/Regular (RR)</u> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans Develop strategies for structural and non-structural measures based on HRVCA 	
		<u>Long Term (T3)</u> <p>Undertake detailed studies on vulnerability and risk under GACC scenarios along the coast</p>		<u>Medium Term (T2)</u> <p>Assess GACC risks of vulnerable and marginalised sections</p>	
Climate Change Adaptation (CCA)	MOES*, MOEFCC*, MOST, DOS, MOJS, MSIE DST (es)	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> Understanding adaptation needs Study coping mechanisms Develop GACC adaptation mechanisms 	SDMA, IRD/WRD*, EFD, DRD, DSIE, DDMA, PRIs, UJBs	<u>Recurring/Regular (RR)</u> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation 	
		<p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Implement GACC adaptation programs Promote appropriate combinations of Green and Blue infrastructure approach Promote adaptive measures in social protection programmes for the vulnerable groups 		<u>Medium Term (T2)</u> <p>Develop local adaptation strategies and pilot projects</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts 	

Flood				Climate Change Risk Management		
Sub-Thematic Area for DRR		Centre #	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State	Responsibility – State
				<ul style="list-style-type: none"> • Implementation of GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups 		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3 Urban Flood

7.3.1 Understanding Disaster Risk

Urban Flooding				Central/ State Agencies and their Responsibilities				Understanding Disaster Risk			
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre		State [#]	Responsibility – State			Recurring/ Regular (RR)		
1	Mapping/ Zoning, Estimation of Possible Inundation levels, monitoring networks	MHUA*, MOES, MOJS, DOS	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Develop guidelines for assessment of potential and actual damages to be done separately MOES (IMD) to prioritize the establishments in consultation with State Governments Establish satellite-linked Automatic Rain Gauge Stations, Automatic Weather Stations for 24X7 weather monitoring <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Maximize real-time hydro-meteorological network to cover all urban centres MOES (IMD) and MHUA to work out a strategic expansion of DWR network across the country to cover all urban centres <p>Long Term (T3)</p> <p>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</p>	DMD [§] , SDMA, RD, SRSAC, DDMA, PRIs (peri-urban), ULBs	<ul style="list-style-type: none"> Develop land use planning based on multi-hazard disaster risk assessment Place land-use planning maps in public domain Undertake adequate studies, evaluations, and planning considering land use constraints to prevent flooding Coordinate with the central agencies and implement recommendations Undertake HRVCA as part of preparing and periodic revision of DM plans Ward level assessment Constitute/ strengthen the mechanisms for consultation with experts and stakeholders 						

Understanding Disaster Risk					
Urban Flooding		Central/ State Agencies and their Responsibilities			
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
2	Information Systems, Monitoring, Forecasting, Early Warning	MOES, MOJS	<u>Recurring/ Regular (RR)</u> Medium Term (T2) Establishing technical umbrella for urban flood forecasting and warning		<u>Short Term (T1)</u> State Urban Flood Disaster Management Information System Medium Term (T2) Set up EOCs by the ULBs connected to the ARG network <u>Long Term (T3)</u> Develop capacities to make quantitative forecasts and simulate inundation levels under various scenarios
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NIDMA, NIDM, MSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRV/CA 		<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments <u>Short Term (T1)</u> Disaster Damage and Losses 2005-2015 baseline
4	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.		DMD\$, SDMA, all depts.	<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.2 Inter-Agency Coordination

Urban Flooding				Central/ State Agencies and their Responsibilities			Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State			
1	Overall disaster governance	MHUA	R ecurring/ Regular (RR) Providing coordination, technical inputs, and support	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	R ecurring/ Regular (RR) • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR			
2	Response	MHUA	R ecurring/ Regular (RR) Organising and coordinating central assistance	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	R ecurring/ Regular (RR) • Organising and coordinating the immediate response • Coordinate with central agencies			
3	Warnings, Information, Data	MOES* (IMD), MOJS, MOES, NDMA, MEITY	R ecurring/ Regular (RR) Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	R ecurring/ Regular (RR) Coordinating the 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	MHUA, BIS, NDMA	R ecurring/ Regular (RR) Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	R ecurring/ Regular (RR) Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring			

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.3 Investing in DRR – Structural Measures

Urban Flooding				Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	Responsibility – State
1	Civil Works	MHUA*, MCVIA, NBCC, BMTPC, CBRI, SERC, IE(I), CRRI	<ul style="list-style-type: none"> • City Bridge Design Considerations • City Road Level Design • Technical Support 	DMD [§] , UDD, ULBS, PRIs (peri-urban)	<p>Short Term (T1)</p> <p>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</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Upgrade the existing drainage and storm water systems • Managing drainage systems • Protection of Water Bodies • Ensure protection of Water Bodies and its restoration/ revival <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Bus and Metro Terminals, Railway stations and 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 • Remove encroachments and take strict action against the encroachers as per the byelaws/ regulations
2	Establishment/ Strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	Recurring/ Regular (RR)	DMD [§] , SDMA, ULBS, PRIs (peri-urban)	<p>Recurring/ Regular (RR)</p> <p>Ensure round the clock operations of EOCs during the flood season with adequate manpower/ resources</p>
3	Hazard resistant construction,	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Guidance and implementation	SDMA, DDMA, ULBS, PRIs (peri-urban)	Medium Term (T2)
					Collaboration with technical agencies and implementation

Urban Flooding				Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities		Responsibility – State	
				State [#]			
	Strengthening, and retrofitting of all lifeline structures and critical infrastructure						
<p>Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$ DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.</p>							
<h3>7.3.4 Investing in DRR – Non-Structural Measures</h3>							
Urban Flooding				Non-Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities		Responsibility – State	
				Medium Term (T2)			
1	Preparation of comprehensive Urban Storm Drainage Design Manual (USDDM)	MHUA	MHUA will consider current international practices, specific locations and rainfall pattern of the cities and future needs for preparing USDDM	DMD\$, SDMA, DDMA, UDD		<u>Recurring/ Regular (RR)</u> Take initiatives and collaborate with central agencies	
	Preparation of Storm Water Drainage System Inventory	MHUA	MHUA, in consultation with States/UTs and ULBs promote storm water drainage information system based on best technologies available integrating spatial and non-spatial data	DMD\$, SDMA, ULBs, PRIs (peri-urban)		<u>Long Term (T3)</u> Coordinate with MHUA in preparing the inventory through ULBs	
2	Operation and Maintenance of Drainage Systems	MHUA	Provide guidelines, and carry out monitoring	DMD\$, SDMA, ULBs, PRIs (peri-urban)		<u>Recurring/ Regular (RR)</u> Adequate budget to be provided to take care of the men, material, equipment and	

Urban Flooding		Non-Structural Measures				
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
			Short Term (T1) Issue guidelines to State/UT for making storm water drainage concerns a part of all EIA norms	DMD ^{\$} , SDMA, ULBs, EFD, PRIs (peri-urban)	Ensure strict compliance with the guidelines and land-use planning consistent with sound storm water management Medium Term (T2) Minimise loss of ecologically important areas and natural wetlands	Short Term (T1) machinery for O&M of drainage systems on a periodic basis
4	Environmental Impact Assessment	MOEFCC*, MHUA	Recurring/ Regular (RR) • Coordinate the efforts of the States for compliance with Techno-Legal Regime by all the ULBs in their respective States • Technical guidance to strengthen land-use planning	DMD ^{\$} , SDMA, ULBs, PRIs (peri-urban)	• Strengthen land-use planning Medium Term (T2) • Incorporate water sensitive urban design considerations into land use planning • Incorporate the topography and specific terrain elements such as hilly, coastal, etc. in the land use plan to minimise flooding allowing free flow of storm water along natural contours	Short Term (T1) Regime especially of land use through ULBs
5	Techno-Legal Regime • Land use planning • City/Town Planning	MHUA, MFIN	Recurring/ Regular (RR) • Lead role in the establishment of the technical umbrella at the national level	DMD ^{\$} , SDMA, 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	Long Term (T3) Promote private participation in disaster management facilities
6	Constitution of Urban Flooding Cell for Integrated UFDM	MHUA	Long Term (T3) Guidance and model regulations	UDD, SDMA, DDMMA		
7	Public Private Partnerships	NDMA, MHUA, MCA*, MCF,				

Urban Flooding					Non-Structural Measures	
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities		Responsibility – State	
			Responsibility – Centre	State [#]		
		MOCI, MPFI, MHIPE, MFIN				
8	Risk Transfer	MFIN*, NDMA, MIHA, MAFW	<u>Recurring/ Regular (RR)</u> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	DFIN*, DMD\$, SDMA, DAG	<u>Recurring/ Regular (RR)</u> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

Urban Flooding					Capacity Development	
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities		Responsibility – State	
			Responsibility – Centre	State [#]		
1	Education and Training	MHUA*, MHRD, MHFW, NDRF, NIDM, CBSE, MYAS	<u>Medium Term (T2)</u> Introduce UFDM modules in school curricula through CBSE Support to training of SDRF, CDEF, community, and volunteers	ULB, PRIs (peri- urban), SDRF	<u>Recurring/ Regular (RR)</u> Trainings for urban flood rescue and management for CDEF, community, volunteers and others Short Term (T1) <ul style="list-style-type: none"> Upgrade equipment and skills of F&ES for UFDM Enlist professionals for veterinary care and support to disaster-affected animals Medium Term (T2) State Governments will encourage their school boards to develop similar content in their school curriculum	<u>Recurring/ Regular (RR)</u> Trainings for urban flood rescue and management for CDEF, community, volunteers and others Short Term (T1) <ul style="list-style-type: none"> Upgrade equipment and skills of F&ES for UFDM Enlist professionals for veterinary care and support to disaster-affected animals Medium Term (T2) State Governments will encourage their school boards to develop similar content in their school curriculum

Urban Flooding				Capacity Development		
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
2	Awareness Generation	MHUA*, NDMA, NDRF, CAPF, NIDM	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • 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 	DMD\$, SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police, ULB, PRIs (peri-urban)	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • 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	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning 	DMD\$, SDMA, RD, DDMA, ULB, State ATI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning 	
4	Empowering women, marginalised, and persons with disabilities	MWCD*, MSJE, NDMA, NIDM	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management 	DMD\$, SDMA, DDMA, RD, SIDM, ATI, and other state-level institutions	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management 	
5	Community-Based Disaster Management	MHUA*, MORD*, NDMA, NIDM		DMD\$, SDMA, SDRF, RD, DDMA, ULB, SIDM	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Promotion, guidance, support, training for CDEF, community, volunteers 	

Urban Flooding				Capacity Development
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
		Recurring/ Regular (RR) Promotion, Guidance, and Support, Training for CDEF, Community, Volunteers		Short Term (T1) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach Medium Term (T2) Training for RWA, SHG, NCC, NSS, Youth, Ward Committees, local community organizations
6	Mock Drills/ Exercises	MHUA, NDMA, All Govt. Ministries/ Agencies, NDRF, Armed Forces, CAPF	Recurring/ Regular (RR) Promoting the planning and execution of emergency drills by all ministries and in all States/UTs	DMD ^{\$} , SDMA, RD, DDMA, ULB, SDRF, F&ES, CDEF, Police
				Recurring/ Regular (RR) Joint planning and execution of emergency drills

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.6 Climate Change Risk Management

Urban Flooding				Climate Change Risk Management
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility/ Regular (RR)
1	Research, Forecasting / Early Warning, Data Management, Zoning, Mapping	MOES, MOJS*, MAFW, MOEFCC, DOS, NLRTI	Recurring/ Regular (RR) Assessment, Monitoring, and Scientific studies Short Term (T1) • Flood vulnerability maps under GACC scenarios	DMD ^{\$} , IRD, WSD*, EFD, SDMA, AGD, FIHD, DDMA, ULBs, PRs (peri-urban) <ul style="list-style-type: none">Support national risk reduction efforts related to GACCCoordination with central agenciesSponsor and promote state-specific efforts and local efforts

Climate Change Risk Management				
Urban Flooding		Central/ State Agencies and their Responsibilities		
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		<ul style="list-style-type: none"> Assessing GACC effects on catchments and river basins including trends over past decades Assess enhanced economic and social risks under GACC scenarios <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Study GACC-related changes in the rivers flowing from trans-boundary rivers Develop Database management system relating to climate change impact on floods Prepare GACC scenario maps for all river systems Enhanced risks from GACC and on adaptations to change <p>Long Term (T3)</p> <ul style="list-style-type: none"> Improve the flood forecasting capabilities consistent with the anticipated GACC impacts on flood-prone areas Coordinate with all neighbouring countries to understand and monitor GACC impacts on major rivers associated with or flowing from neighbouring countries 	<p>for GACC mitigation and adaptation</p> <p>Medium Term (T2)</p> <p>Document state-specific GACC impacts and coping mechanisms</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards 	<p>Responsibility – State</p>
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NIDM, MOJS*, MOST, MOST, CSIR, DOS, NLRTI	Medium Term (T2)	<p>DMD[§], SDMA, RD, IRD, WRD, SLRTI</p> <p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans

Climate Change Risk Management					
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
		<p>Responsibility – Centre</p> <ul style="list-style-type: none"> in flood-prone areas to extreme hydro-climatic events Provide technical support and guidance for comprehensive HRVCA considering GACC impacts Assess GACC risks of vulnerable and marginalised sections <p>Long Term (T3)</p> <p>Undertake detailed studies on vulnerability and risk under GACC scenarios along the coast</p>		<ul style="list-style-type: none"> Develop strategies for structural and non-structural measures based on HRVCA <p>Medium Term (T2)</p> <p>Assess GACC risks of vulnerable and marginalised sections</p>	
3 Climate Change Adaptation (CCA)	MOES*, MOST, DOS, MOJS, MOEFCC*	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Understanding adaptation needs Study coping mechanisms Develop GACC adaptation mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> Implement GACC adaptation programs Promote appropriate combinations of Green and Blue infrastructure approach Promote adaptive measures in social protection programmes for the vulnerable groups 	DMD\$, SDMA, IRD, WSD*, EFD, DRD, DDMA, ULBs, PRIs (peri-urban)	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Medium Term (T2)</p> <p>Develop local adaptation strategies and pilot projects</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Implementation of GACC adaptation programs 	

Urban Flooding				Climate Change Risk Management		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		State [#]	State [#]	Responsibility – State
Centre [#]	Responsibility – Centre	Centre [#]	Responsibility – Centre	State [#]	State [#]	Responsibility – State
						<ul style="list-style-type: none"> • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.4 Seismic/ Earthquakes

7.4.1 Understanding Disaster Risk

Seismic				Central/ State Agencies and their Responsibilities				Understanding Disaster Risk	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State				
1	<ul style="list-style-type: none"> • Earthquake Monitoring Services • National Seismological Network • Real Time Seismic Monitoring Network (RTSMN) • Earthquake Hazard and Risk Assessment (EHRA) 	MOES, MEITY, NLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Estimate the earthquake parameters quickly after detection • Disseminate information • Share information relating to undersea earthquakes capable of generating tsunamis in the Indian coastal regions with INCOIS to issue of tsunami related messages and warnings • Share seismic activity data with national and international scientific, academic and R&D institutions <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Seismic hazard assessment • Seismic zoning • Seismic micro-zoning 	DMD ^{\$} , SDMA, DDMA, RD	Share information widely	Recurring/ Regular (RR)	Ensuring implementation, enforcement, compliance and monitoring; Awareness creation	Long Term (T3)	Carry out need assessment from end-users, conduct micro-zonation studies,
2	Scientific Seismic Zonation	MOES*, EREC, BIS, GSI, NLRTI, MOST	Short Term (T1) Inter-Agency Coordination and Collaboration for publishing the guidelines	DMD ^{\$} , SDMA, RD, UDD, SPWD, ULB, DDMA	Recurring/ Regular (RR)				
3	Seismic Micro-zonation	EREC, NLRTI	Medium Term (T2)	DMD ^{\$} , SDMA, RD, DDMA, SLRTI					

Seismic		Central/ State Agencies and their Responsibilities				Understanding Disaster Risk	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	State [#]	Responsibility – State	
		Develop a status paper based on a consensus among the professionals on the methodologies for micro-zonation studies				prioritize important urban areas for micro-zonation, do professional review before adoption	
		Recurring/ Regular (RR)					
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NDMA, NIDM, MOST, MSJE, NLRTI	<ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	DMD ^{\$} , SDMA, RD, DSJE, PRIs, ULBs, DDMA	<p>Undertake HRVCA as part of preparing and periodic revision of DM plans</p> <p>Short Term (T1)</p> <p>Constitute/ strengthen the mechanisms for consultation with experts and stakeholders</p>	Recurring/ Regular (RR)	
5	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	Systematic data management of data on disaster damage and loss assessments	DMD ^{\$} , SDMA, all depts.	<p>Systematic data management of data on disaster damage and loss assessments</p> <p>Short Term (T1)</p> <p>Disaster Damage and Losses 2005-2015 baseline</p>	Recurring/ Regular (RR)	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context . (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.4.2 Inter-Agency Coordination

Seismic				Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Overall disaster governance	MoES	Recurring / Regular (RR) Providing coordination, technical inputs, and support	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
2	Response	MHA	Recurring / Regular (RR) Organising and coordinating central assistance	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Organising and coordinating the immediate response Coordinate with central agencies
3	Non-structural measures	MoES*, MHA, BIS, NDMA	Recurring / Regular (RR) Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.4.3 Investing in DRR – Structural Measures

Seismic				Structural Measures		
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Recurring/ Regular (RR)	Responsibility – State
1	Social Housing Schemes	Relevant Central Government Ministries, MORD, MHUA	Recurring/ Regular (RR) Ensure that multi-hazard resistant features are incorporated in planning and execution of social housing schemes (with special focus on earthquake)	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, DRD, UDD, PRD	<ul style="list-style-type: none"> • Ensure that earthquake resistant features are incorporated in planning and execution of social housing schemes • Ensure compliance with relevant building codes 	Recurring/ Regular (RR)
2	Strengthening and seismic retrofitting of prioritized lifeline structures and buildings	Relevant Central Government Ministries	Medium Term (T2) Implementation strengthening and seismic retrofitting as per recommendations of safety audits	DMD ^{\$} , SDMA, SPWD, RD, DDMA, PRIs, ULBs	Implementation strengthening and seismic retrofitting as per recommendations of safety audits in all govt. departments, agencies, public utilities, schools, colleges, community halls, etc.	Medium Term (T2)
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	Recurring/ Regular (RR) Guidance and implementation	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, SPWD	<ul style="list-style-type: none"> • Collaboration with technical agencies and implementation 	Recurring/ Regular (RR)

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.4.4 Investing in DRR – Non-Structural Measures

Seismic				Non-Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Regulations and model codes for town planning, civil works and public infrastructure	IRC, MRTTH, RDSO, MOR, AERB, DAE, BIS, MORD, MHUA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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 	DMD ^{\$} , SDMA, RD, UDD, DRD, SPWD, DDMA, PRIs, ULBs	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Adopt suitable byelaws for rural and urban areas, put model codes (e.g., NBC 2016) into practice and ensure proper compliance Micro-zonation for seismic risk reduction <p>Long Term (T3)</p> <p>Ensure strict compliance with code implementation through relevant Departments and agencies</p>
2	<ul style="list-style-type: none"> 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	<p>Recurring/ Regular (RR)</p> <p>Periodically provide clarifications in line with the relevant national standards</p> <p>Medium Term (T2)</p> <p>Formulate standard procedures and guidelines</p>	DMD ^{\$} , SDMA, RD, UDD, SPWD, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <p>Carry out safety audit of lifeline buildings and critical infrastructure</p> <p>Medium Term (T2)</p> <p>Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals</p>
3	Licensing and certification of professionals	MHRD, NDMA, relevant Central Ministries /Departments,	Medium Term (T2)	Relevant Departments	<p>Medium Term (T2)</p> <p>Implement licensing of engineers through appropriate legal framework and institutional mechanism</p>

Non-Structural Measures					
Seismic		Central/ State Agencies and their Responsibilities			
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		professional bodies of architects and engineers	procedure for certification of engineers		
4	Public Private Partnerships	NDMA, MOES, MCA*, MCF, MOCI, MPFI, MHRE, MFIN	Recurring/ Regular (RR) Guidance	DMD [§] , SDMA, RD, DDMA	Recurring/ Regular (RR) Promote private participation in disaster management facilities
5	Risk Transfer	MFIN*, NDMA, MHA, MAFW	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	DFIN*, DMD [§] , SDMA, DAG	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

Capacity Development					
Seismic		Central/ State Agencies and their Responsibilities			
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	Training	MOES*, NIDM, MHRD, NDMA, MYAS, NDRF, others**	<ul style="list-style-type: none"> Support regular training programs Training support for SDRF, CDEF, community, volunteers Medium Term (T2)	DMD [§] , SDMA, SDRF, RD, EDD, ATI, SIRD, DDMA	Recurring/ Regular (RR) Carry out regular trainings of CDEF, community and volunteers Medium Term (T2) <ul style="list-style-type: none"> Carry out the national effort to build the requisite number of trained personnel to handle seismic safety in India

Seismic					Capacity Development
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
	Centre[#]	Responsibility – Centre	State[#]	Responsibility – State	
		personnel to handle seismic safety in India.		<ul style="list-style-type: none"> • Trainings in search and rescue for CDDEF, community, and volunteers 	
2	Curriculum Development	MOES, MOCB, MHRD, UGC, AICTE, IITs, NIDM and other related agencies	Medium Term (T2) Facilitate the introduction of subjects related to DM, in the undergraduate and professional courses	DMD [§] , SDMA, RD, HD, EDD, DDMA	Medium Term (T2) DM related aspects to be included in undergraduate and professional courses
3	Awareness Generation	NDMA, NDRF, CAPF, NIDM	Recurring/ Regular (RR) <ul style="list-style-type: none"> • 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 	DMD [§] , SDMA, IPRD, RD, SIDM, ATIs, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs	Recurring/ Regular (RR) <ul style="list-style-type: none"> • 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 Medium Term (T2) <ul style="list-style-type: none"> • 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	Recurring/ Regular (RR) Monitoring Emergency Preparedness of Ministries/ Departments		Recurring/ Regular (RR) Monitoring Emergency Preparedness of Departments

Seismic		Capacity Development				
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities			State [#]	Responsibility – State <u>Short Term (T1)</u>
		Responsibility – Centre <u>Short Term (T1)</u>	State [#]	Responsibility – State <u>Short Term (T1)</u>		
		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	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, ATI	Recurring/ Regular (RR) Popularization and distribution of documentation in local languages		
6	Empowering women, marginalised, and persons with disabilities	MWCD, MSJE, NDMA, NIDM	DMD ^{\$} , SDMA, RD, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs	Medium Term (T2) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels	Medium Term (T2) 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, MHUA	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Promotion, Guidance, and Support	Recurring/ Regular (RR) Training for PRI, SHG, NCC, NSS, Youth, local community organizations Short Term (T1) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) ALCTE, CA, IE(I), NITTTR, NICMAR, CFJ, BAI, and other professional institutions. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5 Tsunami

7.5.1 Understanding Disaster Risk

Tsunami				Understanding Disaster Risk		
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
1	Research and Development Efforts	MOES [*] , MOST, NLRTI	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> 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 basis on past tsunami events 	DMD [§] , SDMA, RD, DDMA	<p>Medium Term (T2)</p> <p>Develop detailed computerized maps and databases of vulnerable areas along the coast for planning and coordination of DM activities</p>	
2	Zoning/ Mapping	MOES [*] , MOST, NLRTI	<p>Long Term (T3)</p> <p>Database of Tsunami Risk and Vulnerability in the coastal areas with information on trends of storm surge, high tides, local bathymetry, etc.</p>	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <p>Ensure support to the Central Government agencies in zoning/ mapping and carry out at their level</p>	
3	Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	MOES [*] , NLRTI DOS, IAF, Indian Navy, ICG	<p>Medium Term (T2)</p> <p>Assess the status of existing important installations in coastal areas to withstand tsunami</p> <p>Medium Term (T2)</p> <p>Securing critical instrumentation to ensure fail-safe functioning of these critical instruments and their protection</p>	DMD [§] , SDMA, RD, DDMA, SLRTI	<p>Recurring/ Regular (RR)</p> <p>Support, cooperation for data collection and updates</p>	
4	Dissemination of warnings, data, and information	MOES [*] , MHA	<p>Recurring/ Regular (RR)</p> <p>Monitoring seismic activity, provide warnings based on seismic models and issue periodic bulletins</p>	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <p>Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk</p>	

Tsunami						Understanding Disaster Risk
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State [#]	Responsibility – State	
Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	5	MOES*, NDMA, NIDM, MOST, MSIE	<ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	DMD ^{\$} , SDMA, RD, DSIE, PRIs, ULBS, DDMA	<u>Recurring/ Regular (RR)</u> Undertake HRVCA as part of preparing and periodic revision of DM plans Short Term (T1) Constitute/ strengthen the mechanisms for consultation with experts and stakeholders	
Disaster Data Collection and Management	6	MHA*, MOSPI, all ministries/ depts.	<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	DMD ^{\$} , SDMA, all depts.	<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5.2 Inter-Agency Coordination

Tsunami					Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Overall disaster governance	MOES*	Recurring/ Regular (RR) Providing coordination, technical inputs, and support	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none">Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasksAll aspects of disaster risk management and mainstreaming DRREnsuring coherence and mutual reinforcement of DRR, CCA and development in the coastal areas	Recurring/ Regular (RR)
2	Response	MHA*	Recurring/ Regular (RR) Organising and coordinating central assistance	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none">Organising and coordinating the immediate responseCoordinate with central agencies	Recurring/ Regular (RR)
3	Warnings, Information, Data	MOES*, NDMA	Recurring/ Regular (RR) Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Recurring/ Regular (RR)
4	Non-structural measures	MOES*, MHA, BIS, NDMA	Recurring/ Regular (RR) Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Recurring/ Regular (RR)

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5.3 Investing in DRR – Structural Measures

Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			Structural Measures	
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
1	Strengthening of lifeline structures and high priority buildings	Relevant Central Government Ministries	<u>Recurring/ Regular (RR)</u> Implementation as per recommendations of safety audit where applicable	DMD ^{\$} , SDMA, RD, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Implementation as per recommendations of safety audit	
2	<ul style="list-style-type: none"> • Shelters from storm surges and tsunamis • Construction of large-scale submerged sand barriers • Periodical dredging of the inlets and 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 	MOES*, NDMA, NLRTI**	<u>Recurring/ Regular (RR)</u> Guidance to implementing agencies	DMD ^{\$} , SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Implementation in compliance with relevant building codes/ standards/ technical guidance	
3	Hazard resistant construction, strengthening, 3 and retrofitting of all lifeline structures and critical infrastructure	BIS, NDMA, NLRTI**	<u>Recurring/ Regular (RR)</u> Guidance and implementation	DMD ^{\$} , SDMA, RD, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> Collaboration with technical agencies and implementation	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) NBCC, BMTPC, CBRI, SERC, IE(I), IITs. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5.4 Investing in DRR – Non-Structural Measures

Tsunami					Non-Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Recurring/ Regular (RR)	Recurring/ Regular (RR)
1	Mainstreaming DM into Development Planning	MFIN, NDMA, Niti Ayog	Inclusion of DM concerns in plan schemes and non-plan proposals by various ministries as per norms	DMD ^{\$} , SDMA, RD, Finance Dept., DDMA, PRIs, ULBs	Include DM concerns in all schemes and proposals by various ministries as per norms	Recurring/ Regular (RR)
2	Regulation and enforcement of relevant laws	MOES; DOS	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Guidance and Support Oversight and monitoring of compliance with CRZ laws 	DMD ^{\$} , SDMA, RD, EFD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Ensure compliance with coastal environment protection laws and regulations such as the CRZ Regulating aquaculture, and groundwater extraction <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Eco logically sound land-use zonation Discourage inappropriate/ risky use of coastal areas 	Short Term (T1)
3	Techno-Legal Regime	BIS	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Implementation and popularization of relevant Indian Standards Support State Government in preparing byelaws for rural areas (for both engineered and non-engineered buildings) 	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Ensure implementation of standards through all departments/ institutions <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop suitable byelaws for rural areas (for both engineers and non-engineered buildings) considering local conditions 	Recurring/ Regular (RR)
4	Non-structural shore stabilization measures and bio-shields	NDMA, MOEFCC, MOES	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Guidance and Support 	DMD ^{\$} , SDMA, RD, EFD, DDMA	<ul style="list-style-type: none"> Developing sand dunes along the coast with sea weeds or shrubs or casuarinas trees for stabilization of the sand dunes 	Medium Term (T2)

Non-Structural Measures					
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
				<ul style="list-style-type: none"> Raising the ground level (above the design water level) with natural beach sand <p>Long Term (T3)</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Raising the ground level (above the design water level) with natural beach sand <p>Long Term (T3)</p> <ul style="list-style-type: none"> 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
				DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	<p>Long Term (T3)</p> <ul style="list-style-type: none"> 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
5	Safety audits and evaluation of all lifeline structures and important facilities	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all Ministries/ Departments	Recurring/ Regular (RR) Guidance and Support	DMD [§] , SDMA, RD, DDMA	Recurring/ Regular (RR) Promote private participation in disaster management facilities
6	Public Private Partnerships	NDMA, MOES, MCA*, MCF, MOCI, MPFI, MHPE, MFIN	Recurring/ Regular (RR) Guidance	DMD [§] , SDMA, RD, DDMA	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property
7	Risk Transfer	MFIN*, NDMA, MHA, MAFW	DFIN*, DMD [§] , SDMA, DAG	DFIN*, DMD [§] , SDMA, DAG	Short Term (T1) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework

Non-Structural Measures			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities
			Responsibility – Centre Short Term (T1) Policy Framework
			Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5.5 Capacity Development

Capacity Development			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Capacity Development
	Centre [#]	Responsibility – Centre	Responsibility – State
			<u>Recurring/ Regular (RR)</u>
		<ul style="list-style-type: none"> • Technical capabilities in safety audit • Conduct training programmes for State, SDRF, and Local Administration personnel • Including Fire and Rescue and Police personal in disaster management • Support training of SDRF, CDEF, community, and volunteers 	Training and orientation programs for DMD ^{\$} , SDMA, SDRF, RD, ATI, SIRD, DDMA State Govt. staff/ emergency response officials, CDEF, Community, and other volunteer groups
1	Training and Capacity Development of Professionals	<u>Medium Term (T2)</u> Evolve an action plan to offer a comprehensive curriculum related to tsunami management in the form of training modules for the various target groups	<u>Recurring/ Regular (RR)</u> Training of the Trainers to impart knowledge related to tsunami mitigation measures to various target groups
2	Curriculum Development	<u>Short Term (T1)</u> MHRD, UGC, AICTE, ICAR, etc. Include DM in the educational curricula including Tsunami hazard	<u>Short Term (T1)</u> DMD ^{\$} , SDMA, RD, EDD, DDMA Include DM in the educational curricula and develop adequate technical expertise on various subjects related to DM including Tsunami

Tsunami		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Recurring/ Regular (RR)
3 Awareness Generation	NDMA, NDRF, CAPF, NIDM	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • 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 	DMD ^{\$} , SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police	<ul style="list-style-type: none"> • 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 	Recurring/ Regular (RR)
4 Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	<p>Recurring/ Regular (RR)</p> <p>Joint planning and execution of emergency drills (Central and State)</p>	DMD ^{\$} , SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police	<p>Recurring/ Regular (RR)</p> <p>Joint planning and execution of emergency drills (Central, State, Local and Community)</p>	Recurring/ Regular (RR)
5 Documentation	NIDM, MOES, through its nodal institutions	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • 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 	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> • 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 	Recurring/ Regular (RR)
6 Empowering women, marginalised, and persons with disabilities	MSJE*, MWCD, NDMA, NIDM	<p>Recurring/ Regular (RR)</p> <p>Incorporating gender sensitive and equitable approaches in capacity</p>	DMD ^{\$} , SDMA, RD, SIDM, ATI,	<p>Recurring/ Regular (RR)</p> <p>Incorporating gender sensitive and equitable approaches in capacity</p>	Recurring/ Regular (RR)

Tsunami		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	
		Responsibility – Centre		Responsibility – State	
		development covering all aspects of disaster management	SLRTI, DDMA, PRIs, ULBs	development covering all aspects of disaster management at the state, district, and local levels	
7	Community-Based Disaster Management	NDMA, NIDM Promotion, Guidance, and Support to CDEF and community, volunteers	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach Training for PRI, SHG, NCC, NSS, Youth, CDEF, local community organizations, volunteers 	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.5.6 Climate Change Risk Management

Earthquakes are not triggered by climate change. However, tsunami needs to be considered due to change in the storm surge pattern due to sea level rise.

Tsunami		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		Responsibility – Centre	Responsibility – Centre		
		Recurring/ Regular (RR)	Promote studies and research on climate change - related risks and adaptation options Medium Term (T2)	DMD ^{\$} , SDMA, RD, AGD, AHD, FIHD, WRD,	Recurring/ Regular (RR)
1	Research, Forecasting, Early Warning, Information Systems	MOES*, DOS, MOST, MOEFCC, MAFW, NDWA, NLRTI	• Studies on GACC driven ecosystem and shoreline changes	• Support national risk reduction efforts related to GACC • Coordination with central agencies	

Climate Change Risk Management					
Tsunami		Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
Zoning, Mapping		<ul style="list-style-type: none"> Carry out risk zonation/mapping of climate change impacts considering various sea-level rise and shoreline change scenarios <p>Long Term (T3)</p> <ul style="list-style-type: none"> Develop database management system for GACC impacts Develop forecasting model for risks from GACC and its likely impacts 	EFD, SLRTI	<ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Medium (T2)</p> <ul style="list-style-type: none"> Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards 	
Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	2 NIDM, MOEFC, MOES*, NLRTI	<p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Assess the changes in risk, vulnerability and capacities under GACC impact scenarios Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	DMD ^{\$} , SDMA, RD, EFD, Ag.D, FIHD, WRD, DDMA, PRIs, ULBs, SLRTI	<p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on vulnerabilities, capacities and risks under GACC impact scenarios Assess GACC risks of vulnerable and marginalised sections 	
Climate Change Adaptation (CCA)	3 MOES*, MOST, DOS, MOJS, MAFW, MOEFC	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Understanding CCA needs Study GACC coping mechanisms Develop CCA mechanisms <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Support the implementation GACC adaptation programs 	DMD ^{\$} , SDMA, EFD*, FIHD, RD, AGD, WRD, DDMA,	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation 	

Climate Change Risk Management				
Tsunami	Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		<ul style="list-style-type: none"> Promote adaptive measures in social protection programmes for the vulnerable groups 	PRIs, ULBs	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Promote appropriate combinations of Green and Blue infrastructure approach Implementation of GACC adaptation programs Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.6 Landslides and Snow Avalanches

7.6.1 Understanding Disaster Risk

Landslides and Snow Avalanches				Central/ State Agencies and their Responsibilities			Understanding Disaster Risk	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State			
1	Hazard Zoning, mapping, geological, and geotechnical Investigations in regions prone to landslides and snow avalanches	MOM*, MOD*, WIHG, NIDM, DOS, BRO, NLRTI**	User-friendly inventory of landslides and avalanche prone areas and its updation as per widely accepted standards	DMD\$, SDMA, RD, State DGM, SRSAC, DDMA	Recurring/ Regular (RR) Preparation of high resolution / large scale landslide and snow avalanche maps Short Term (T1) Studies and monitoring of risk prone areas on site and using satellites Medium Term (T2) Studies to classify vulnerable areas as per likelihood of hazard	Recurring/ Regular (RR) Support to and cooperation with central agencies		
2	Research and Development	MOM, MOD, MOST, NLRTI**		DMD\$, SDMA, RD, DGM, SRSAC, DDMA	Medium Term (T2) Scientific assessment for predicting likelihood of landslides, and better understanding of driving forces Long Term (T3) R&D for methods to reduce risk and factors driving landslide	Recurring/ Regular (RR) Support to and cooperation with central agencies		
3	Hazard Risk Vulnerability and Capacity	MOM*, MOD*, NDMA, NIDM, MOST, MSJE		DMD\$, SDMA, RD, DSIE,	Recurring/ Regular (RR) Promote studies, documentation and research	Recurring/ Regular (RR) Undertake HRVCA as part of preparing and periodic revision of DM plans		

Understanding Disaster Risk					
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
		Centre [#]	Responsibility – Centre	State [#]	
	Assessment (HRVCA)		<ul style="list-style-type: none"> Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	PRIs, ULBs	Short Term (T1) Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
4	Dissemination of warnings	MOM*, MOD*, MOJS, DOS, MOES, BRO	Recurring/ Regular (RR) Quick, clear, effective dissemination among central and state agencies	DMD\$, RD, SDMA, SPWD, DDMA, PRIs, ULBs	Recurring/ Regular (RR) <ul style="list-style-type: none"> 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*, MOD*, MOJS, DOS, MOES, BRO	Medium Term (T2) Deploy reliable monitoring and warning systems	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Support and collaboration in implementation
6	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	Recurring/ Regular (RR) Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	DMD\$, SDMA, all depts.	Recurring/ Regular (RR) Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. Lead agencies: GSI under MoM for Landslides; SASE under MOD for Avalanche. (**) Academic/ Research institutions, especially CEDMM/IIT-Roorkee, DTRL. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/JT.

7.6.2 Inter-Agency Coordination

Landslides and Snow Avalanches				Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	
				State [#]	Responsibility – State
1	Overall disaster governance	MOM, MOD	Recurring/ Regular (RR) Providing coordination, technical inputs, and support	DMD\$, SDMA, RD, DDMA, ULBs, PRIs	<ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
2	Response	MHA	Recurring/ Regular (RR) Organising and coordinating central assistance	DMD\$, SDMA, RD, DDMA, ULBs, PRIs	<ul style="list-style-type: none"> Organising and coordinating the immediate response Coordinate with central agencies
3	Warnings, Information, Data	GSI, SASE, MOES (IMD), MOM, BRO, NDMA	Recurring/ Regular (RR) Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD\$, SDMA, RD, DDMA, ULBs, PRIs	<ul style="list-style-type: none"> Coordinating the 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	GSI, MHA, BIS, MOD, BRO, NDMA	Recurring/ Regular (RR) Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD\$, SDMA, RD, DDMA, ULBs, PRIs	<ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.6.3 Investing in DRR – Structural Measures

Landslides and Snow Avalanches				Central/ State Agencies and their Responsibilities		Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
1	Protection of Human Settlements and other infrastructures	MOM, MOD, BRO	<u>Recurring/ Regular (RR)</u> Technical inputs and guidance	DMD ^{\$} , State DGM, SPWD		<u>Recurring/ Regular (RR)</u> Improving infrastructure, roads, and land stabilization work	
2	Protection of Heritage Structures	ASI	<u>Recurring/ Regular (RR)</u> Prepare lists of structures/sites at risk due to landslides/slope stability problems and prioritise them for hazard mitigation	DMD ^{\$} , SDMA, State DGM, SRSAC, DDMA, PRIs, ULBs		<u>Recurring/ Regular (RR)</u> Support and collaboration	
3	Multi-Hazard Shelters	NDMA, NIDM	<u>Recurring/ Regular (RR)</u> Technical support	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> • 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 	Short Term (T1) Identification safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk	Medium Term (T2)

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.6.4 Investing in DRR – Non-Structural Measures

Landslides and Snow Avalanches				Central/ State Agencies and their Responsibilities		Non-Structural Measures	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		Medium Term (T2)
1	Site selection for Human Settlements in Landslide and Snow Avalanche Prone Areas	MOM, MOD	Short Term (T1) Guidelines for proper site selection for human settlements, amenities, and other infrastructure	DMD ^{\$} , SDMA, State DGM, DDMA, Local Authorities		<ul style="list-style-type: none"> • Detailed land-use zonation incorporating landslide and snow avalanche risks as applicable 	

Landslides and Snow Avalanches				Non-Structural Measures		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Responsibility – State	
				<ul style="list-style-type: none"> • Adopt suitable byelaws for rural and urban areas • Enforce/ promote model codes (e.g., NBC 2016 and updated standards) into practice • Ensure proper compliance 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Ensure implementation and adherence to codes and guidelines 	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Adopt the techno-legal framework for ensuring compliance with land use zoning and landslide /avalanche safety issues • Adopt land use zoning, building byelaws and model code (e.g., NBC 2016) legislation with suitable modification for reducing risk
2	Regulations and building codes	MOM [*] , MOD [*] , BIS, NIDM	DMD ^{\$} , SDMA, UDD, DDMA, Local Authorities	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	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Evolve an appropriate techno-legal framework for mandatory licensing of professionals • Establish a Professional Civil Engineers Council established by an Act for certification of engineers and 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Implement licensing of engineers through appropriate legal framework and institutional mechanism
3	Licensing and certification of professionals	MOM [*] , NDMA, MHRD, relevant Central Ministries /Departments, AICTE, IITs, COA, IIA, Urban planners, professional bodies of architects and engineers	DMD ^{\$} and all relevant Departments			

Landslides and Snow Avalanches		Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
		<ul style="list-style-type: none"> COA and IIA will be responsible for the registration, training and upgradation of the skills of architects and town planners in landslide safety and construction in case of architects and town planners 			
4	Public Private Partnerships	MOM, MOD, NDMA, MCA*, MCF, MOCI, MPFI, MHPE, MFIN	Recurring/ Regular (RR) Guidance	DMD ^{\$} , SDMA, DDMA	Recurring/ Regular (RR) Promote private participation in disaster management facilities
5	Risk Transfer	MFIN*, NDMA, MHA, MAFW	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	DFIN*, DMD ^{\$} , SDMA, DAG	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.6.5 Capacity Development

Landslides and Snow Avalanches				Capacity Development	
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Recurring/ Regular (RR)
1 Training	NIDM, MOM, MOD, CDMM, COA, MYAS, NDRF	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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 Support to SDRF, CDEF, community, and volunteers 	DMD ^{\$} , State DGM, SRSAC, SDRF, ATIs, SIRD, SIDM, SLRTI	<ul style="list-style-type: none"> Support and collaboration to national agencies Training and skill upgrades for search and rescue for CDEF, community, and volunteers Conduct regular training programmes for professionals including those for care and protection of disaster affected animals 	Recurring/ Regular (RR)
	MOM, GSI, MHRD, UGC, AICTE, COA, NIDM	<p>Medium Term (T2)</p> <p>Review and revise curriculum</p>	DMD ^{\$} , SDMA, EDD	Medium Term (T2)	Include information on landslides and snow avalanches in the curriculum
2 Curriculum Development	GSI, NIDM, NDMA, NDRF, CAPF, MOIB	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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 	DMD ^{\$} , SDMA, SDRF, F&ES, IPRD, DDMA, PRIs, ULBs, CDEF, Police	<ul style="list-style-type: none"> 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 Inform people about care and protection of disaster-affected animals 	Recurring/ Regular (RR)
	NDMA, All the concerned Government	<p>Recurring/ Regular (RR)</p> <p>Promoting the planning and execution of</p>	DMD ^{\$} , SDMA, SDRF, F&ES, CDEF, Police,	Recurring/ Regular (RR)	Joint planning and execution of emergency drills
4 Mock Drills/ Exercises					

Landslides and Snow Avalanches				Capacity Development	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
	Ministries/ Agencies, NDRF, Armed Forces, CAPF	emergency drills by all ministries and in all States/UTs	DDMA, PRIs, ULBs	DMD ^{\$} , SDMA, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs	Constitute multi-institutional and multi-disciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate
5 Documentation	Nodal Agency: MOM-GSI in collaboration with the NIDM; CBRI; CRRI; MOST; BRO; IITs, universities, and other academic institutions	<u>Recurring/ Regular (RR)</u> Documenting the history of landslide studies and other related activities in India	<u>Recurring/ Regular (RR)</u> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	DMD ^{\$} , SDMA, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
6 Empowering women, marginalised, and persons with disabilities	MSJE [*] , MWCD, NDMA, NIDM	<u>Recurring/ Regular (RR)</u> Promotion, Guidance, and Support	<u>Recurring/ Regular (RR)</u> NDMA, NIDM, MORD, MHUA	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, local community organizations
7 Community-Based Disaster Management					

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.6.6 Climate Change Risk Management

Landslide and Snow Avalanches		Climate Change Risk Management			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
			<u>Recurring/ Regular (RR)</u>		<u>Recurring/ Regular (RR)</u>
1	Research, Forecasting/Early Warning, Data Management, Zoning, Mapping	MOM*, MOD*, MOES*, MAFW, DOS	<p><u>Assessment, Monitoring, and Scientific studies on GACC impacts on LSA</u></p> <p><u>Short Term (T1)</u></p> <p><u>LSA vulnerability maps under GACC scenarios</u></p> <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Study GACC-related changes on LSA <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Prepare detailed scenario maps of LSA-prone areas likely to be impacted by GACC • Assess enhanced LSA risks from GACC • Develop database management system relating LSA, GACC and triggering events. <p><u>Medium Term (T2)</u></p> <p>Improve the LSA forecasting capabilities consistent with the anticipated GACC impacts on flood-prone areas</p>	DMD ^{\$} , IRD, WRD, SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> • Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation • Document state specific GACC impacts and coping mechanisms • Promote local weather-based insurance mechanisms and agricultural practices. <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOM*, MOD*, NDMA, NIDM, MOIS, MOST, MSJE, NLRTI		DMD ^{\$} , SDMA, RD, IRD, DSJE, SLRTI	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Undertake HRVCA as part of preparing and periodic revision of DM plans • Improve the understanding of the enhanced vulnerabilities of LSA-prone communities <p><u>Short Term (T1)</u></p> <p>Data collection related to landslides</p>

Climate Change Risk Management				
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		<ul style="list-style-type: none"> Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts <p>Long Term (T3)</p> <p>Undertake detailed studies on vulnerability and risk due under GACC scenarios for LSA-prone regions</p>	<ul style="list-style-type: none"> Develop State specific strategies Assess GACC risks of vulnerable and marginalised sections 	<ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short Term (T1)</p> <p>Understanding adaptation needs</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Study coping mechanisms Develop adaptation mechanisms <p>Long Term (T3)</p> <p>MOM*, MOD*, MOES*, MOST, DOS, MOJS, MOEFCC</p> <ul style="list-style-type: none"> Implement adaptation programs and projects Promote appropriate combinations of Green and Blue infrastructure approach Promote adaptive measures in social protection programmes for the vulnerable groups
3	Climate Change Adaptation (CCA)	DMD [§] , EFD, SDMA, DDMA, PRIs, ULBs	Develop local adaptation strategies and pilot projects	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short Term (T1)</p> <p>Develop local adaptation strategies and pilot projects</p> <p>Medium Term (T2)</p> <p>Sponsor and promote state-specific efforts and local efforts</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Implementation of GACC adaptation programs Promote appropriate combinations of Green and Blue infrastructure approach

Landslide and Snow Avalanches				Climate Change Risk Management	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
			<ul style="list-style-type: none"> • Integrate adaptive measures in social protection programmes for the vulnerable groups 		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.7 Drought

This section relies on the guidelines published by NDMC on drought management listed in Annexure-I and the manual⁵⁴ prepared by the MAFW (2016).

7.7.1 Understanding Risk

Drought		Central/ State Agencies and their Responsibilities			Understanding Risk
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1 Vulnerability Maps	MNCFC, MAFW, DOS, MOES, MOJS, MOST	<ul style="list-style-type: none"> • Block-wise rainfall deficit maps in the relevant regions – at crucial stages of monsoon (e.g., early, middle, and end), separately for SW and NE monsoon⁵⁵ • Comprehensive assessment of water deficit in dryland farming, rainfed, and drought-prone areas every year, at the end of the SW and NE monsoons (stream flow, surface and groundwater) • 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 	<ul style="list-style-type: none"> • 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 	<p>Recurring/ Regular (RR)</p>	

⁵⁴ Drought Management Manual—MAFW (2016)

⁵⁵ Most of India receives rainfall from the South-West (SW) monsoon, while Tamil Nadu, Pondicherry, and coastal Andhra Pradesh get bulk of their rainfall from the Post-Monsoon (or the North East – NE – monsoon). For Tamil Nadu, NE monsoon is the main rainy season.

Drought				Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	Understanding Risk
2	Assessment, Monitoring, Forecasting, Early Warning	MAFW, MOES, DOS, MOJS, MOST	<ul style="list-style-type: none"> • 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 as per latest national manual for drought management • 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 considering agro-climatic zones 	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Analysis of satellite imageries, use of appropriate indicators (vegetation, NDVI, SAVI, soil moisture, MAI, etc.) 	<p>State[#]</p>	<p>Responsibility – State</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • 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 with requisite facilities and staff to continuously monitor water availability in the drought-prone blocks after likelihood of drought. Is high. • 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 	

Drought		Central/ State Agencies and their Responsibilities				Understanding Risk
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	the state that are likely to experience water deficit	
3 Drought Declaration	MAFW, MOES, DOS, NITI Aayog	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Apply the latest (most updated) criteria and methods for assessment of drought conditions and key indicators for declaring drought, as per latest recommendations of the appropriate agency 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 regions covered by SW monsoon and by end of March for regions relevant to NE monsoon 	DMD\$, SDMA, RD, SDMC, SAU, AGD, IRD, WRD, DDMA	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Monitor key indicators for drought declaration with the support of relevant Central/ State agencies/ Dept. 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 Notify drought - Kharif by 30 October; Rabi by 31 March Early season drought: In August as per recommended criteria 		
4 Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MAFW, MOJS, MOES, MOST, MSJE, DOS			<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Promote studies, documentation and research Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Undertake HRVCA as part of preparation/ revision of DMP Estimate vulnerability of crops to rainfall uncertainties 	<p>Short Term (T1)</p> Constitute/ strengthen the mechanisms for consultation with experts and stakeholders

Drought					Understanding Risk
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
	Centre[#]	Responsibility – Centre	State[#]	Responsibility – State	Recurring/ Regular (RR)
5 Research	MAFW, MOES (IMD), DOS, MOJS, NRAA, CRIDA, NIDM, MOST, MOST, CSIR, and other agencies related to research	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Agricultural research focussed on drought-prone areas, arid/semi-arid tracts, and dryland farming areas Research related to water conservation and management 	DMD ^{\$} , SDMA, 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	Recurring/ Regular (RR)
6 Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	<p>Recurring/ Regular (RR)</p> <p>Systematic data management of data on disaster damage and loss assessments</p> <p>Short Term (T1)</p> <p>Disaster Damage and Losses 2005-2015 baseline</p>	DMD ^{\$} , SDMA, all depts.	Systematic data management of data on disaster damage and loss assessments	Recurring/ Regular (RR)
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.					Short Term (T1)
<h3>7.7.2 Inter-Agency Coordination</h3>					Inter-Agency Coordination
Drought		Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR		Centre[#]	Responsibility – Centre	State[#]	Responsibility – State
1 Overall disaster governance	MAFW		<p>Recurring/ Regular (RR)</p> <p>Providing coordination, technical inputs, and support</p>	DMD ^{\$} , SDMA, RD, AGD, DRD, PRD, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR

Drought				Inter-Agency Coordination						
Central/ State Agencies and their Responsibilities										
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State						
		Organising and coordinating central assistance		<ul style="list-style-type: none"> Ensuring coherence and mutual reinforcement of DRR, CCA and development 						
2 Response	MAFW	Recurring/ Regular (RR)	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Recurring/ Regular (RR)	<ul style="list-style-type: none"> Organising and coordinating the immediate response Coordinate with central agencies 					
3 Warnings, Information, Data	MAFW, MOJS, DOS, MOST, MEITY, NDMA	Recurring/ Regular (RR)	SDMC, DMD ^{\$} , SDMA, RD, AGD, IRD, WRD, DDMA, PRIs, ULBs	Recurring/ Regular (RR)	<ul style="list-style-type: none"> Coordinating the 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	MAFW, MOJS, MOES, MHA, BIS, NDMA	Recurring/ Regular (RR)	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs	Recurring/ Regular (RR)	<ul style="list-style-type: none"> Coordination among state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies 					
<p>Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/JT.</p>										
Central/ State Agencies and their Responsibilities				Structural Measures						
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Structural Measures						
1 Storage Facilities	MAFW, MOJS, MORD	Recurring/ Regular (RR)	DMD ^{\$} , SDMA, RD, DDMA, Forest Dept., Water Supply	<ul style="list-style-type: none"> Technical support for water conservation structures, integrated water resources 						

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management which is not the same in every state/UT.

7.7.3 Investing in DRR - Structural Measures

Central/ State Agencies and their Responsibilities				Structural Measures	
Drought	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
			management infrastructure needs (surface and ground water) Short Term (T1) <ul style="list-style-type: none">• Projects/ Grants• Guidelines on various forms of coping arrangements	Dept., PRIs, ULBs, WRD, DRD, PRD, RD	<ul style="list-style-type: none">• Fodder storage facilities to maintain fodder banks• Rainwater harvesting systems – individual and community
2	Water Conservation Structures	MAFW, MOJS, MORD	Recurring/ Regular (RR) <ul style="list-style-type: none">• Technical support• Guidelines• Projects/ Grants	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, WRD, DRD, PRD, AHD, RD, IRD	<ul style="list-style-type: none">• Water harvesting and storage structures• Check dams, reservoirs with excess capacity• Groundwater recharge augmentation systems
3	Social Housing Schemes	MORD, MHUA, relevant Central Government Ministries	Recurring/ Regular (RR) <ul style="list-style-type: none">• Ensure rainwater harvesting and storage in the social housing schemes in drought-prone areas	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, WRD, DRD, PRD, AHD, RD, IRD	<ul style="list-style-type: none">• Ensure rainwater harvesting and storage in the social housing schemes especially in drought-prone areas

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/JT.

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.7.4 Investing in DRR – Non-Structural Measures

Drought					Non-Structural Measures		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities					
	Centre [#]	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		Recurring/ Regular (RR)
1	Mitigation Measures	MOES, MAFW, MOJS	<u>Short Term (T1)</u> • Conduct pilot studies in drought	DMD ^{\$} , SDMA, RD, DDMA, PRS, ULBs,	Coordinate the efforts of the central		

Drought		Sub-Thematic Area for DRR			Central/ State Agencies and their Responsibilities		Non-Structural Measures
	Centre [#]	Centre [#]	Responsibility – Centre	State [#]	State [#]	Responsibility – State	
			<ul style="list-style-type: none"> prone areas for suggesting long term mitigation measures Promote watershed development projects <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Convergence of lessons learnt from studies carried out by various research institutions. Technical inputs on better crop management (especially for dryland/ rainfed farming) Public Private Partnerships 	WRD, DRD, PRD, AHD, RD, IRD, SAU, EFD	agencies in implementing mitigation measures	Short Term (T1) <ul style="list-style-type: none"> Promote private participation in disaster management facilities Improve the implementation of watershed development programmes <p>Medium Term (T2)</p> <ul style="list-style-type: none"> 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 	agencies in implementing mitigation measures <ul style="list-style-type: none"> 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
			<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support training programmes IEC efforts Judicious use of surface and groundwater Technical and training inputs Research, guidance, and documentation support 	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs, WRD, DRD, PRD, AHD, RD, IRD, SAU, EFD	Promote water efficient irrigation systems (sprinklers, drip, etc.)	Recurring/ Regular (RR) <ul style="list-style-type: none"> 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 	Promote water efficient irrigation systems (sprinklers, drip, etc.) <ul style="list-style-type: none"> 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
2	Promote water conservation, harvesting, efficient irrigation, afforestation	MAFW, ICAR, Agricultural Research Institutions, DOS, NIDM					

Non-Structural Measures					
Drought		Central/ State Agencies and their Responsibilities		State [#]	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
				Recurring/ Regular (RR)	
3	Agricultural credit, agricultural inputs, finance, marketing, and crop insurance	MAFW, IRDA, NABARD, Banks, ICAR	DMC, AGD, State Rural Coop. Banks, Rural Banks, SLBC, DDMA	<ul style="list-style-type: none"> 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 workers 	
4	Risk Transfer	MFIN*, NDMA, MHA, MAFW	DFIN*, DMD\$, SDMA, DAG	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.7.5 Capacity Development

Drought		Capacity Development			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Training and Capacity Building	MAFW, NIDM, NDRF, MANAGE, NIRD, DMC, MIYAS, NDRF	<p>Short Term (T1)</p> <ul style="list-style-type: none"> 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 <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques Support training of SDRF, CDEF, community, and volunteers 	SDMA, ATI, SIDM, SIRD, SLRTI, SDMC, SDRF, DDMA, PRIs, ULBs	<p>Short Term (T1)</p> <ul style="list-style-type: none"> 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 Implement different training programmes for officials at various levels, elected representatives, community leaders, CDEF, civil society organizations, animal welfare organizations <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques Professionals for veterinary care and support to drought-affected animals

Drought		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
2 Curriculum Development	MAFW, Agri. Univ., MHRD, NCERT, CBSE	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture offered by central institutions Include drought mitigation in secondary and higher secondary school curriculum 	DMD ^{\$} , SAU, EDD, SBSE	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture and veterinary courses offered by state institutions Include drought mitigation in secondary and higher secondary school curriculum 	
3 Awareness Generation	NDMA, NDRF, NIDM	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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 	DMD ^{\$} , SDMA, IPRD, RD, DDMA, PRIs, ULBs, SAU	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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 Promote Community Radio Inform people about care and protection of disaster-affected animals 	
4 Empowering women, marginalised communities, and differently abled persons	MWCD, MSJE, NDMA, NIDM	<p>Recurring/ Regular (RR)</p> <p>Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management</p>	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD, SAU, EFD, DSJE	<p>Recurring/ Regular (RR)</p> <p>Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels</p>	

Drought		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		<u>Short Term (T1)</u>			
5 Drought Management Plans	MAFW	<ul style="list-style-type: none"> Support the preparation of 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 	<u>Short Term (T1)</u>	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD, SAU, EFD	<u>Short Term (T1)</u> Ensure development of state, district, block, taluka and village drought management plans
		Relevant Central Ministries in collaboration with State Governments	<u>Recurring/ Regular (RR)</u> All ministries/ departments will mainstream disaster management efforts in their developmental plans	DMD ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD	<u>Recurring/ Regular (RR)</u> All state govt. departments/ agencies will mainstream disaster management efforts in their developmental plans
6 Mainstreaming drought management in developmental plans					Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

Drought		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		<u>Recurring/ Regular (RR)</u>			<u>Recurring/ Regular (RR)</u>
1 Research, Forecasting, Data Management, Zoning, Mapping	MAFW*, MOEFCC, MOES, DOS, MOJS, NLRTI	Improving the assessment and monitoring of intensity, frequency of weather events and rainfall/water deficit in rainfed, arid/semiarid areas factoring-in GACC impacts	DMD ^{\$} , IRD, AGD, WRD, SDMA, DDMA, PRIs, ULBs, SLRTI, EFD		<ul style="list-style-type: none"> Support national risk reduction efforts related to GACC Coordination with central agencies

7.7.6 Climate Change Risk Management

Climate Change Risk Management					
Drought		Central/ State Agencies and their Responsibilities			
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
		<p>Short Term (T1)</p> <ul style="list-style-type: none"> Assessing GACC effects on drought-prone areas Assess enhanced economic and social risks under GACC scenarios <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Prepare GACC scenario maps for all drought-prone areas Assess enhanced drought risks from GACC and on adaptations to change Develop Database management system relating to climate change & Drought Risk <p>Long Term (T3)</p> <ul style="list-style-type: none"> Improve GACC impact-based projection and assessment capabilities consistent with the anticipated changes in the occurrence of drought conditions Expansion of weather insurance mechanisms and agricultural practices. Research on climate resilient crops for drought proofing. 	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short Term (T1)</p> <ul style="list-style-type: none"> Document state-specific GACC impacts and coping mechanisms Take initiatives to promote drought resistant crops Promote local weather-based insurance mechanisms and agricultural practices <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards. 	<p>Recurring/Regular (RR)</p> <p>Undertake HRVCA as part of preparing and periodic revision of DM plans</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Impact assessment, economic and social risks under GACC and reporting 	
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	<p>MAFW*, NDMA, NIDM, MOJS, MOST, MSIE, NLRTI</p> <p>Short-Term (T1)</p> <p>Water deficit and crop vulnerability maps under GACC scenarios</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Improve the understanding of the enhanced vulnerabilities of communities to extreme hydro-climatic events. 	<p>DMD^{\$}, SDMA, RD, IRD, AGD, DSJE, SLRTI</p>		

Climate Change Risk Management					
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
			<p>Responsibility – Centre</p> <ul style="list-style-type: none"> • Creation of data bank and hazard risk & vulnerability mapping. • Impact assessment, periodic review and evaluation • Assess GACC risks of vulnerable and marginalised sections • Provide technical support and guidance for comprehensive HRVCA considering GACC impacts <p>Long Term (T3)</p> <p>Undertake detailed studies on vulnerability and risk due to land degradation / desertification.</p>	<p>Medium Term (T2)</p> <p>Creation of databank and hazard, risk & vulnerability mapping at local level.</p>	<ul style="list-style-type: none"> • Assess GACC risks of vulnerable and marginalised sections <p>Medium Term (T2)</p> <p>Creation of databank and hazard, risk & vulnerability mapping at local level.</p>
3	Climate Change Adaptation (CCA)	MAFW*, MOES*, MOST, DOS, MOJS, MOEFCC	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Promote climate resilient crops • Capacity Building and Regular Monitoring & Evaluation <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Understanding adaptation needs • Study coping mechanisms • Develop adaptation mechanisms <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> • Implement CCA programs • Implement efficient water management and monitoring systems as part of CCA in the drought-prone areas • Formulate legal and regulatory frameworks in drought-prone areas considering GACC • Promote appropriate combinations of Green and Blue infrastructure approach 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Sensitisation and Public Awareness • Capacity building and utilising traditional knowledge to build eco-system. <p>Short Term (T1)</p> <p>DMD^{\$}, SDMA, DDMA, PRIs, ULBs, AGD</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Implement various water and soil conservation programmes consistent with anticipated GACC impacts • Adaptation and mitigation strategies under DM plan for ensuring food security. 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Sensitisation and Public Awareness • Capacity building and utilising traditional knowledge to build eco-system. <p>Short Term (T1)</p> <p>DMD^{\$}, SDMA, DDMA, PRIs, ULBs, AGD</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Implement various water and soil conservation programmes consistent with anticipated GACC impacts • Adaptation and mitigation strategies under DM plan for ensuring food security.

Drought		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	Responsibility – Centre	State [#]	Responsibility – State
		<ul style="list-style-type: none"> • Promote adaptive measures in social protection programmes for the vulnerable groups 	<ul style="list-style-type: none"> • Sponsor state-specific efforts; support local efforts • Develop climate resilient infrastructure. 	<ul style="list-style-type: none"> • Implement efficient water management and monitoring systems as part of CCA in the drought prone areas. • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups 	<p>Long Term (T3)</p>

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.8 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 DDMA and local authorities (PRIs and ULBs). Risk transfer arrangements including multi-hazard insurance for life and property should be implemented. The central and state governments should develop relevant policy frameworks.

7.8.1 Mitigation Measures for People

The State Governments must maintain close coordination with India Meteorological Department (MOES (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

7.8.2 Mitigation Measures for Crops and Animals

The MAFW closely monitors cold wave situation in consultation with MOES (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 7-1.

Table 7-1: Snow and frost – Illustrative Crop Protection Measures

Stages of Plant Growth		Measures to be taken by Farmers
1	Seedling/ Nursery Stage	Change of microclimate 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, chickpea, and wheat

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

7.8.3 Climate Change Risk Management

Note: Unlike other sub-sections, the responsibility framework given here has a simpler format.

Central/ State Agencies and their Responsibilities			
Centre[#]	Responsibility – Centre	State[#]	Responsibility – State
MOES, MAFW*, MOEFCC, NLRTI	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Promote research, monitoring and information systems consistent with the anticipated GACC impacts Develop Database management system relating to Climate Change & cold wave 	DMD ^{\$} , SDMA, DDMA, DRD, UDD, AGD, PRIs, ULBs, SLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts
MOEFCC*, MORD, MoHUA, NDMA, MSJE	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Understanding adaptation needs Study coping mechanisms <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop adaptation mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> Implement adaptation programs Promote adaptive measures in social protection programmes for the vulnerable groups 	DMD ^{\$} , SDMA, DRD, UDD, DDMA, PRIs, ULBs, DSJE	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short Term (T1)</p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts <p>Long Term (T3)</p> <ul style="list-style-type: none"> Implementation of GACC adaptation programs Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and

context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.9 Thunderstorm, Lightning, Dust, Squall and Strong Winds

Note: Unlike other sub-sections, the responsibility framework given here has a simpler format.

Thunderstorm, Lightning, Dust, Squall and Strong Winds				
Thematic Area for DRR	Centre[#]	Central/ State Agencies & Their Responsibilities	State[#]	Recurring/ Regular (RR)
7.9.1 Understanding Risk	MOES	<p>Recurring/ Regular (RR)</p> <p>Technical support, data collection <u>Short Term (T1)</u> Compiling the baseline data of 2005-2015 <u>Medium Term (T2)</u> Guidelines and action plan</p>	SDMA*, DMD ^{\$}	<ul style="list-style-type: none"> Preparing State Action Plan and its implementation Prepare detailed departmental SoPs by concerned department Data Collection <p>Short Term (T1) Compiling the baseline data of 2005-2015</p>
7.9.2 Inter Agency Coordination	MOES*, MIB, DOT, MPWR, MIHA, MAFW, MHA, NEC, NDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Early Warning and Communication Alerts and weather forecasts In case of forecasts/ warning of extreme /severe nature: Specific message and information, dissemination to public at large through print/ electronic and social media, SMS, etc. in relevant geographic area <ul style="list-style-type: none"> Specific message dissemination to concerned Power Generation, Transmission, Distribution and Supply offices Alertness and deployment of NDRF as per requirement Monitoring and Review of the Guidelines Technical support 	DMD ^{\$*} , SDMA, DDMA, IPRD, PED*, AGD*	<ul style="list-style-type: none"> To disseminate the information received from IMD to public at large Promote installations of lightning arresters and Doppler Radars Create a network of community based early warning systems Ensure specific message and information, dissemination to public at large through print/electronic/social and other mass media at local level

Central/ State Agencies & Their Responsibilities			
Thematic Area for DRR	Centre [#]	State [#]	Responsibility
Thunderstorm, Lightning, Dust, Squall and Strong Winds	<ul style="list-style-type: none"> Periodic review/ updating 	<ul style="list-style-type: none"> Ensure Push SMS by various telecom service operators to all active mobile connections Activate all concerned DISCOM office/officers To ensure power cuts⁵⁶ and restoration of power supply and also provide emergency power supply to critical facilities Activate the district administration with line departments as soon as specific warning is received. Following and quickly implementing the instructions of central/State govt. Designate a nodal officer for emergency response Institutionalised multi-agency coordination with clear role and responsibility Rescue and evacuation operations in coordination with the administration, NGOs and volunteers. Emergency medical response Other necessary related actions 	<ul style="list-style-type: none"> Push SMS by various telecom service operators to all active mobile connections Activate all concerned DISCOM office/officers To ensure power cuts⁵⁶ and restoration of power supply and also provide emergency power supply to critical facilities Activate the district administration with line departments as soon as specific warning is received. Following and quickly implementing the instructions of central/State govt. Designate a nodal officer for emergency response Institutionalised multi-agency coordination with clear role and responsibility Rescue and evacuation operations in coordination with the administration, NGOs and volunteers. Emergency medical response Other necessary related actions

⁵⁶ At the time of occurrence of thunderstorm power supply may further pose additional threats of electrocution. Timely power cut and restoration need to be ensured by concerned authority as per weather forecast.

Thunderstorm, Lightning, Dust, Squall and Strong Winds				
Thematic Area for DRR	Centre[#]	Central/ State Agencies & Their Responsibilities	State[#]	Responsibility
				<ul style="list-style-type: none"> • Nodal officer's act as the contact person for each dept. / agency • Monitor State/District level plan • Collect updated data / information and plan for review/updating
		Recurring/ Regular (RR)		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Inter-agency coordination and review and update precautionary measures and procedures • Ensure building bye laws and make it mandatory or all ground floor plus two and taller buildings to install lightning conductors /arresters • Promote install of lightning conductors / arresters in schools, industries, and Government and private buildings • A drive to be undertaken to check the structural strength of hoarding and old structures
7.9.3 Investing in DRR – Structural measures	MHUA*, MOPR, MEITY, MPWR, MRTH	<ul style="list-style-type: none"> • Technical guidance for structural measures • Inter-agency coordination, review and update precautionary measures and procedures to be followed • Follow the Building Bye Laws, makes it mandatory for all G+2 and above building to install lightning conductors /arresters • Promote installations of lightning arresters • Start a drive to check the structural strength of hoardings and similar old structures • Start a drive to check the medical & hospital equipment at places 	DMD [§] , SDMA, DDMA, ULBs, PRIs	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Inter-agency coordination and implementation • Prepare Assessment, preparedness and mitigation measures report and implement • Review and update precautionary measures and procedures
7.9.4 Investing in DRR – Non-structural measures	NDMA*, MOCI, MORD, MHUA, DOT, MPWR, MRTH, MHFV, MAFW, MOEFC, MHA	Recurring/ Regular (RR)	DMD ^{§*} , SDMA, UDD, DRD, IPRD, PED, SPWD, HFWD, AGD*, AHD EFD	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Disseminate information to public on structural mitigation measures • Ensure drives to check the structural strength of trees, old structures • Setup alternative or emergency communication systems

Thematic Area for DRR				Central/ State Agencies & Their Responsibilities	
Centre [#]	State [#]	Responsibility	State [#]	Responsibility	
		<ul style="list-style-type: none"> • To deal with power cuts and emergency power supply • Start a drive to check and maintain/replace old electrical equipment/cables • To ensure road connectivity and access to vulnerable areas • Create a post of medical staff in respect of emergency • Hospital preparedness, including training of human resources • Ensure adherence to crop safety norms • Construction safe crop storage shelters for farmers • Set up awareness programs • Compiling data and documentation • Organising and maintaining data base • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Technical guidance for preparedness • Develop norms for Inter-agency coordination • Construct shelters/ sheds, bus stands as per BIS code • Risk Transfer arrangements – policies framework 		<ul style="list-style-type: none"> • Public awareness and education for early warning response • Identify vulnerable places • Follow alerts/warning, advisory, • Disseminate Dos and Don'ts for general public and enable access to safe places. • Protecting property/infrastructure and environment from fire damage • Ensuring strict adherence to fire safety norms • To ensure essential services and facilities at vulnerable places • Setup alternative or emergency communication systems • To ensure early restoration of electricity supply to essential services during emergencies and restoration of electric supply at the earliest • To ensure functional state of all electrical equipment and maintain the service or replace equipment from time to time • Ensure road connectivity and access to vulnerable areas • Ensure appropriate medical staff, and facilities at place of incident 	

Thematic Area for DRR				Central/ State Agencies & Their Responsibilities
Centre[#]	Responsibility	State[#]	Responsibility	
Thunderstorm, Lightning, Dust, Squall and Strong Winds			<ul style="list-style-type: none"> • Strengthen health centres with a network of paramedical professionals • Ensure stock piling of life-saving drugs, de-toxicants, anaesthesia, availability of Halogen tablets in vulnerable areas • Assessment of damage from weather events • Collecting post disaster data from field and reporting to state/national level • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Establishment of public information / facilities. • Construction of thunderstorm safe crop storage shelters for farmers • Ensuring adherence to fire safety norms • Protecting of property/infrastructure and the environment from fire damage • Risk Transfer arrangements – implementation including crop and animal insurance 	

Thunderstorm, Lightning, Dust, Squall and Strong Winds			
Thematic Area for DRR	Centre[#]	Central/ State Agencies & Their Responsibilities	Recurring/ Regular (RR)
Recurring/ Regular (RR)	Centre[#]	State[#]	Recurring/ Regular (RR)
7.9.5 Capacity Development	NIDM*, MIB, NDRF, other ministries	<ul style="list-style-type: none"> Training programme for all concerned functionaries, SDRF, CDEF, community, and volunteers Extensive IEC campaigns to create awareness through print, electronic and social media Push SMS by various telecom service operators to all active mobile connections 	<ul style="list-style-type: none"> Training programme for all concerned department officials/ volunteers , CDEF, community, and volunteers Conduct training programmes and drills on usage of various fire protection equipment and preventive systems Creation of public awareness Extensive IEC campaigns to generate public awareness through print, electronic and social media Ensure Push SMS by various telecom service operators to all active mobile connections.
7.9.6 Climate Change Risk Management	MOES*, MAFW*, MOEFCC, NLRTI	<ul style="list-style-type: none"> Promote research, monitoring and information systems consistent with the anticipated GACC impacts Develop database management system relevant to climate change 	<ul style="list-style-type: none"> DMD[§], SDMA, EFD, AGD, AHD, DRD, UDD, SLRTI, PRI, ULB, SPWD, SLRTI Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts
	MOES*, MAFW*, MOEFCC	<ul style="list-style-type: none"> Understanding GACC adaptation needs Study GACC coping mechanisms Develop GACC adaptation mechanisms <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Implement GACC adaptation programs 	<ul style="list-style-type: none"> DMD[§], SDMA, DDMA, PRIs, ULBs Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies

Thematic Area for DRR				Central/ State Agencies & Their Responsibilities	
Centre [#]	Responsibility	State [#]	Responsibility		
	<ul style="list-style-type: none"> Promote adaptive measures in social protection programmes for the vulnerable groups 		<ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short -Term (T1)</p> <p>Develop local adaptation strategies and pilot projects</p> <p>Medium -Term (T2)</p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Implementation of GACC adaptation programs Integrate adaptive measures in social protection programmes for the vulnerable groups 		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.10 Cloudburst and Hailstorm

Note: Unlike other sub-sections, the responsibility framework given here has a simpler format.

Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Recurring/ Regular (RR)	Responsibility – State
Cloudbursts and Hailstorms				<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Technical support for HRVCA and risk assessment Data Collection <p>Short Term (T1)</p> <p>Compiling the baseline data of 2005-2015</p> <p>MOES, MAFW, MOEFCC, MOST, DOS, NLRTI**</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Installing Automatic Weather Stations (AWS) Deploying Doppler Weather Radar (DWR) 	DMD ^{\$} , SDMA, EFD, AGD, AHD, DRD, UDD, SLRTI, PRI, ULB, SPVWD, DDMA	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Identify settlements located on sites prone to landslides/ unstable slope Prepare list of settlements and households facing very high risk Mapping landslide-prone areas and identification of unsafe sites for human settlements Compiling the baseline data of 2005-2015 <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Landslide Hazard Zonation (LHZ) using different kinds of spatial data (aerial photographs, satellite imagery) employing the technological improvements in remote sensing that greatly improve the mapping accuracy Amalgamation of local/indigenous knowledge of landslide-prone areas 	

Cloudbursts and Hailstorms				
Thematic Area for DRR	Centre[#]	Responsibility – Centre	State[#]	Responsibility – State
			<ul style="list-style-type: none"> • Inventory of areas that experienced hailstorm episodes and related losses, especially crop losses 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development • Organising and coordinating the immediate response
7.10.2 Inter-Agency Coordination	MOES, MAFW, MOEFCC	DMD ^{\$} , SDMA, DDMA	<ul style="list-style-type: none"> • Providing coordination, technical inputs, and support • Organising and coordinating central assistance • Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data • Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Coordinate with central agencies • Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring
7.10.3 Investing in DRR –	MHUAA, MORD	DMD ^{\$} , SDMA, DRD, UDD, SLRTI, PRI, ULB, SPWD, DDMA	<p>Recurring/ Regular (RR)</p> <p>Technical support for slope stabilization and geo-engineering</p>	<p>Recurring/ Regular (RR)</p> <p>Undertake slope stabilization measures on a regular basis</p>

Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
Structural Measures				<p>Short Term (T1)</p> <p>Integrated approach to slope stabilization combining bioengineering (plants, trees) and mechanical structures for slope stabilisation</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop additional drainage for quick and safe flow of storm water Repair and maintain natural drainage systems, rivulets, etc. to ensure unhindered flow of storm water 	<p>Short Term (T1)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Review of existing regulations and amending them in accordance with safer building Amend town and city plans to reduce risks <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Apply concept of multi-level safety to settlements and the expansion of towns/cities – prevention, spatial planning, organization and emergency management
7.10.4 Investing in DRR – Non-Structural Measures	MHA, MOES, MOEFCC, MOST	All departments, ULBs, PRIs	<p>Recurring/ Regular (RR)</p> <p>Provide Support</p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p>Short Term (T1)</p> <ul style="list-style-type: none"> Frame model rules, laws, guidelines Risk Transfer Policy Framework 	<p>Recurring/ Regular (RR)</p> <p>Provide Support</p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p>Short Term (T1)</p> <ul style="list-style-type: none"> Frame model rules, laws, guidelines Risk Transfer Policy Framework 	<p>Recurring/ Regular (RR)</p> <p>DMD^{\$}, SDMA, SDRF, EFD, AGD, AHD, DRD, UDD, SIRD,</p>
7.10.5 Capacity Development	MAFW, MOES, MOEFCC, DOS, MSIE, MWCD, NIDM, NDRF		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Awareness raising 		

Cloudbursts and Hailstorms			
Thematic Area for DRR	Centre[#]	Central/ State Agencies and their Responsibilities	Recurring/ Regular (RR)
Centre[#]	Responsibility – Centre	State[#]	Responsibility – State
	<ul style="list-style-type: none"> • Technical support for post-hailstorm management in agriculture • Provide guidance and technical support to SDRF, CDEF, community, and volunteers • Sponsor ToT programs on various aspects such as managing landslide, and search and rescue • Training support for SDRF, CDEF, community, and volunteers 	SLRTI, PRI, ULB, SPWD, DDMA	<ul style="list-style-type: none"> • Enhancing capabilities of ULB/PRIs to prepare and cope with events like cloudbursts and hailstorms • Basic training on coping up with hailstorm for CDEF, community, and volunteers • Training on various aspects of coping with cloudburst, hailstorms, search and rescue • Training on post-hailstorm management in agriculture • Basic training on coping with cloudburst and hailstorm • Training on various aspects of coping with cloudburst, hailstorms, search and rescue • Promoting culture of awareness, alertness and preparedness • Awareness generation programs for public, utilities, ULBs, PRIs, and industries • IEC materials and ensure wider disseminate to general public through all medium • Information on safety, care and protection of disaster-affected animals • Promote use of insurance/ risk transfer

Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> • Understanding GACC adaptation needs • Study GACC coping mechanisms • Develop GACC adaptation mechanisms 		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation 	
7.10.6 Climate Change Risk Management	<p>MOES*, MAFW*, MOEFCC, NLRTI</p> <ul style="list-style-type: none"> • Promote research, monitoring and information systems consistent with the anticipated GACC impacts • Develop Database management system relating to Hailstorm, Cloudburst & Climate Change 	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> DMD^{\$}, SDMA, DDMA, EFD, AGD, AHD, DRD, UDD, SLRTI, PRI, ULB, SPWD, SLRTI <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Implement GACC adaptation programs • Promote adaptive measures in social protection programmes for the vulnerable groups 	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> • Develop local adaptation strategies and pilot projects <p>Medium -Term (T2)</p> <ul style="list-style-type: none"> • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups 	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) Especially IMD, NCMRWF, GSI, ISRO, NRSC, IITs, CEDMM/IIT-Roorkee, BRO, CBRI, CSMRS, DTRL. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/J.T.

7.11 Glacial Lake Outburst Flood (GLOF)

Note: Unlike other sub-sections, the responsibility framework given here has a simpler format. The GLOF is applicable only to the Himalayan region (see 2.2.2.11).

Glacial Lake Outburst Flood (GLOF)				Central/ State Agencies and their Responsibilities	
Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
				<u>Recurring/ Regular (RR)</u>	
7.11.1 Understanding Risk	MOJS*, MOES, MOST, DOS, MOEFCC, NLRTI**	Short Term (T1) <ul style="list-style-type: none"> • Technical support • Regular monitoring of all glacial lakes • Data Collection • Research on glacier melting and formation of glacial lake • Mapping all glacial lakes, glaciers and relevant waterbodies in IHR as well as classification based on potential GLOF risks • Improving the understanding of potential GLOF triggering factors • Provide technical support for HRVCA 	SDMA*, DMD_S, DRD, UDD, SLRTI, PRI, ULB, SPWD	Recurring/ Regular (RR) <ul style="list-style-type: none"> • Involve local communities in monitoring of glacial lakes and water bodies with high risk – boundary conditions, discernible terrain changes, etc. • Data Collection 	Short Term (T1) <ul style="list-style-type: none"> • Install and operationalise appropriate warning systems • Mapping and identification of unsafe areas for human settlements that are likely to be at risk from each of the likely GLOF (i.e., glacial lake and waterbody wise) • Identify settlements located on sites prone to landslides/ unstable slope, mostly downstream (economic, social, etc.) • Compiling baseline 2005-2015
		Medium Term (T2) <ul style="list-style-type: none"> • Prioritisation of glacial lakes/ waterbodies according to GLOF risk • Compilation and analysis of proven methods for the controlled release of water from glacial lake to avoid sudden breach due to 		Medium Term (T2) <ul style="list-style-type: none"> • Amalgamation of local/indigenous knowledge of the terrain and technical expertise for monitoring of glacial lake/ waterbodies • Landslide Hazard Zonation (LHZ) using different kinds of spatial data employing the technological improvements in remote sensing that greatly improve the mapping accuracy 	

Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
Glacial Lake Outburst Flood (GLOF)		<p>landslide or overflowing of water from glacial lakes</p> <ul style="list-style-type: none"> Understanding the GLOF risk in relation to the people and property located downstream Dam-break modelling and downstream vulnerability assessment <p>Long Term (T3)</p> <ul style="list-style-type: none"> Refining/ improving computer simulation models of GLOF risk Facilitating international technical cooperation and sharing of expertise 		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support Organising and coordinating central assistance Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data <p>MOE/FCC*, MOES, MAFW, MOJS, MOM, DOS</p>
7.11.2 Inter-Agency Coordination			DMD ^{\$} , SDMA, DDWA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development Organising and coordinating the immediate response Coordinate with central agencies Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Glacial Lake Outburst Flood (GLOF)					
Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Central/ State Agencies and their Responsibilities	
		enact/amend laws, regulations and d) adopt/ review policies			Responsibility – State
7.11.3 Investing in DRR – Structural Measures	MOJS*, NLRTI*	R <u>e</u> curing/ R <u>e</u> gular (RR) Technical support	DMD ^{\$} , SDMA, DRD, UDD, SLRTI, PRI, ULB, SPWD, DDWA	<p>M<u>edium</u> T<u>erm</u> (T2)</p> <p>Reduce the volume of water in the lake, thus reducing the magnitude of the possible peak discharge at the time of breach - controlled breaching of the moraine dam; construction of an outlet control structure; pumping or siphoning the water from the lake; and tunnelling through the moraine barrier or under an ice dam.</p> <p>Protecting downstream infrastructure from peak floods</p> <p>L<u>ong</u> T<u>erm</u> (T3)</p> <ul style="list-style-type: none"> Infrastructure downstream (diversion weirs, intakes, bridges, or river bank settlements) can be protected against a possible surge through proper construction that allows sufficient space for the flow of water and avoids damming River banks with potential or old landslides and scree slopes near settlements should be stabilised 	<p>R<u>ecurring</u>/R<u>egular (RR)</u></p> <p>S<u>hort</u> T<u>erm</u> (T1)</p> <ul style="list-style-type: none"> Review of existing regulations and amending them in accordance with safer building Discourage/ disallow settlements on or near low river terraces within the GLOF hazard zones Risk Transfer Policy Framework <p>M<u>edium</u> T<u>erm</u> (T2)</p> <p>Frame model rules, laws, guidelines</p> <p>M<u>edium</u> T<u>erm</u> (T2)</p> <ul style="list-style-type: none"> Make legal provisions mandating infrastructure developers, especially private hydropower developers,
7.11.4 Investing in DRR – Non-Structural Measures	MOES, MOEFC, MOST, MOJS, NDMA and NRSC	R <u>e</u> curing/ R <u>e</u> gular (RR) Provide technical support Implement risk transfer arrangements	DMD ^{\$} , SDMA, DRD, UDD, SLRTI, PRI, ULB, SPWD, DDWA	<p>S<u>hort</u> T<u>erm</u> (T1)</p> <ul style="list-style-type: none"> Review of existing regulations and amending them in accordance with safer building Discourage/ disallow settlements on or near low river terraces within the GLOF hazard zones Risk Transfer Policy Framework <p>M<u>edium</u> T<u>erm</u> (T2)</p> <p>Frame model rules, laws, guidelines</p>	<p>R<u>ecurring</u>/R<u>egular (RR)</u></p> <p>S<u>hort</u> T<u>erm</u> (T1)</p> <ul style="list-style-type: none"> Review of existing regulations and amending them in accordance with safer building Discourage/ disallow settlements on or near low river terraces within the GLOF hazard zones Risk Transfer Policy Framework <p>M<u>edium</u> T<u>erm</u> (T2)</p> <ul style="list-style-type: none"> Make legal provisions mandating infrastructure developers, especially private hydropower developers,

Glacial Lake Outburst Flood (GLOF)			
Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities
			State [#]
			<p>to engage in GLOF early warning and risk reduction activities</p> <ul style="list-style-type: none"> • Land use zoning to discouraging development in risky zone <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Amend town and city plans to reduce risks • Apply concept of multi-level safety to settlements and the expansion of towns/cities – prevention, spatial planning, organization and emergency management
7.11.5 Capacity Development	MOES*, MOST, DOS, MOJS, MOE FCC, MSJE, MWCD, NIDM, NDRF	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Provide support for awareness raising about GLOF and GACC for SDRF, CDEF, community, and volunteers • Training support for SDRF, CDEF, community, and volunteers <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Basic training on coping with GLOF • ToT programs on various aspects of GLOF, managing landslide and search and rescue <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Technical support from specialised agencies and research institutions – national and international for strengthening the scientific and technical capabilities 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Training for SDRF, CDEF, community, and volunteers • Promoting culture of awareness, alertness and preparedness • IEC materials; ensure wider dissemination to general public through all medium • Dissemination and communication of GLOF risk information and early warnings to individuals and communities at risk • Training support for CDEF, community, and volunteers <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Training in how to respond during and after GLOF events • Information on safety, care and protection of disaster-affected animals • Enhancing capabilities of PRIs and local communities at risk to monitor and prepare for the likelihood GLOF (close to the glacial lake and along the likely path of flood after a GLOF)

Glacial Lake Outburst Flood (GLOF)				
Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
		<ul style="list-style-type: none"> Coordinated research by major institutes with international collaboration Mechanisms for inter-governmental collaboration in sharing data and information where relevant 	<ul style="list-style-type: none"> Training on various aspects of GLOF without exaggerations using best information available Understanding early signs, glacial lake characteristics, level of hazards, How to respond during and after GLOF events Long Term (T3) Decentralisation of risk management activities to communities and local authorities Promote use of insurance/ risk transfer 	
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) Especially, MOES (IMD), NCMRWF, GSI, CSMRS, WIHG, ISRO, NRSC, DTRL, Roorkee Univ., IITs, CBM/IIIT-Roorkee, CIMFR, BRO and CBRI. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.				
7.11.6 Climate Change Risk Management				
Glacial Lake Outburst Flood (GLOF)				
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1 Research, Forecasting, Early Warning, Information Systems, Zoning, Mapping	MOES*, MOD*, MOJS*, MOST, DOS, MOEFCC, NLRTI	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Mapping all glacial lakes, glaciers and relevant waterbodies in IHR based on potential GLOF risks anticipated under GACC impacts Monitoring GACC related aspects of the glacial system Develop Database management system relating to GLOF & Climate Change and triggering events 	DMD ^{\$} , SDMA, SPWD, WRD, SLRTI	<p>Recurring/ Regular (RR)</p> <p>Support and cooperate with central agencies</p> <p>Short – Term (T1)</p> <p>Sponsor and support state-specific and local efforts</p>

Glacial Lake Outburst Flood (GLOF)				Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	State [#]	Responsibility – State	Responsibility – State
		Long Term (T3) Research on climate change impact on glaciers, the extension of existing glacial lake boundaries, formation of new glacial lakes, etc.				Short-Term (T1) Undertake HRVCA as part of preparing and periodic revision of DM plans / SOPs.	
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Medium & Long Term (T2, T3) <ul style="list-style-type: none"> • Improve understanding of the enhanced vulnerabilities of GLOF and its domino effects due to climate change • Undertake detailed studies on vulnerabilities and risk under climate change for GLOF prone regions • Assess GACC risks of vulnerable and marginalised sections • Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	MOJS*, MOES*, MOEFCC*, MSJE, NLRTI	DMD ^{\$} , SDMA, SPWD, WRD, DSJE, SLRTI	Medium Term (T2) <ul style="list-style-type: none"> • Develop State specific strategies • Assess GACC risks of vulnerable and marginalised sections 	Recurring/ Regular (RR) <ul style="list-style-type: none"> • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation 	Short-Term (T1) Develop local adaptation strategies and pilot projects
3	Climate Change Adaptation (CCA)	Short-Term (T1) <ul style="list-style-type: none"> • Understanding adaptation needs • Study coping mechanisms • Develop adaptation mechanisms 	MOJS*, MOES*, MOEFCC*	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	Medium & Long Term (T2, T3) <ul style="list-style-type: none"> • Implement adaptation programs • Promote adaptive measures in social protection programmes for the vulnerable groups 		

Glacial Lake Outburst Flood (GLOF)		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
		<p>Responsibility – Centre</p> <ul style="list-style-type: none"> • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups 		Medium & Long Term (T2, T3)	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.12 Heat Wave

This section is based on the NDMA guidelines⁵⁷ for preparation of Heat-wave Action Plan (HAP) listed in Annexure-I.

7.12.1 Understanding Risk

Heat Wave				Understanding Risk		
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Observation Networks, Information Systems, Monitoring, Research, Forecasting, Early Warning and Zoning/ Mapping	MOES*, MOEFCC, MEITY, NDMA, MHFW	Recurring/ Regular (RR) <ul style="list-style-type: none"> Support for organising training Extend technical support 	DMD [§] , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRI/ULB, DDMA, SLRTI	Short Term (T1) <ul style="list-style-type: none"> Vulnerability Assessment and Establishing Heat-Health Threshold Temperatures Strengthening and maintaining monitoring and data logging systems for temperature, humidity, etc. required for threshold for heat wave alerts. 	Maintaining preventive measures as per norms
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOES, MOEFCC, NDMA, MHFW, MSJE	Recurring/ Regular (RR) <ul style="list-style-type: none"> Promote studies, documentation and research 	DMD [§] , SDMA, EFD, DSIE, PRI/ ULB, DDMA, SLRTI	Medium Term (T2) <ul style="list-style-type: none"> Establish and maintain community-based network for sharing alerts Long Term (T3) <ul style="list-style-type: none"> Modify or customise warnings according to thresholds suitable for the State/UT 	Recurring/ Regular (RR) <ul style="list-style-type: none"> Updating HRVCA Identification and listing of Identifying the vulnerable population/ communities/ settlements

⁵⁷ NDMA Guidelines for Preparation of Action Plan – Prevention and Management of Heatwave, 2017

Heat Wave		Central/ State Agencies and their Responsibilities				Understanding Risk
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
		<ul style="list-style-type: none"> Provide Training & Technical support Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects <p>Short-Term (T1)</p> <p>Develop guidelines</p>		<ul style="list-style-type: none"> Identification of groups requiring special attention Constitute/ strengthen the mechanisms for consultation with experts and stakeholders Conduct audit of equipment and human resource requirements <p>Short Term (T1)</p>		
3	Dissemination of warnings, data, and information	<p>Recurring/ Regular (RR)</p> <p>IMD, MOEFCC, NDMA, MHFW</p> <ul style="list-style-type: none"> Support for organising training Extend technical support 	DMD [§] , SDMA, EFD, SLRTI, PRIs/ ULBs, DDMA	<ul style="list-style-type: none"> Create awareness preventive measures Extensive IEC campaigns to create awareness through print, electronic and social media <p>Medium Term (T2)</p> <p>Specific messages for highly vulnerable groups such as elderly, young children, outdoor workers and slum residents</p>	Short Term (T1)	
4	Disaster Data Collection and Management	<p>Recurring/ Regular (RR)</p> <p>MHA*, MOSPI, all ministries/ depts.</p>	Systematic data management of data on disaster damage and loss assessments	DMD [§] , SDMA, all depts.	Recurring/ Regular (RR)	Systematic data management of data on disaster damage and loss assessments

Heat Wave				Understanding Risk			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]
		Short Term (T1) Disaster Damage and Losses 2005-2015 baseline					Short Term (T1) Disaster Damage and Losses 2005-2015 baseline
		Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.					
7.12.2 Inter-Agency Coordination							
Heat Wave		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]
1	Overall disaster governance	MHFW, NDMA, MHUA, MRD,	DMD [§] , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRIs, ULB, DDMA	Recurring/ Regular (RR) • Creating/ strengthening the institutional framework including assigning nodal agency and nodal officials at different levels • Preparing state/region-specific Heat Action Plan • Team preparation and streamlining coordination mechanisms • Technical inputs for implementation based on experience from different locations • Collaboration with NGOs/CSOs	Recurring/ Regular (RR) • Ensure the local administration (city/district) can understand and meaningfully use all the heatwave-related information from various agencies and health authorities – central and state • Team preparation and coordination - officials and agencies are well prepared for the heat-wave season • Coordinate with IMD regarding forecasts, early warning and alert system based on drought severity	Short Term (T1) • Appointing a State Nodal Agency and Officer • Preparing/Adapting Heat Wave Action Plan • Implementation as per specific conditions in the state	

Heat Wave						Inter-Agency Coordination
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State	
		Responsibility – Centre	State [#]			
					Medium Term (T2) Develop a clearly defined interagency emergency response plan with roles and information flows clearly marked out	Long Term (T3) <ul style="list-style-type: none">Ensuring coherence and mutual reinforcement of DRR, CCA and developmentPartnering local institutions with national institutions / expertsAdapting HAPs developed in other countries /cities, monitoring and evaluating implementation and impact on mortality and morbidity
2	Preparation and Response	MHUA, MORD, MOJS, MRTI, MHRD, MOPR, MLBE, MPWR, MHFW	DMD ^{\$} , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRD, ULB, PRIs, DDMA	Recurring/ Regular (RR) Directives/ Advisory on shelters, creating awareness, managing resources, organizing medical support, strengthening hospital preparedness	Recurring/ Regular (RR) <ul style="list-style-type: none">Organising and coordinating the immediate responseCoordinate with central agenciesImplementing heat action planEstablishing First Aid/ Medical Aid facilities in key locationsIdentify vulnerable places and provide drinking water points at those places and worksites; also, ORSAvoiding outdoor games/sports activitiesLivestock preparedness during hot weather - ensuring that the livestock has sufficient shade and water on hot days Short Term (T1) <ul style="list-style-type: none">Heat treatment wings in hospitals	

Heat Wave				Inter-Agency Coordination		
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
					<ul style="list-style-type: none"> • Establishing medical assistance facilities at places of mass gathering <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Implement a system of heat alerts to trigger early morning shifts for schools and offices/ Rescheduling school and office timings during heat-wave season • To construct cool shelters, bus stands, etc that offer shelter from heat wave 	
3 Warnings, Information, Data	MOES*, MHFW		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Issue Heat wave alerts and weather forecasts on Short / Medium / Long range duration • Public awareness and community outreach <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Documentation • Collecting Data from States • Maintaining national-level database 	DMD ^{\$} , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRD, ULB, PRIs, DDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Follow the alerts/warning “Do’s-and-Don’ts” during a heat wave should be available in local languages and disseminated through media. <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Collecting Data/Information necessary for review/update of the plan 	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.12.3 Investing in DRR – Structural Measures

Heat Wave				Structural Measures		
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Heat wave shelters and other measures	MHUA, MORD, MOJS, MRTH, MOPR	Short Term (T1) Directive to promote cool roofs and heat reducing integrated development	DMD ^{\$} , SDMA, Forest Dept., ULBs, DDMA		<ul style="list-style-type: none"> Strengthening/mainstreaming the network medical assistance facilities Temperature forecasts and heat alerts will be sent as bulk messages on mobile phones, local electronic media Electronic screens at busy traffic intersections and market places Effective transportation Promote cool roofs and heat reducing integrated development
2	Social Housing Schemes	MHUA, MORD, MOPR	Short Term (T1) Guidelines and technical support for incorporation of protection from heat wave in multi-hazard resistant housing schemes	DMD ^{\$} , SDMA, EFD, PRIs, ULBs, DRDA, DDMA		Short Term (T1) Ensure incorporation of protection from heat wave in multi-hazard resistant features in the planning and execution of social housing schemes in heat wave prone areas
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	MHUA, MORD, MOPR	Recurring/ Regular (RR) Guidance and implementation	DMD ^{\$} , SDMA, EFD, PRIs, ULBs, DDMA		Recurring/ Regular (RR) Collaboration with technical agencies and implementation

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.12.4 Investing in DRR – Non-Structural Measures

Heat Wave		Non-Structural Measures			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Techno-Legal regimes	MHUA, MORD, MOJS, MRTH, MHRD, MOPR, MLBE, MPWR, MHFW	<ul style="list-style-type: none"> Laws and Regulations Guidance and Support Improving the forest coverage and green areas 	EFD, PRIs, ULBs, UDD, DRD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Laws and Regulations Institutional arrangements Improving the forest coverage and green areas Promote use of building materials that provide protection from heat Promote designs to reduce heat island effects in urban areas Facilitate integrated development plans that can cope better with heatwave conditions
2	Risk Transfer	MFIN*, NDMA, MHA, MAFW	<u>Recurring/ Regular (RR)</u> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term [T1]</u>	DFIN*, DMD\$, SDMA, DAG	<u>Recurring/ Regular (RR)</u> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term [T1]</u> Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.12.5 Capacity Development

Heat Wave		Capacity Development			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	State [#]	Recurring/ Regular (RR)	Responsibility – State
	Centre [#]	Responsibility – Centre	State [#]	Recurring/ Regular (RR)	Recurring/ Regular (RR)
1	Training	MHUA, MORD, NDRF, MHFW, NIDM, MYAS	DMD ^{\$} , SDMA, SDRF, RD, DRD, UDD, DWSD, EDD, PD, EFD, SIRD, SLRTI, AHD, HD, WCD, PRI/ ULB, DDMA	<ul style="list-style-type: none"> • Training and orientation programs for central govt. staff, other direct stakeholders • Training support for youth through NCC, NYKS, Scouts and Guides and NSS, SDRF, CDEF, community, and volunteers 	<ul style="list-style-type: none"> • Train key officials regarding pre, during and post heat-wave season activities • Training for CDEF, community, and volunteers • Training for deployment of Rapid Medical Response Teams • Training on heat-wave specific health care for vulnerable groups
2	Curriculum Development	MHFW, NLRTI	DMD ^{\$} , SDMA, SDMI, EDD, SLRTI, DDMA	<u>Short Term (T1)</u> Inclusion of heat wave and similar issues in various curriculum	<u>Short Term (T1)</u> Inclusion of heat wave and similar issues in various curriculum
3	Awareness Generation	NDMA, MOIB	DMD ^{\$} , SDMA, UDD, RD, HD, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Support awareness campaigns/ IEC • Support network of civil society organizations for awareness generation about coping with heat wave 	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Promoting awareness, alertness and preparedness • Training programs for public, PRIs/ ULBs • Carry out mass media campaigns in heat-wave prone areas • Create awareness of coping with heat wave and HAP

Heat Wave		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		Recurring/ Regular (RR)	Recurring/ Regular (RR)		Recurring/ Regular (RR)
4 Mock Drills/ Exercises	MHUA, MOPR	Promoting the planning and execution of emergency drills	DMD ^{\$} , SDMA, UDD, RD, SDRF, F&ES, CDEF, Police, DDMA	<ul style="list-style-type: none"> Identify and resolve communication gaps between participating departments, partners and the public Joint execution of emergency drills with local bodies to address heat-wave emergencies in relevant areas 	Conduct training programmes Short Term (T1) Creating ToT teams for different trades relevant to heat-wave protection in the construction of different types of housing and infrastructure
5 Vocational Training/ Skill development	MHUA, MOPR, NDMA, NLSDA, MSDE	Short Term (T1) Promoting skill development for hazard resistant construction with emphasis on protection from heat in heat-wave prone areas for different types of housing and infrastructure	DMD ^{\$} , SDMA, RD, SLSDA, DDMA		Recurring/ Regular (RR) Incorporating gender sensitive and equitable approaches in capacity development for coping with heat wave emergencies
6 Empowering women, marginalised communities, SC/ST, and persons with disabilities	MSJE	<ul style="list-style-type: none"> Guidance to addressing heat wave emergencies in relevant areas Promote gender sensitive and equitable approaches for awareness raising 	DMD ^{\$} , SDMA, SIDM, DSIE, PRIs, ULBs, DDMA		Recurring/ Regular (RR)

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.12.6 Climate Change Risk Management

Heat Wave				Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State		
		Short Term (T1)	Responsibility – Centre				
1 Research, Forecasting, Early Warning, Data Management, Zoning, Mapping	MOES*, MOEFCC, NDMA, NLRTI	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Develop GACC impact scenarios relevant for occurrence of heat wave Improving the assessment and forecasting of intensity, severity of extreme weather events Improving the assessment and monitoring of intensity, severity of extreme weather events & forecasting <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop Database management system relating to Heat Wave & climate change 	DMD ^{\$*} , SDMA, UDD, DRD, HD, SLRTI		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and coordination Research on local threshold and climate change adaptation Improving the dissemination information on GACC and adaptation 		
2 Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOES*, MOEFCC, NDMA, MSJE, NLRTI	<p>Recurring/ Continuous (RR)</p> <ul style="list-style-type: none"> Impact Assessment, Periodic review and evaluation <p>Short Term (T1)</p> <ul style="list-style-type: none"> Creation of data bank and hazards risk & vulnerable mapping 	DMD ^{\$*} , SDMA, UDD, DRD, HD, DSJE, SLRTI		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Incorporate updated info on GACC in HRVCA while preparing or periodic revision of DM plans <p>Short Term (T1)</p> <ul style="list-style-type: none"> Assess heat wave risk and vulnerability due to GACC Update heat-wave vulnerability maps based on projected GACC impacts Assess GACC risks of vulnerable and marginalised sections <p>Medium Term (T2)</p>		

Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	Responsibility – State [#]
		<p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Assess the trends of heat wave risk under GACC scenarios • Assess GACC risks of vulnerable and marginalised sections • Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Understanding CCA needs • Study GACC coping mechanisms • Develop CCA mechanisms <p>Medium & Long Term (T2,T3)</p> <ul style="list-style-type: none"> • Formulate strategy under GACC like cool-roof, green energy, reducing omission CO2 • Promote solar energy at roof top at every house or retrofitting • Implement adaptation programs • Promote appropriate combinations of Green
3 Climate Change Adaptation (CCA)	MOES*, DOS, MOEFCC	MOST, MOJS, ULBs	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • DMD[§], SDMA, HFWD, DDMA, PRIS, ULBs <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Sponsor and promote state-specific efforts and local efforts <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Implementation of GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Heat Wave		Climate Change Risk Management		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		Responsibility – State
		Responsibility – Centre	State [#]	
		and Blue infrastructure approach • Promote adaptive measures in social protection programmes for the vulnerable groups		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.13 Chemical (Industrial) Disasters

7.13.1 Understanding Risk

Chemical (Industrial) Disasters		Understanding Risk			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
		Short Term (T1)			
		<ul style="list-style-type: none"> Online information system on HAZCHEM conforming to international standards Chemical Accident Information Reporting System Information on dealing with HAZCHEM <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Research on effective management of HAZCHEM National Hazardous Waste Information System (NHWIS) <p>Long Term (T3)</p> <ul style="list-style-type: none"> 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 quality personal protection equipment most of which are currently imported Studies on improving occupational safety 	DDMS, SDMA, INDD, SPCB, DISH, DDMA	<u>Recurring/ Regular (RR)</u> Support and coordination	
1	Information Systems, Monitoring, Research	MOEFCC*, MIBF, MCF, MCOAL, MCA, MPFI, MHIP, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEX			

Chemical (Industrial) Disasters		Central/ State Agencies and their Responsibilities				Understanding Risk	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		Medium Term (T2)	
2 Zoning/ Mapping	MOEFCC*, MCF, MCOAL, MOCI, MPFI, MHIPE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MSTL, MTEX, MLBE, DOS	Recurring/ Regular (RR) Guidance, Data Management	DMD\$, SDMA, INDD, SPCB, DISH, DDMA	<ul style="list-style-type: none"> Industrial zones on basis of hazard potential and effective disaster management for worst case scenarios for MAH Units Separate zoning for siting of MAH units Carry out the mapping and related studies in collaboration with central agencies/ technical organizations 	Recurring/ Regular (RR) Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste	DMD\$, SDMA, INDD, SPCB, DISH, DDMA	Recurring/ Regular (RR) Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste
3 Monitoring	MOEFCC*, MCF, MCOAL, MOCI, MPFI, MHIPE, MLBE, MMSME, MLBE, MOM, MNRE, MPNG, MOP, MSTL, MTEX	Recurring/ Regular (RR) Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste	Recurring/ Regular (RR) Promote studies, documentation and research	<ul style="list-style-type: none"> Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects Provide technical support and guidance for comprehensive HRVCA 	DMD\$, SDMA, DSJE, DISH, PRIs, ULBs, DDMA	Recurring/ Regular (RR) Undertake HRVCA as part of preparing and periodic revision of DM plans	Recurring/ Regular (RR) Short Term (T1) Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
4 Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOEFCC*, MLBE, NDMA, NIDM, MOST, MCF, MCOAL, MOCI, MPFI, MHIPE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MSTL, MTEX, MSJE			Recurring/ Regular (RR) Systematic data management of data on disaster damage and loss assessments	DMD\$, SDMA, all depts.	Recurring/ Regular (RR) Systematic data management of data on disaster damage and loss assessments	
5 Disaster Data Collection and Management	MHA*, MOSPI, All Ministries/ Depts.						

Chemical (Industrial) Disasters		Understanding Risk			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
		<u>Short Term (T1)</u>		<u>Short Term (T1)</u>	
		Disaster Damage and Losses 2005-2015 baseline		Disaster Damage and Losses 2005-2015 baseline	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.13.2 Inter-Agency Coordination

Chemical (Industrial) Disasters		Inter-Agency Coordination			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Recurring/ Regular (RR)
		<u>Recurring/ Regular (RR)</u>		<u>Recurring/ Regular (RR)</u>	
1 Overall disaster governance	MOEFCC*, MCA	Providing coordination, technical inputs, and support	DMD\$, SDMA, RD, INDD, SPCB, DISH, DDMA, PRIs, ULBs, IBTA	• Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR	
2 Response	MOEFCC*, MCF, MCOAL, MOCI, MCA, MPFI, NHRIPE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEX	<u>Recurring/ Regular (RR)</u> Organising and coordinating central assistance	DMD\$, SDMA, RD, INDD, SPCB, DISH, DDMA, PRIs, ULBs, IBTA	<u>Recurring/ Regular (RR)</u> • Organising and coordinating the immediate response • Coordinate with central agencies	
3 Warnings, Information, Data Dissemination	MOEFCC*, NDMA, MCA	<u>Recurring/ Regular (RR)</u> Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective	DMD\$, SDMA, RD, INDD, SPCB, DISH,	<u>Recurring/ Regular (RR)</u> Coordinating the dissemination of warnings to all, down to the last mile	

Chemical (Industrial) Disasters					Inter-Agency Coordination			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Responsibility – Centre	State [#]	Responsibility – State			
		dissemination of warnings, information and data		DDMA, PRIs, ULBs, IBTA	– remote, rural or urban; Regular updates to people in areas at risk			
4	Non-structural measures	MOEFCC*, MHA, BIS, NDMA, MCF, MCOAL, MOCI, MICA, MPFI, MHIVE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MISTL, MTEX	Recurring/ Regular (RR) Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD ^{\$} , SDMA, RD, SPCB, DISH, DDMA, PRIs, ULBs, IBTA	Recurring/ Regular (RR) Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring			
<p>Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.</p>								
7.13.3 Investing in DRR – Structural Measures								
	Chemical (Industrial) Disasters	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	Structural Measures		
1		• Shelters, evacuation, and support facilities • Multiple routes for reliable access and escape • Decontamination facilities	MOEFCC*, NDMA, NLRTI**	Recurring/ Regular (RR) Technical support	DMD ^{\$} , SDMA, INDD, SPCB, DISH, DDMA, PRIs, ULBs, IBTA	<p>Short Term (T1)</p> <ul style="list-style-type: none"> 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 <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Providing wide roads and multiple routes in the industrial area to allow quick access by first responders and to ensure escape pathways 		

Chemical (Industrial) Disasters				Structural Measures							
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities							
			State [#]	Responsibility – State							
<p>Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) NBCC, BMTPC, CBRI, SERC, IE(I). (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.</p>											
<h4>7.13.4 Investing in DRR – Non-Structural Measures</h4>											
Chemical (Industrial) Disasters				Non-Structural Measures							
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	Medium Term (T2)					
1	<ul style="list-style-type: none"> Laws Regulations, Techno-Legal regimes Enforcement, Compliance and Monitoring Institutional Arrangements 	<ul style="list-style-type: none"> MOEFCC*, MLBE, MCF, MCOAL, MOCI, MCA, MPFI, MHIPF, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEx 	Medium Term (T2) Review existing rules, regulations, laws particularly of land use and siting of hazardous industries	<ul style="list-style-type: none"> DMD^{\$}, SDMA, DDMA, SPCB, DISH, EFD, INDD, PRIs, ULBs, IBTA 	<ul style="list-style-type: none"> Formulate/ strengthen rules, norms, and laws such as factories rules consistent with that of ensuring greater safety in hazardous industries and to reduce likelihood of disasters Review land use norms for the siting of hazardous industries 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 						

Chemical (Industrial) Disasters				Non-Structural Measures		
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
					<ul style="list-style-type: none"> • Strengthen the conduct of safety audits and enforcement of disaster prevention norms 	
					<p>Medium Term (T2)</p> <ul style="list-style-type: none"> • 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 Risk Management 	
2	Public Partnerships	MCA*, MOEFCC, NDMA, MCF, MOCI, MPFI, MHFPE, MFIN, Private sector**	Recurring/ Regular (RR) Guidance	DMD ^{\$} , SDMA, DDMA, IBTA		
3	Risk Transfer	MFIN*, NDMA, MIHA, MAFW	Recurring/ Regular (RR) Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Short Term (T1) Policy Framework	DFIN*, DMD ^{\$} , SDMA, DAG	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) ASOCHAM, FICCI, CII, AIAI, etc. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.13.5 Capacity Development

Chemical (Industrial) Disasters		Capacity Development			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
		Recurring/ Regular (RR)	Recurring/ Regular (RR)		
1 Training	MOEFFCC*, NIDM, MLBE, MCF, MCOAL, MOCI, MCA, MPFI, WHIPE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEx, MYAS	<ul style="list-style-type: none"> Training and orientation programs on management and disposal of HAZCHEM Training support for SDRF, CDEF, community, and volunteers 	DMD\$, SDMA, SDRF, ATI, SIRD, SPCB, INDD, DDMA, PRIs, ULBs, IBTA, SLRTI		Recurring/ Regular (RR) Training and orientation programs for state govt. staff, and other stakeholders such as CDEF, community, and volunteers
	NIDM, NDRF, CAPF, MYAS, MOD	Short Term (T1) Incorporating disaster response, search and rescue in the training programs of youth such as NSS, NYS, Scouts and Guide	DMD\$, SDMA, SIDM, ATI DDMA, PRIs, ULBs, IBTA		Recurring/ Regular (RR) 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	MHRD, AICTE, IITs, UGC, NIDM	Recurring/ Regular (RR) Promote inclusion of more specializations and electives on HAZCHEM and chemical disaster management	Professional Bodies and Councils in States, IBTA		Recurring/ Regular (RR) Add more specializations and electives on HAZCHEM and chemical disaster management
	MHFW, NLRTI	Short Term (T1) <ul style="list-style-type: none"> 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 	HD, DDMA		Short Term (T1) Implement the recommendations of reviews in all educational institutions in the state/UT

Chemical (Industrial) Disasters				Capacity Development
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
		Responsibility – Centre with victims of chemical disasters <ul style="list-style-type: none">• Review and take steps to improve the facilities required to treat victims of chemical disasters		
	Central Boards of Education	Short Term (T1) Introducing basic DM concepts and precautions related to HAZCHEM	State Education Boards	Short Term (T1) Introducing basic DM concepts and precautions related to HAZCHEM
3 Awareness Generation	MOEFFCC, NDMA, NDRC, CAPF, NIDM, MLBE, MCF, MCOAL, MOCI, MCA, MPFI, MHPE, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEx	Short Term (T1) <ul style="list-style-type: none">• 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 Medium Term (T2) <ul style="list-style-type: none">• 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• Focus on safety and compliance with SOP at workplace for workers	DMD ^{\$} , SDMA, IPRD, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs, IBTA	Short Term (T1) <ul style="list-style-type: none">• Carry out mass media campaigns• Promote culture of disaster risk prevention, mitigation, and better risk management Medium Term (T2) <ul style="list-style-type: none">• 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		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
	Centre [#]	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
4	Mock Drills/ Exercises	MOEFC [*] , NDMA, NDRF, Armed Forces, CAPF, MCF, MCOAL, MOCI, MCA, MPFI, MHIP, MLBE, MMSME, MOM, MNRE, MPNG, MOP, MOR, MSTL, MTEx	Recurring/ Regular (RR) Promoting the planning and execution of emergency drills by all ministries and in the all States/UTS	DMD ^{\$} , SDMA, INDD, SDRF, F&ES, CivDef, Police, DDMA, PRIs, ULBs, IBTA	Recurring/ Regular (RR) Joint planning and execution of emergency drills	
5	Empowering women, marginalised, and persons with disabilities	MSIE [*] , NDMA, NIDM	Recurring/ Regular (RR) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	DMD ^{\$} , SDMA, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs, IBTA	Recurring/ Regular (RR) 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	MOEFC [*] , NDMA, NIDM, MORD, MHUA	Recurring/ Regular (RR) Promotion, Guidance, and Support	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs, IBTA	Recurring/ Regular (RR) • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, local community organizations	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management which is not the same in every state/UT.

7.14 Nuclear and Radiological Emergencies

7.14.1 Understanding Risk

Nuclear and Radiological		Understanding Risk			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Monitoring and warning network Strengthening Radiation Monitoring	DAE*, MHA, MOD	<u>Short Term (T1)</u> Establish set ups for monitoring, warning including IERMON system network <u>Medium Term (T2)</u> Strengthening radiation Monitoring and Detection Systems in the Public Domain	DMD\$, SDMA, DDMA	<u>Short Term (T1)</u> Follow and support the safety and regulatory requirements
2	Setting up reliable and dedicated communication network	NDMA	<u>Short Term (T1)</u> To set up reliable and dedicated communication network at the national level for the last mile connectivity	DMD\$	<u>Short Term (T1)</u> To extend logistics
3	Establish monitoring mechanism to prevent illicit movement of radioisotopes	DAE*, MHA, MOD, Port Authorities	<u>Short Term (T1)</u> Install radiation detectors at all identified locations at border posts, and ports.	DMD\$	<u>Short Term (T1)</u> Coordination with and support to central agencies
4	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments <u>Short Term (T1)</u> Disaster Damage and Losses 2005-2015 baseline	DMD\$, SDMA, all depts.	<u>Recurring/ Regular (RR)</u> Systematic data management of data on disaster damage and loss assessments <u>Short Term (T1)</u> Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.14.2 Inter-Agency Coordination

Nuclear and Radiological				Inter-Agency Coordination		
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities		Responsibility – State
1	Overall disaster governance	DAE*	Recurring/ Regular (RR) Providing coordination, technical inputs, and support	DMD [§] , SDMA, RD, HFWD, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks All aspects of disaster risk management and mainstreaming DRR 	Recurring/ Regular (RR)
2	Response	DAE*, MHA	Recurring/ Regular (RR) Nodal ministry for central assistance	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	Organising the immediate response and seeking assistance of central agencies	Recurring/ Regular (RR)
3	Warnings, Information, Data	DAE*, MHA, NEC, NDMA	Recurring/ Regular (RR) Quick, clear, effective dissemination among central and state agencies	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Recurring/ Regular (RR)
4	Non-structural measures	AERB*, BIS	Short Term (T1) <ul style="list-style-type: none"> Revised/ Updated rules, norms, and codes New/Updated standards Review and improve laws, regulations and policies 	DMD [§] , SDMA, RD, DDMA, PRIs, ULBs	Short Term (T1) <ul style="list-style-type: none"> Adapting the norms/ codes as per State's requirement, enforcement, monitoring 	Short Term (T1)

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.14.3 Investing in DRR – Structural Measures

Nuclear and Radiological				Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities	
	Centre [#]	Responsibility – Centre	State [#]		Responsibility – State		Responsibility – State
1	Shelters	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Recurring/ Regular (RR) Technical support	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Identification 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 	Short Term (T1)	
2	• Decontamination centres • Strengthen protection systems of nuclear facilities	DAE [*]	Short Term (T1) Strengthen physical protection systems along with proper inventory and control procedures of the radiation sources	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<ul style="list-style-type: none"> Recurring/ Regular (RR) Coordination with and support to central agencies 	Recurring/ Regular (RR)	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.14.4 Investing in DRR - Non-Structural Measures

Nuclear and Radiological				Non-Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities		Central/ State Agencies and their Responsibilities	
	Centre [#]	Responsibility – Centre	State [#]		Responsibility – State		Responsibility – State
1	Setting of safety standards and other safety and regulatory documents	AERB [*] , DAE	Short Term (T1) Prepare safety and regulatory documents for all nuclear/ radiological applications, transport, safe custody, waste handling, personal safety, medical aspects etc.	DMD ^{\$}	Short Term (T1)	To follow the requirements	
2	Improve regulatory cover	AERB [*]	Short Term (T1) To set up regional regulatory centres for better coverage of safety and regulatory aspects	DMD ^{\$}	Recurring/ Regular (RR)	To enforce compliance	

Nuclear and Radiological				Non-Structural Measures			
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities		State [#]		Responsibility – State
			<u>Recurring/ Regular (RR)</u>				
3	Public Private Partnerships	NDMA, DAE*, NICA*, MCF, MOCI, MPFI, MHIFE, MFIN	<u>Recurring/ Regular (RR)</u> Guidance	DMD ^{\$} , SDMA, DDMA	Promote private participation in disaster management facilities		
4	Risk Transfer	NFIN*, NDMA, MHA, MAFW	<u>Recurring/ Regular (RR)</u> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> Policy Framework	DFIN*, DMD ^{\$} , SDMA, DAG	Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> Policy Framework		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/JT.

Nuclear and Radiological				Capacity Development			
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities		State [#]		Responsibility – State
			<u>Recurring/ Regular (RR)</u>				
		MHA, DAE*, NDRE, CAPF, MYAS, Others**	• Enhancing public awareness on nuclear/radiological application, safety. Training of first responders, staff • Training support for SDRF, CDEF, community, and volunteers	DMD ^{\$} , SDMA, SDRF, DDMA, CDEF, PRIs, ULBs,	Training of state police, CDEF, community, and volunteers		
1	Training	MHA, DAE*, MHFW, NDMA, MYAS	Training of medical and paramedics on various aspects of medical management of radiological events	DMD ^{\$} , DDMA, PRIs, ULBs,	To follow and comply		

7.14.5 Capacity Development

Nuclear and Radiological Sub-Thematic Area for DRR				Capacity Development			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State	
2	Curriculum Development	MHRD*, DAE	<u>Short Term (T1)</u> Relevant subjects should be included in the school/college syllabus throughout the country	DMD\$, SDMA, EDD		<u>Short Term (T1)</u> To follow the same	
3	Awareness Generation	DAE*, NDMA, NDRF, CAPF, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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 	DMD\$, SDMA, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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 	<u>Short Term (T1)</u> Joint planning and execution of emergency drills	
4	Mock Drills/ Exercises	DAE*, NDMA, NDRF, All Government Ministries/ Agencies, Armed Forces, CAPF	<u>Recurring/ Regular (RR)</u> Promoting the planning and execution of emergency drills by all ministries and in all States/ UTs	DMD\$, SDMA	<u>Short Term (T1)</u> Develop State and district plans		
5	Developing Capability for response	MHA*, NCMC, DAE, MOD, AERB	<u>Short Term (T1)</u> Prepare a national plan for nuclear and radiological emergencies				

Nuclear and Radiological Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				Capacity Development
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
	MHA*, MOD, DAE	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Prepare nuclear/radiological emergency management plan for metros and other important cities Surveillance at vulnerable locations and early detection capabilities 	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs, State (Police)	<p>Short Term (T1)</p> Follow the MHA, DAE guidelines Acquire detection capabilities.		
	Ministries/ Departments	<p>Short Term (T1)</p> Prepare own plans in line with the national plan	DMD ^{\$} , SDMA	<p>Short Term (T1)</p> Prepare own plans in line with the national plan		
	MOH&FW*, DAE, MOD	<p>Short Term (T1)</p> Prepare plan on nuclear/radiological emergency on site, off-site and public events	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<p>Short Term (T1)</p> To follow and ensure compliance		
6	Prepare comprehensive plan on medical management	<p>Recurring/ Regular (RR)</p> Provide guidance	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> To establish tertiary care hospitals for treatment of radiation injuries Establish primary and secondary care hospitals of adequate capacity at select cities. 		
7	Preparedness	<p>Short Term (T1)</p> DAE*, NDRF, CAPF, MoH&FW	Maintain adequate stock of radiation detection, monitoring instruments, safety kits, first aid medicines	<p>Short Term (T1)</p> To equip the health and police dept. appropriately		
		<p>Medium Term (T2)</p> DAE*, NDRF	Adequate number of ERCS should be set up across the country for covering of any event in reasonable time	<p>Short Term (T1)</p> To equip the health and police dept. appropriately		

Nuclear and Radiological		Central/ State Agencies and their Responsibilities				Capacity Development
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
MHUA		Short Term (T1) To identify the places/buildings such as community buildings/schools/hospitals for use as emergency shelters	DMD ^{\$} , SDMA, DDMA			Short Term (T1) To help identify the locations and ensure that evacuation plans are in place
MAFW, MoH&FW *		Short Term (T1) Provision for food, water, medicines and other relief materials should be made at the shelters for the affected public	DDMA, PRIs, ULBs			Short Term (T1) Provision for food, water, medicines and other relief materials should be made at the shelters for the affected public
MoH&FW * , DAE, DRDO		Short Term (T1) Setting up of at least one mobile radiological laboratory unit in each district and at least two such units in each metropolis	DDMA, PRIs, ULBs			Short Term (T1) To provide support for setting up of mobile radiological laboratories
MoH&FW, AERB * , MHA, NDMA		Short Term (T1) Appoint, and maintain areas wise details of radiological safety officers, trained medical personnel, first responders, trained volunteers, etc.	DMD ^{\$} , SDMA, DDMA, PRIs, ULBs			Short Term (T1) To maintain the data district wise

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) Users of nuclear/radiological facilities including industries, hospitals. (\$) DMD—Disaster Management Department:
The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.15 Biological and Public Health Emergencies (BPHE)

7.15.1 Understanding Risk

Biological & Public Health Emergencies (BPHE)				Understanding Risk		
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1	Observation Networks, Monitoring, Research, Forecasting, Early Warning and Zoning/ Mapping	MHFW [*] (NCDC), MAFW, MHA, MOD, MOES, MOEFCC, MOR, MLBE, METI, NDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support for training Extend technical support <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Establishment of Early Warning System Strengthening IDSP and early warning systems at regional levels Epidemiological disease mapping Health facilities mapping 	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Strengthening integrated health surveillance systems <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Establishing and maintain community-based network for sharing alerts Strengthening IDSP <p>Long Term (T3)</p> <ul style="list-style-type: none"> States should, modify or adapt IMD's warning system according to thresholds applicable in each state 		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Maintaining preventive measures as per norms
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MHFW [*] , MAFW [*] , MHA, MOD, MOES, MOEFCC, MSJE, NDMA		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Promote studies, documentation and research Provide Training & Technical support Studies on vulnerabilities and capacities covering social, physical, 		<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Updating HRVCA Identifying the vulnerable population/ communities/ settlements Identification of groups requiring special attention Conduct audit of equipment and human resource requirements

Biological & Public Health Emergencies (BPHE)				Understanding Risk	
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State <u>Short Term (T1)</u>
		Responsibility – Centre	State [#]		
		economic, ecological, gender, social inclusion and equity aspects Short-Term (T1) Develop guidelines			Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
3	Dissemination of warnings, data & information	MHFW, MHA, MOD, MOES, MAFVN, MOEFCC, NDMA	Recurring/ Regular (RR) <ul style="list-style-type: none">Support for organising trainingExtend technical support	HFWD*, DMD ^{\$} , SDMA, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI, ULB, SLRTI, DDMA	Short Term (T1) <ul style="list-style-type: none">Create awareness preventive measuresExtensive IEC campaigns to create awareness through print, electronic and social media Medium Term (T2) <ul style="list-style-type: none">Specific messages for highly vulnerable groups such as elderly, young children, outdoor workers and slum residents
4	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	Recurring/ Regular (RR) <ul style="list-style-type: none">Systematic data management of data on disaster damage and loss assessments	DMD ^{\$} , SDMA, all depts.	Recurring/ Regular (RR) <ul style="list-style-type: none">Systematic data management of data on disaster damage and loss assessments Short Term (T1) <ul style="list-style-type: none">Disaster Damage and Losses 2005-2015 baseline Short Term (T1) <ul style="list-style-type: none">Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.15.2 Inter-Agency Coordination

Biological & Public Health Emergencies (BPHE)				Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Responsibility – Centre	State [#]	Responsibility – State
1	Overall disaster governance	MHFW, MHA, MOD, MOES, MAFW, MOEFCC, MOR, MLBE, NDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Preparing guidelines Promote the mainstreaming of DRR in healthcare Technical inputs for implementation based on experience from different locations Collaboration with NGOs/CSOs 	HFWD, DMD ^{\$} , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI, ULB, DDMA	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Implementation as per specific conditions in the state Team mobilization and coordination - officials and agencies Involving local administration <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Coordinate with the state MOES (IMD) office regarding forecasts, early warning and alert system based on colour codes corresponding to different thresholds Develop a clearly defined interagency emergency response plan with roles and information flows clearly marked out <p>Long Term (T3)</p> <ul style="list-style-type: none"> Partnering local institutions with national institutions / experts Adapting HAPs developed in other countries /cities, monitoring and evaluating implementation and impact on mortality and morbidity
2	Preparation and Response	MHFW*, MHA, MOD, MAFW, MOEFCC, MLBE	Short Term (T1)	HFWD*, DMD ^{\$} , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI, ULB, DDMA	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Strengthening of integrated surveillance systems based on epidemiological surveys; detection and investigation of any disease outbreak. <ul style="list-style-type: none"> Rapid health assessment and provision of laboratory support

Biological & Public Health Emergencies (BPHE)					Inter-Agency Coordination
Sub-Thematic Area for DRR	Central/ State Agency [#]	Responsibility – Centre	State [#]	Responsibility – State	
		<ul style="list-style-type: none"> Development of HEOC and its integration with centralised EOC Developing specialised response capabilities for biological emergencies Develop preparedness for biosafety issues relating animals and agricultural crops, especially food crops 		<ul style="list-style-type: none"> Institution of public health measures to deal with secondary emergencies as an outcome of biological emergencies 	
					Short Term (T1)
					<ul style="list-style-type: none"> Follow the alerts/warning “Do’s-and-Don’ts” should be available in local languages and widely disseminated Dissemination of warnings to all, down to the last mile – remote, rural or urban Regular updates to people in areas at risk <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Collecting Data/ Information necessary for review/ update of the plan Maintaining national-level database <p>Short Term (T1)</p> <ul style="list-style-type: none"> HFWD*, DMD\$, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI/ULB, SLRTI, DDMA Collecting Data/ Information necessary for review/ update of the plan
3 Warnings, Information, Data	MHFW*, MHA, MOD, MOES, MAFW, MOEFCC, MOR, MLBE, NDMA	<ul style="list-style-type: none"> Public awareness and community outreach Documentation Collecting Data from States Collecting Data/ Information necessary for review/ update of the plan Maintaining national-level database 			<p>Notes: (#) Every ministry, department or agency of the government - central and state - not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.</p>
7.15.3 Investing in DRR – Structural Measures					
Biological & Public Health Emergencies (BPHE)					Structural Measures
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1 Strengthening Response	MHFW*, MHA, MOD, MOES,	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Strengthening Pre-hospital Care and Emergency 	HFWD*, DMD\$, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD,	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Establishing adequate decontamination systems, critical care Intensive Care Units (ICUs) and 	

Biological & Public Health Emergencies (BPHE)				Structural Measures	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
	MAFW, MOEFCC, NDMA	Medical Care (EMC) Network <ul style="list-style-type: none"> Identifying infrastructure needs for formulating mitigation plans Laying down minimum standards for water, food, shelter, medical care, sanitation, and hygiene Strengthening of EMT response mechanism nationally and IHR internationally and IHR Framework 	WCD, PRI/ULB, SLRTI, DDMA	<ul style="list-style-type: none"> Isolation wards with pressure control and lamellar flow systems Adequate Personal Protective Equipment (PPE) for all the health workers associated with the responding to biological emergencies <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Strengthening/mainstreaming the network medical assistance facilities Equipping Medical First Responders (MFRs)/Quick Reaction Medical Teams (QRMTs) with all material logistics and backup support <p>Long Term (T3)</p> <ul style="list-style-type: none"> Upgradation of earmarked hospitals to cope with Chemical, Biological, Radiological and Nuclear (CBRN) emergencies Communication and networking system with appropriate intra-hospital and inter-linkages with state ambulance/transport services, state police departments and other emergency services Mobile tele-health services and Mobile Hospitals 	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Guidelines and technical support Specialised health care and laboratory facilities <p>Long Term (T3)</p> <ul style="list-style-type: none"> Creating a chain of public health laboratories with at least one public health laboratory in each district
2 Upgrading Medical Facilities	MHFW*, MHA, MOD		HFWD*, DMD\$, SDMA, DRD, UDD, WCD, PRI, ULB, DDMA		<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Specialised health care and laboratory facilities <p>Long Term (T3)</p> <ul style="list-style-type: none"> Creating a chain of public health laboratories with at least one public health laboratory in each district

Biological & Public Health Emergencies (BPHE)				Structural Measures		
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
			<ul style="list-style-type: none"> least one such laboratory in each district Stockpiling of essential medical supplies such as vaccines and antibiotics, etc. Guidance for establishing and strengthening quarantine facilities 			
<p>Notes: (#) Every ministry, department or agency of the government - central and state - not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.</p>						
Biological & Public Health Emergencies (BPHE)				Non-Structural Measures		
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1 Techno-Legal regimes		MHFW*, MHA, MOD, MAFW, NDMA	<p><u>Recurring/ Regular (RR)</u></p> <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Dovetail norms and regulations relevant for BPHE with the DM Act 2005 Enact/ amend any Act, Rule or Regulation, if necessary, for better implementation of BPHE programmes 	<p><u>Recurring/ Regular (RR)</u></p> <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> HD, DMD^{\$}, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI, ULB, DDMA 		<p><u>Recurring/ Regular (RR)</u></p> <p>Strengthen institutional arrangements</p> <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Enact/ amend any Act, Rule or Regulation, if necessary, for better implementation of BPHE programmes

Biological & Public Health Emergencies (BPHE)				Non-Structural Measures		
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities		Responsibility – State
				State [#]		
2	Biosafety and Biosecurity Measures and Environmental Management	MHFW*, MHA, MOD, MOES, MAFW, MOEFCC	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Strict compliance with biosafety and biosecurity provisions • Environmental monitoring to prevent outbreaks • Integrated vector management for elimination of breeding places • Biological and chemical interventions for vector control • Monitoring of water supply and sewage systems to prevent the dispersal of biological agents that can cause epidemics 	HD, DMD ^{\$} , SDMA, AHD, PRI, ULB, SLRTI, DDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Strict compliance with biosafety and biosecurity provisions • Environmental monitoring to prevent outbreaks 	
3	Risk Transfer	MFIN*, NDMA, MHA, MAFW	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>	DFIN*, DMD ^{\$} , SDMA, DAG	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p>Short Term (T1)</p> <p>Policy Framework</p>	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.15.5 Capacity Development

Biological & Public Health Emergencies (BPHE)				Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	Human Resource Development & Training	<p>Recurring/ Regular (RR)</p> <p>Training support for SDRF, CDEF, community, and volunteers</p> <p>Medium Term (T2)</p> <p>Strengthening of National Disaster Response Force (NDRF), medical first responders, medical professionals, paramedics and other emergency responders</p> <p>Long Term (T3)</p> <ul style="list-style-type: none"> Development of human resources for monitoring and management of the delayed effects of BPHE in the areas of mental health and psychosocial care Training programmes in the areas of emergency medicine and biological emergency management for hospital administrators, specialists, medical officers, nurses and other health care workers Training for youth through NCC, NYKS, Scouts and Guides and NSS 	<p>Recurring/ Regular (RR)</p> <p>Training support for CDEF, community, and volunteers</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Training for surveillance Training for deployment of Rapid Medical Response Teams Training for All Health and allied healthcare professions, AYUSH doctors and practitioners, community health workers, ASHA, MPWS, ANM and aanganwadi workers. <p>Long Term (T3)</p> <p>Organising community awareness programmes for first aid and general triage</p>	<p>HFWD*, DMD^{\$}, SDMA, SDRF, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI, ULB, SIRD, SLRTI, DDMA</p>

Biological & Public Health Emergencies (BPHE)				Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	State [#]	Recurring/ Regular (RR)
	Centre [#]	Responsibility – Centre		Recurring/ Regular (RR)
2	Knowledge management & Curriculum Development	<ul style="list-style-type: none"> Incorporating basic knowledge of BPHE management through the educational curricula Support for proper education and training health emergency personnel Promote continuing medical education programmes and workshops at regular intervals Defining the role of public, private, and corporate sector for their active participation and their sensitisation 	<ul style="list-style-type: none"> HFWD*, DMD^{\$}, DRD, UDD, EDD, EFD, AHD, SLRTI, PRI, ULB, DDMA 	<ul style="list-style-type: none"> Incorporating basic knowledge of BPHE management through the educational curricula Proper education and training of personnel Conduct continuing medical education programmes and workshops at regular intervals Defining the role of public, private, and corporate sector for their active participation and their sensitisation
3	Awareness Generation	<ul style="list-style-type: none"> Support awareness campaigns/ IEC Support network of civil society organizations for awareness generation about emergencies caused by biological agents 	<ul style="list-style-type: none"> HFWD*, DMD^{\$}, SDMA, IPRD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI/ULB, SLRTI, SIHFW, DDMA 	<ul style="list-style-type: none"> Promoting awareness, alertness and preparedness Training programs for public, PRIs/ ULBs Community awareness programme for first aid Dos and Don'ts to mitigate the effects of medical emergencies caused by biological agents Awareness about the importance of personal hygiene With due consideration to the social, ethnic and religious issues involved, utmost care will be

Biological & Public Health Emergencies (BPHE)				Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
				Recurring/ Regular (RR) <ul style="list-style-type: none"> Defining the role of the community as a part of the disaster management Testing of various elements of the hospital emergency preparedness through table top exercises, and mock drills Identify and resolve communication gaps between participating departments, partners and the public Joint execution of emergency drills with local bodies
4	Mock Drills/ Exercises/ CBDM	MHA*, MHFW, MOD, MAFW, MOEFC, MOR, NDMA, NRDF	HFWD*, DMD ^{\$} , SDMA, EFD, RD, DDMA, SDRF, F&ES, CDEF, Police, PRI, ULB	Recurring/ Regular (RR) <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills Technical support for identifying and resolve communication gaps between participating departments, partners and the public
5	Hospital Preparedness	MHFW*, MHA, MOD, MLBE	HFWD*, DMD ^{\$} , SDMA, DRD, UDD, DWSD, WCD, DDMA	Recurring/ Regular (RR) Preparation of DMP by all the hospitals including those in the private sector

Biological & Public Health Emergencies (BPHE)				Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
		<p>vaccines and other agents for protection, detection, and medical management</p> <p>Medium Term (T3)</p> <ul style="list-style-type: none"> Institutionalisation of advanced Emergency Medical Response System (EMRS) Upgrading existing biosafety laboratories and establishing new ones 		<p>Medium Term (T2)</p> <p>Developing a mechanism to augment surge capacities to respond to any mass casualty event following a biological emergency</p> <p>Long Term (T3)</p> <p>Specialised health care and laboratory facilities</p>
6	Applied research	<p>Post-disaster phase medical documentation procedures and epidemiological surveys</p> <p>Short Term (T1)</p> <p>Regular updating by adopting activities in Research and Development (R&D) mode, initially by pilot studies</p> <p>Medium Term (T2)</p> <p>Development of post-disaster medical documentation procedures and epidemiological surveys</p> <p>Long Term (T3)</p> <p>Strengthening of scientific and technical institutions for knowledge management and applied research and training in management of CBRN emergencies</p>	MHFW*, MOD, MOES, MAFW, MOEFCC, MOST	<p>Long Term (T3)</p> <p>HFWD*, DMD[§], SDMA, DRD, UDD, DWSD, EDD, PD, EFD, AHD, WCD, PRI/ULB, SLRTI</p>
7	Empowering women, marginalised communities	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Guidance Promote gender sensitive and equitable approaches 	MHFW*, MHA, NIIDM, NDMA	<p>Recurring/ Regular (RR)</p> <p>WCD*, HFWD, DMD[§], SDMA, DRD, UDD, PRI, ULB, DDMA</p> <p>Recurring/ Regular (RR)</p> <p>Incorporating gender sensitive and equitable approaches in capacity development for coping with BPHE</p>

Biological & Public Health Emergencies (BPHE)			Capacity Development		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
SC/ST, and persons with disabilities					

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.15.6 Climate Change Risk Management

Biological & Public Health Emergencies (BPHE)			Climate Change Risk Management		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
1 Research, Forecasting, Early Warning, Data Management, Zoning, Mapping	MHFW*, MOES, MOEFCC, MOES, NDMA, NIORTI	<p>Recurring/ Regular (RR)</p> <p>Share information and updates</p> <p>Short Term (T1)</p> <p>Strengthening integrated health surveillance systems based on GACC scenarios</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Detailed assessment and monitoring of biological threats under GACC impact scenarios Develop Database management system relating to Biological Disasters & climate change <p>Long Term (T3)</p> <p>Improve forecasting and assessment capabilities</p>	HFWD*, DMD§, SDMA, DRD, UDD, AGD, DWSD, EDD, PD, EFD, AHD, SLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor and support state-specific and local efforts 	

Biological & Public Health Emergencies (BPHE)				Climate Change Risk Management	
	Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	
			State [#]	Responsibility – State	
			consistent with the anticipated changes		
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MHFW*, MOES, MAFW*, MOEFCC, NDMA, MSJE, NLRTI	<p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Undertake detailed studies on vulnerability and risk under GACC scenarios Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	<p>Recurring/ Regular (RR)</p> <p>Undertake HRVCA as part of preparing and periodic revision of DM plans</p> <p>Medium Term (T2)</p> <p>Assess GACC risks of vulnerable and marginalised sections</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation
3	Climate Change Adaptation (CCA)	MHFW*, MOES, MOJS, MOEFCC, MAFW	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> Understanding adaptation needs Study coping mechanisms Develop adaptation mechanisms <p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Environmental monitoring to reduce risks from GACC Support the implementation of CCA programs Promote appropriate combinations of Green and Blue infrastructure approach 	<p>Recurring/ Regular (RR)</p>	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects

Biological & Public Health Emergencies (BPHE)				Climate Change Risk Management		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Medium -Term (T2)	Long – Term (T3)	Responsibility – State
		<p>• Promote adaptive measures in social protection programmes for the vulnerable groups</p>		<p>Sponsor and promote state-specific efforts and local efforts</p> <p>Long – Term (T3)</p> <ul style="list-style-type: none"> • Implementation of GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups 		

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.16 Fire Hazard

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

Thematic Area for DRR		Fire Hazard		
Central/ State Agencies and their Responsibilities	State [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
MHA* , MHUA, MOEFCC, Other Relevant Ministries/ Departments	Recurring/ Regular (RR) Short Term (T1) <ul style="list-style-type: none"> • Technical support • Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	Recurring/ Regular (RR) Short Term (T1) <ul style="list-style-type: none"> • Applying the classification system for hazardous industries in rural and urban areas based on norms laid down by the SFAC for fire services • Vulnerability analysis of densely populated clusters prone to high risk of fire Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	Recurring/ Regular (RR) Short Term (T1) <ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	Recurring/ Regular (RR) Short Term (T1) <ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline

Fire Hazard					
Thematic Area for DRR	Centre[#]	Responsibility – Centre	Central/ State Agencies and their Responsibilities	State[#]	Responsibility – State
7.16.2 Inter-Agency Coordination	MHA, MHUA, NDRF	Recurring/ Regular (RR) Provide guidance, technical inputs, and support	DMD ^{\$} , SDMA, F&ES, SDRF, INDD, SPCB, DISH, ULBs, PRIs, DDMA, Other Depts.		Recurring/ Regular (RR) <ul style="list-style-type: none"> Preparation and implementation of fire safety and prevention plans in all built environments Ensure the functioning of agencies to ensure proper compliance of fire safety norms
7.16.3 Investing in DRR – Structural Measures	MHA, MHUA, NLRTI	Medium Term (T2) <ul style="list-style-type: none"> Identify the gaps in existing capabilities – equipment and infrastructure Address gaps in infrastructure and equipment needs, upgrade equipment including personal protective equipment Action plan for modernization and meeting future needs Strengthening and standardizing response mechanisms 	DMD ^{\$} , SDMA, F&ES, SDRF, INDD, SPCB, DISH, ULBs, PRIs, DDMA, SLRTI, Other Depts.	Long Term (T3) <ul style="list-style-type: none"> 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 considering local hazards and vulnerabilities 	

Thematic Area for DRR	Fire Hazard			Central/ State Agencies and their Responsibilities	Responsibility – State [#]	Recurring/ Regular (RR)
	Centre [#]	Responsibility – Centre	State [#]			
7.16.4 Investing in DRR – Non-Structural Measures				MHA, MHUA, Other relevant Ministries/ Depts.	<ul style="list-style-type: none"> • Enforcement of Fire Safety Rules and Regulation • Provide Support • Frame model rules, laws, guidelines • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p>Short Term (T1)</p> <p>Risk Transfer Policy Framework</p>	<ul style="list-style-type: none"> • Strict implementation and strengthening 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 • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property • Enactment of Fire Act and other legal measures as per recommendations of SFAC and other official bodies • Promotion of building codes as per NBC 2016, especially parts relating to fire and life safety and other relevant sections • Institutional reform and major changes in organizational set up • Legal regime for mandatory fire clearance from F&ES for different types of buildings, colonies, industries and other installations • Risk Transfer Policy Framework

Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	Recurring/ Regular (RR)	
7.16.5 Capacity Development	MHA, NDMA, NIDM, NDRF, Other relevant Ministries/ Departments	DMD ^{\$} , SDMA, SDRF, SIDM, ATI, F&ES, SDRF, CDEF, ULBs, PRIs, DDMA, SIRD, SLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Provide guidance and support to SDRF, CDEF, community, and volunteers TOT programs on various aspects such as firefighting, managing collapsed structure, and search and rescue 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Advanced training on disaster management CDEF, community, and volunteers Promoting culture of awareness, alertness and preparedness Awareness generation programs for public, utilities, ULBs, PRIs, and industries IEC materials and ensure wider disseminate to general public through all medium Information on safety, care and protection of disaster-affected animals TOT programs on various aspects such as firefighting, managing collapsed structure, and search and rescue 	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Address the capability gaps – human and institutional Strengthening and standardizing response mechanisms

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD – Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.17 Forest Fire Hazard

7.17.1 Understanding Risk

Forest Fires for DRR				Central/ State Agencies and their Responsibilities				Understanding Risk	
	Sub-Thematic Area	Centre [#]	Responsibility – Centre		Recurring/ Regular (RR)	State [#]		Recurring/ Regular (RR)	Responsibility – State
1	Observation Networks, Information Systems, Monitoring, Research, Forecasting, Early Warning and Zoning/ Mapping	MOEFCC*, MOES, DOS, MHA, MOD, MEITY	<p>Support for organising training Extend technical support</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Employ a system of fire risk classification based on best available methods such as those using satellites Technical support in mapping forest fire vulnerability areas using satellites Seasonal forest-fire monitoring and assessment <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Strengthen coordination between MoEFCC and MoEFCC <p>Long Term (T3)</p> <ul style="list-style-type: none"> Strengthen the early detection and warning Operationalise a system of near-real-time monitoring of forest fires using best technologies available such as low flying aircraft, unmanned aerial vehicles (UAV) and drones <p>Near Real-Time monitoring of forest fires</p>	<p>Mapping of human settlements in fire-prone forest areas</p> <ul style="list-style-type: none"> Monitoring fire-prone forest areas Identify areas prone to forest fires and monitor them closely in the months when fires usually occur <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Establish and maintain community-based networks for early detection and reporting to the nearest authorities Promoting community-based forest monitoring system <p>Long Term (T3)</p> <ul style="list-style-type: none"> Establishing and maintain arrangements to communicate effectively with people living within and near forests Establish and maintain a system of mutual aid among nearby fire 					

Forest Fires				Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	Understanding Risk
					<ul style="list-style-type: none"> Studies/ assessments of areas prone to forest fires, ecological aspects, wildlife concerns Conduct a detailed fire history to determine the frequency, distribution, and severity of wildfire 				<ul style="list-style-type: none"> Updating HRVCA Identification and listing of population clusters prone to forest fire risk Identification of population clusters within forests requiring urgent attention Conduct audit of equipment and manpower requirements 	<p>Recurring/ Regular (RR)</p> <p>Short Term(T1)</p> <p>Constitute/ strengthen the mechanisms for consultation with experts and stakeholders</p>
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOEFCC*, MOES, MSIE, NDMA, NIDM	<ul style="list-style-type: none"> Promote studies, documentation and research Provide Training & Technical support Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects <p>Short-Term (T1)</p> <p>Develop guidelines</p>	EFD*, DMD ^{\$} , SDMA, DSJE, PRIs, ULBs, DDMA					<p>Short Term(T1)</p> <p>Create awareness for forest fire prevention as most fires are caused by humans, deliberately or inadvertently</p> <p>Medium Term (T2)</p> <p>Establishing reliable system to pass on the correct information on fire situation to communities and responders</p>	
3	Dissemination of warnings, data, and information	MOEFCC*, MOES, NDMA, NIDM		EFD*, DMD ^{\$} , SDMA, SLRTI, PRIs/ ULBs, DDMA	<p>Recurring/ Regular (RR)</p> <p>Support for organising training</p> <p>Extend technical support</p>					

Forest Fires					Understanding Risk	
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
4	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/depts.	Recurring/ Regular (RR)	Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline	DMD ^{\$} , SDMA, all depts.	Recurring/ Regular (RR) Systematic data management of data on disaster damage and loss assessments Short Term (T1) Disaster Damage and Losses 2005-2015 baseline
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.						
Forest Fires					Inter-Agency Coordination	
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	Overall disaster governance (Forests are in the concurrent list)	MOEFCC*, MHA, NDMA, MOES, MOD, DOS, MORD, MHUA	Recurring/ Regular (RR)	• Providing coordination, technical inputs, and support • Coordination among multiple agencies – forest, IMD, FSI,	EFD*, DMD ^{\$} , SDMA, RD, PRIs, ULBs, DDMA	Recurring/ Regular (RR) • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2	Response	MOEFCC*, MHA, MOD, NDMA	Recurring/ Regular (RR)	• Organising and coordinating central assistance • Strengthening Incident Command System involving multiple agencies	EFD*, DMD ^{\$} , SDMA, RD, PRIs, ULBs, DDMA	Recurring/ Regular (RR) • Organising and coordinating the immediate response • Coordinate with central agencies

Forest Fires						Inter-Agency Coordination	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		Responsibility – Centre		State [#]	
				<u>Recurring/ Regular (RR)</u>		<u>Recurring/ Regular (RR)</u>	
3	Warnings, Information, Data	MOEFCC*, MOES, DOS, NDMA, NIDM, MORD, MHUA	Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	EFD*, DMD\$, SDMA, RD, PRIS, ULBs, DDMA	Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	EFD*, DMD\$, SDMA, PRIS, ULBs, DDMA	Responsibility – State
Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.							
7.17.3 Investing in DRR – Structural Measures							
Forest Fires		Central/ State Agencies and their Responsibilities				Structural Measures	
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre		State [#]	Responsibility – State	
1	Strengthening forest-fire fighting systems	MOEFCC*, MORD, MHUA	<u>Recurring/ Regular (RR)</u>		EFD*, DMD\$, SDMA, PRIS, ULBs, DDMA	<u>Recurring/ Regular (RR)</u>	
			Support by deploying aircrafts, helicopters, UAV, drones and equipment			<ul style="list-style-type: none"> • Strengthening various forest fire prevention measures • Communication network of wireless system • Effective transportation • Specialised equipment to fight forest fires • Improved fire-resistant clothing • Strengthening the network of watch towers • Expanding fire detecting systems 	
2	Social Housing Schemes	MORD, MHUA,	<u>Recurring/ Regular (RR)</u>	Guidelines and technical support for incorporation of fire and multi-hazard resistant features in the planning	EFD*, DMD\$, SDMA, PRIS,	<u>Recurring/ Regular (RR)</u>	Ensure incorporation of fire and multi-hazard resistant features in the planning

Forest Fires				Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		State [#]		Responsibility – State	
	Centre [#]	Responsibility – Centre					
	MOEFCC, NDMA	hazard resistant features in planning and execution of social housing schemes		ULBs, DRDA, DDMA		and execution of social housing schemes in the settlements within and adjacent to forests.	
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure near forest area and in forest villages	MOEFCC*, MORD, MHUA, NDMA	Recurring/ Regular (RR) Guidance and implementation	EFD*, DMD\$, SDMA, PRIs, ULBs, DDMA		Recurring/ Regular (RR) Collaboration with technical agencies and implementation	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

Forest Fires				Non-Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		State [#]		Responsibility – State	
	Centre [#]	Responsibility – Centre					
1	Techno-Legal regimes	MOEFCC*, MORD, MHUA	Recurring/ Regular (RR) • Guidance and Support • Institutional Arrangements • Promote use of insurance/ risk transfer Short Term (T1) • Develop forest fire prevention and management manual • Prioritising forest fire management in forestry plans	EFD*, DMD\$, SDMA, UDD, DRD, DDMA, PRIs, ULBs		Recurring/ Regular (RR) • Strengthen the laws and regulations for forest fire prevention and control • Improve the institutional arrangements for forest fire prevention and control • Promote use of insurance/ risk transfer	

Forest Fires		Central/ State Agencies and their Responsibilities				Non-Structural Measures	
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State			
		<ul style="list-style-type: none"> • Review forest management systems and practices • Review Laws & Regulations 					
Risk Transfer	MFIN*, NDMA, MHA, MAFW	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p><u>Short Term (T1)</u></p> <p>Policy Framework</p>	DFIN*, DMD ^{\$} , SDMA, DAG	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p><u>Short Term (T1)</u></p> <p>Policy Framework</p>	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p><u>Short Term (T1)</u></p> <p>Policy Framework</p>	<p>Recurring/ Regular (RR)</p> <p>Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property</p> <p><u>Short Term (T1)</u></p> <p>Policy Framework</p>	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.17.5 Capacity Development

Forest Fires		Capacity Development				
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Recurring/ Regular (RR)
1	Training	MOEFCC*, MHA, NDRF, NDMA, MOES, MOD, DOS, MORD, MHUA, NIDM, MYAS	Training and orientation programs for central govt. staff, SDRF, CDEF, community, volunteers and other direct stakeholders	EFD*, DMD\$, SDMA, SDMI, SIRD, SDRF, DDMA	Training and orientation programs for state govt. staff, and other stakeholders such as: CDEF, civil society, volunteers, elected representatives.	<u>Recurring/ Regular (RR)</u>
			Incorporating prevention and management of forest fires in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS		Incorporating prevention and management of forest fires in the training programs of village volunteers	<u>Short Term (T1)</u>
2	Curriculum Development	MOEFCC*, MHRD, NIDM, NLRTI**	Update curriculum relating to forestry management courses and training programmes to include topics relevant to forest fire prevention and control	EFD*, EDD, SDMI, SLRTI	Update curriculum relating to forestry management courses and training programmes to include topics relevant to forest fire prevention and control	<u>Short Term (T1)</u>
3	Awareness Generation	MOEFCC*, NDMA, NDRF, CAPF, NIDM			<ul style="list-style-type: none"> Promoting awareness, alertness and preparedness Training programs for public, PRIs/ ULBs Carry out mass media campaigns in forest fire prone areas Create awareness of forest fire prevention and control Strengthening network of community involvement in forest fire reporting, prevention and assistance to controlling 	<u>Recurring/ Regular (RR)</u>

Forest Fires				Capacity Development		
Sub-Thematic Area for DRR		Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	
4	Mock Drills/ Exercises	MOEFCC*, NDRF, CAPF, NDMA	Recurring/ Regular (RR) Promoting the planning and execution of emergency drills	EFD*, DMD ^{\$} , SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police	Recurring/ Regular (RR) • Involving forest communities/ forest village committees, JFM committees • Joint execution of emergency drills with local bodies – urban and rural in areas prone to forest fires	
5	Vocational Training/ Skill development	MOEFCC, MSDE, MMSME, NDMA, NIDM	Recurring/ Regular (RR) Promoting skill development for multi-hazard resistant construction with emphasis on fire safety in forest fire prone areas for different types of housing and infrastructure	DMD ^{\$} , SDMA, RD., SLSDA, DDMA	Recurring/ Regular (RR) • Conduct training programmes • Creating TOT teams for different trades relevant to fire-resistant construction in forest fire prone areas for different types of housing and infrastructure	
6	Empowering women, marginalised communities, and persons with disabilities	MWCD*, MOEFCC, NDMA, NIDM	Recurring/ Regular (RR) • Guidance to addressing issues of marginalised communities, SC/ST in forest fire prone areas • Promote gender sensitive and equitable approaches relevant in forest fire prone areas	DSJE*, EFD, SDMA, SIDM, DDMA, PRIs, ULBs	Recurring/ Regular (RR) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels	

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (**) ALCTE, IITs, UGC, NLSDA, IIE, NIESBUD, FSI, FRI. (\$) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.17.6 Climate Change Risk Management

Forest Fire		Climate Change Risk Management			
	Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
			Responsibility – Centre	Medium Term (T2)	
1	Research, Forecasting, Early Warning, Data Management, Zoning, Mapping	MOEFCC*, FSI, MOES, DOS, MHA, MOD, NLRTI	<p>Long Term (T3)</p> <ul style="list-style-type: none"> Studies/ assessments of areas prone to forest fires, ecological aspects, wildlife concerns Conduct a detailed fire history to determine the frequency, distribution, and severity of wildfire 	<p>EFD*, DMD^{\$}, SDMA, SLRTI</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MOEFCC*, MOES, MHA, MOD, MAFW, NDMA, MSIE, MHFW, NLRTI	<p>Medium & Long Term (T2, T3)</p> <ul style="list-style-type: none"> Undertake detailed studies on vulnerability and risk under GACC scenarios Assess GACC risks of vulnerable and marginalised sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	<p>EFD*, DMD^{\$}, SDMA, RD, WRD, DSIE, SLRTI</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Incorporate GACC information in DM plans/ reviews Medium Term (T2) Assess GACC risks of vulnerable and marginalised sections
3	Climate Change Adaptation (CCA)	MOEFCC*, MOES, MHFW, MOJS	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> Understand and assess adaptation needs Study coping mechanisms 	<p>EFD*, DMD^{\$}, SDMA, DDMA, PRIs, ULBS</p>	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitisation and awareness creation Support national CCA efforts Coordination with central agencies

Forest Fire		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State	Responsibility – State
Centre [#]	Responsibility – Centre	State [#]	State [#]	Short Term (T1)	Medium & Long Term (T2, T3)
		<ul style="list-style-type: none"> Support the implementation of CCA programs Promote adaptive measures in social protection programmes for the vulnerable groups 		<ul style="list-style-type: none"> Strengthen ecological monitoring of forests to improve the understanding of risks from GACC Develop local adaptation strategies and pilot projects 	<ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. (§) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

8

Preparedness and Response

8.1 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 (2016) defines response as:

Actions taken directly before, 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.

The overarching concern of disaster response is immediate and short-term needs, including immediate disaster relief. Effective, efficient, and timely response relies on disaster risk -informed preparedness measures, including the development of the response capacities of individuals, communities, organizations, countries and the international community. The institutional elements of response often include the provision of emergency services and public assistance by public and private sectors and community sectors, as well as community and volunteer participation. “Emergency services” are a critical set of specialized agencies that have specific responsibilities in serving and protecting people and property in emergency and disaster situations. They include civil protection authorities, and police and fire services, among many others. The division between the response stage and the subsequent recovery stage is not clear-cut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage.

Preparedness, as defined by UNISDR (2016), consist of the knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters. Preparedness action is carried out within the context of disaster risk management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response to sustained recovery.

Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities as contingency planning, the stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation, and public information, and associated training and field exercises. These must be supported by formal institutional, legal, and budgetary capacities. The related term “readiness” describes the ability to respond quickly and appropriately when required.

Local level preparedness of people for disasters can help in mitigating the impacts of disasters and also better response. Involvement of community at local level through PRIs can go a long way in getting people prepared for countering disasters. In case of disasters, PRIs can play a crucial role in mobilizing people and local resources.

Based on the preparedness, the response process begins as soon as it becomes apparent that a disastrous event is imminent and lasts until the relevant authorities declare it as over. Response is

carried out during periods of high stress in highly time-constrained situations with limited information and recourses. It is considered as the most visible among 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 has a facilitative role in disaster risk management in all phases of the disaster management cycle including response for all types of disasters. 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, threats of nuclear/ radiological terrorism events, CBRN emergencies, detonation of conventional weapons, 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, central government and the specialized agencies. The central government supplements the efforts of state government by providing logistic and financial support, deploying NDRF, Armed Forces, CAPF, and other specialized agencies mandated to respond to particular types of disasters. It will depute experts to assist the state government in planning and its implementation as per request from the state government.

8.2 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 ministries and agencies.

No single agency or department can handle a disaster situation of any scale alone. Different departments must 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)

Currently a National Emergency Response Centre (NERC) is functional in Disaster Management Division of MHA and establishment of an Integrated Control Room for Emergency Response (ICR -ER) has been initiated by MHA. It will be connected to the following control rooms:

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

8.3 National Early Warning System

8.3.1 Central Agencies Designated for Natural Hazard-Specific Early Warnings

Table 8-1: Central Agencies Designated for Natural Hazard-Specific Early Warnings

SN	Hazard	Ministry	Agency
1.	Avalanches	MOD	Snow and Avalanche Study Establishment (SASE)
2.	Cold Wave	MOES	India Meteorological Department (IMD)
3.	Cyclone	MOES	India Meteorological Department (IMD) Regional Specialized Meteorological Centre (RSMC) Tropical Cyclone Warning Centres (TCWC) for different regions
4.	Drought	MAFW	Central Drought Relief Commissioner (CDRC) and Crop Weather Watch Group (CWWG)
5.	Earthquake	MOES	India Meteorological Department (IMD)
6.	Epidemics	MHFW	Ministry of Health and Family Welfare (MHFW)
7.	Floods	MOJS	Central Water Commission (CWC)
8.	Heat Wave	MOES	India Meteorological Department (IMD)
9.	Landslides	MOM	Geological Survey of India (GSI)
10.	Tsunami	MOES	India National Centre for Oceanic Information Services (INCOIS)

The GOI has designated specific agencies (Table 8-1) 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. 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.

8.3.2 Role of Central Agencies/ Departments

The National Emergency Response Centre (NERC) will act as the communication and coordination hub for maintaining constant touch with early warning agencies for updated inputs. It will eventually be upgraded as the Integrated Control Room for Emergency Response (ICR-ER). 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. The NDRF will always be in operational readiness.

8.4 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 1-3, Chapter-1). 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 tend 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 Incident Response System (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.

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. To prevent delays and eliminate ambiguities regarding 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 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 Search and Rescue Advisory Group (INSARAG) must be spelt out in the SDMP. From time to time the DM plan must be tested and rehearsed by carrying out mock exercises.

8.5 Fire and Emergency Services (F&ES)

The Fire and Emergency Service (F&ES) fall within the mandate of the urban local bodies (municipalities/ nagarpalikas) as per constitutional provisions (Section 7, Schedule 12, Article 243W). The administrative and operational structures and systems vary from state to state. Presently F&ES are organized by the concerned States and UTs with the MHA rendering advice on protection, prevention, reforms and legislation. The primary role of F&ES is of responding to fire incidents. However, besides firefighting, F&ES attends to other emergencies such as building collapse, road traffic accidents, human and animal rescue, and several other emergency calls. F&ES also takes part in medical emergencies. The role of F&ES has become multi-dimensional. The role of F&ES extends to the domain of prevention, especially in urban areas. F&ES is an integral part of the group of agencies responding to disaster situations. F&ES 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 F&ES. Further, continuous training should also be provided to the fire staff in using and maintaining the equipment.

F&ES is a key element in the emergency response system. It comes under the 12th schedule of the constitution dealing with municipal functions. At present, States and UTs, and ULBs are managing the F&ES. 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, F&ES 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.

The type, scale and standards applicable for equipment and the training of the staff are subject to technological advances and emerging good global practices. Besides, given the regional differences and local challenges due to diverse terrains as well as conditions, some degree of innovation, customisation and adaptation are necessary to make for effective use and deployment. Both right-sizing and down-sizing are required while maintaining the operational efficiencies of the equipment. For example, in some urban areas where roads are narrow and large equipment cannot gain quick access, it may be necessary to use down-sized equipment mounted on small vehicles that have adequate capacity to carry the equipment. Similarly, in most rural or less developed areas, it is difficult to maintain and operate the same equipment that are deployed in large cities. Therefore, rather than providing specifications or an indicative list, the NDMP enjoins the agencies responsible for response to adopt the best practices and most appropriate technologies subject to rigorous quality control and testing.

In each State, the F&ES have grown according to the initiatives taken by the States and availability of funds. 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 need to be

amended. Government of India has also taken steps for institutional reforms and organizational restructuring of F&ES. However, it is the responsibility of the State Governments to implement the major changes for the modernization of the F&ES to make them more effective.

8.6 Responding to Requests for Central Assistance from States

Catastrophic disasters like earthquakes, floods, cyclones and tsunami result in large 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 hit hard by a severe 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.

8.7 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 India consisting of National, State and District level arrangements 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.

8.8 Response System 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, 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.

8.9 Emergency Functions 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 responsibility framework applicable to all types of disasters. The response responsibility framework 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 must 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 DMD (State Disaster Management Department, i.e., the state's nodal dept. for DM) and SDMA are lead agencies at the state level for coordination of response. The DDMA is the lead agency for coordination of response at District level. Various central ministries, departments, agencies, and state governments must prepare their own hazard specific response plans as per guidelines of the NDMA and in line with the NDMP. They must always ensure preparedness for response and must carry out regular mock drills and conduct tests of readiness periodically, and the ministries/ departments must report the status to the NDMA. Agencies responsible for disaster response should develop their individual scenario-based plans and SOPs considering multiple hazards and envisaging different scenarios ranging from least to the worst cases. The scenario-based planning exercises should be part of the preparedness of response agencies at all levels. The major tasks of disaster response given in the responsibility framework and listed alphabetically for easy reference are:

1. Communication
2. Cultural Heritage Sites, their Precincts and Museums — Protection & Preservation
3. Data Collection and Management
4. Disposal of animal carcasses
5. Drinking Water/ Dewatering Pumps/ Sanitation Facilities
6. Early Warning, Maps, Satellite inputs, Information Dissemination
7. Evacuation of People and Animals
8. Fodder for livestock in scarcity-hit areas
9. Food and Essential Supplies
10. Fuel
11. Housing and Temporary Shelters
12. Management of the dead people
13. Media Relations
14. Medical care

15. Power
16. Public Health
17. Rehabilitation and Ensuring Safety of Livestock and other Animals, Veterinary Care
18. Relief Employment
19. Relief Logistics and Supply Chain Management
20. Search and Rescue of People and Animals
21. Transportation

8.10 Responsibility Framework for Preparedness and Response

Preparedness and Response					
SN	Emergency Function *	Centre	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
1	Communication	MCOM, DOT	<p>Lead Agencies: IPRD</p> <ul style="list-style-type: none"> 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 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. <p>Support Agencies: MOR, MOCI, MOD, Telecom Providers</p> <ul style="list-style-type: none"> 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 fail 	<p>Lead Agencies: IPRD</p> <ul style="list-style-type: none"> 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 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 	

Preparedness and Response					
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State	Responsibility – State
Centre	Responsibility – Centre				
		<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> 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 	
2	Cultural Heritage Sites, their Precincts⁵⁸ and Museums⁵⁹ – Protection & Preservation	<p>Lead Agencies: MOCU</p> <p>Support Agencies: MHUA, MTOU, MOL</p>	<p>Lead Agencies: ARHD</p> <p>Support Agencies: SDMA, DMD\$, DDMA, SEO, SDRF, F&ES, ULBs, PRIS, CUD, TOD, SPWD</p>	<ul style="list-style-type: none"> Safety of the people who engage with the Museums / Cultural Heritage sites and Precincts. Comprehensive plan including evacuation, immediate response protocols and procedures, etc. considering the specific challenges presented by the site/precinct Creating an emergency team that includes the management, administrators and staff of the site or precinct as well as representatives from local stakeholders Identification of evacuation routes, spaces that may act as temporary refuge areas, and displaying these routes and 	

58 National DM Guidelines for Cultural Heritage Sites, Museums and Precincts

59 National DM Guidelines for Museums

Preparedness and Response			
SN	Emergency Function*	Central/ State Ministries/ Departments and their Responsibilities	State Responsibility – State
Centre	Responsibility – Centre	State	Responsibility – State
			<ul style="list-style-type: none"> spaces in a clear manner as signage, maps, printed literature, etc., for wide distribution Identification of various kinds of emergency supplies and equipment and their storage for ease of access should be undertaken
3	Data Collection and Management	<p>Lead Agencies: MHA, NDMA</p> <p>Support Agencies: NIDM, MOIB, MCOM, MOST, MOES, MOJS, MOEFCC, ministries/ depts. with hazard-specific responsibilities</p>	<p>Lead Agencies: DMD⁵</p> <p>Support Agencies: State/JT, RD, SEO, SDMA, DDMA, Bureau of Economics and Statistics, all other relevant Depts.</p> <ul style="list-style-type: none"> 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
4	Disposal of Animal Carcasses	<p>Lead Agencies: MAFW, MAHDF</p>	<p>Lead Agencies: AHD</p> <ul style="list-style-type: none"> Provide clarity when required in following the national guidelines and international norms Facilitate the support from various national laboratories and institutions relevant for recording evidence and compiling data on the dead such as forensic, genetic studies, etc. <ul style="list-style-type: none"> Adopt SOP in SDMP and DDMF as per National Guidelines⁶⁰ and implement it properly Activate the Animal Carcass Management Group in the IRS as per national guidelines

⁶⁰ National Guidelines – Management of the Dead in the Aftermath of Disasters, 2010

Preparedness and Response					
SN	Emergency Function *	Centre	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
	Supporting Agencies: MHA, MHFW	Supporting Agencies: MHA, MHFW	<ul style="list-style-type: none"> If necessary, assist the state government to contain any public health challenges beyond the capabilities of the state administration 	Support Agencies: State/UT, SDMA, RD, DMD ⁵ , SEOC, DDMA, AGD, Police, all other relevant Depts.	<ul style="list-style-type: none"> 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 the public Use of recommended safety kits and personal protection by the staff deployed in carcass disposal so that they are not infected Take measures for dispersal of financial relief as per norms
5	Drinking Water/ Dewatering Pumps/ Sanitation Facilities	Lead Agency: MDWS, MFPI	<ul style="list-style-type: none"> Promote 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 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 	Lead Agencies: WSD	<ul style="list-style-type: none"> 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 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

Preparedness and Response				
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
Centre	Responsibility – Centre			
		<ul style="list-style-type: none"> Facilitate the quick availability of hygienic portable toilets through pre-disaster agreements/ contracts with suppliers Facilitate the quick availability of packaged drinking 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 		<ul style="list-style-type: none"> 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 Arrangements 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 Arrangements with companies for 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	Early Warning, Maps, Satellite Data, Information Dissemination	<p>Lead Agencies:</p> <p>See Table 8-1 for different disasters notified by GOI</p> <p>Support Agencies:</p> <p>Ministries and agencies as</p>	<p>Lead Agencies:</p> <ul style="list-style-type: none"> Issue forecasts, alerts, warnings Provide early warnings (where 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 <p>DMD[§]</p> <p>Support Agencies:</p> <p>State/UT, SDMA, RD, SEO, DDMA, all other relevant Depts.</p>	<ul style="list-style-type: none"> 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

Preparedness and Response					
SN	Emergency Function*	Centre	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
		described in the relevant NDMA guideline	Responsibility – Centre		<ul style="list-style-type: none"> • Ensure appropriate compilation/ analysis of received data • Use of satellite imageries and other scientific methods for risk assessment and forecasting • Quick assessment of evacuation needs such as the number of people and animals to be evacuated and mode of evacuation • Special attention to evacuation of PWD • 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 • 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 for people and animals
7	Evacuation of People and Animals	MHA	<p>Lead Agency:</p> <p>On request, support the affected state government in evacuation of people and animals from areas likely to be affected by major disaster</p> <p>Support Agencies:</p> <p>MOD, CAPF, MRTTH, MOR, MOCI, ministries/ depts. with hazard-specific responsibilities, NDRF, CDEF</p> <p>Special Situations:</p> <ul style="list-style-type: none"> • 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 because of inclement weather, landslides, flash floods and avalanches • Evacuation of fishermen from the high seas in case of a cyclone 	DMD\$	<p>Support Agencies:</p> <p>State/UT, SDMA, SDRF, RD, SEOC, F&ES, DDMA, CDEF, all other relevant Depts.</p>

Preparedness and Response			
SN	Emergency Function*	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
	Centre	Responsibility – Centre	State
			<ul style="list-style-type: none"> • Undertake review and revise DMPs and SOPs after each major incident • Prepare evacuation plan considering 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
8	Fodder for Livestock in Scarcity-hit Areas	<p>Lead Agency: MAFW, MAHDF</p> <p>Support Agencies: MRTH, MOR</p>	<p>Lead Agency: AHD</p> <p>Support Agencies: State/UT, SDMA, RD, DMD⁵, SEO, DDMA, EFD, AGD, Animal Welfare Organizations</p> <ul style="list-style-type: none"> • When required, mobilize fodder and cattle feed to meet shortages, as in drought or scarcity conditions • Facilitate transport of fodder from storage facilities or distant areas to the scarcity-hit areas • Enlist PSUs and private agencies for providing fodder and other support
9	Food & Essential Supplies	<p>Lead Agencies: MCAFDP, MFPI</p>	<p>Lead Agencies: FCSD</p> <ul style="list-style-type: none"> • Availability of adequate and appropriate food supplies to the disaster-affected areas • Food grains • Ready-to-eat/ pre-cooked food/ meals • Transport with essential supplies at strategic location <ul style="list-style-type: none"> • 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 • MOU with suppliers to provide food grains, ready-to-eat/ pre-

Preparedness and Response						
Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
SN	Centre	Responsibility – Centre	Supporting Agencies :	Supporting Agencies :	State	Responsibility – State
		<ul style="list-style-type: none"> MOU with suppliers to provide required quantities of family packs of essential food provisions Supply of provisions to meet the needs of infants/ small children Counselling for lactating mothers Prepare FCI storage facilities to supply required food grains as per requirement of disaster affected areas 	Supporting Agencies : MRTA, MOCI, MOR, MSIE, MHA, FCI	<ul style="list-style-type: none"> cooked food/ meals, family packs of essential food provisions 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 Ensure food storage facilities have sufficient stocks and are located in relatively risk-free locations Supply of provisions to meet the needs of infants/ small children Counselling for lactating mothers 		
10	Fuel	Lead Agencies: MPNG	Support Agencies: MOD, MOR, MRTA, MOCI	Lead Agency: FCSD	Support Agencies: State/UT, SDMA, RD, DMD [§] , SEO, DDMA, CDEF, all other relevant Depts.	<ul style="list-style-type: none"> 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 make the requirement of fuel clear with the Central Ministry and coordinate the delivery of fuel through local arrangements.

Preparedness and Response			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
Centre	Responsibility – Centre	State	Responsibility – State
			<ul style="list-style-type: none"> • 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	Housing and Temporary Shelters	<p>Lead Agencies: MHUA, MORD</p> <p>Support Agencies: MHA, MRTH, MOR, HUDCO, BMTPC, CBRI</p>	<p>Lead Agency: UDD</p> <p>Support Agencies:</p> <ul style="list-style-type: none"> • 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 prefab shelter manufacturers/ suppliers, and tent manufacturers to provide shelters at the site usually within 24 hours of placement of orders • Establish regional logistic facilities (<i>covering 5 major regions in the country</i>) that are well-coordinated with the corresponding NDRF regional unit to maintain stocks of temporary shelters, tents and other non-food resources <ul style="list-style-type: none"> • 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 have MoUs 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

Preparedness and Response					
SN	Emergency Function *	Centre	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
					<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> 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
12	Livestock and Other Animals: Veterinary Care, Rehabilitation and Ensuring Safety	Lead Agency: MAFW, MAHDF Support Agencies: MNRTH, MOR	<ul style="list-style-type: none"> Support the setting up of livestock camps/ shelters for animals in distress due to disasters, including drought Support 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 	Lead Agency: AHD Support Agencies: State/UT, SDMA, RD, DMD ⁵ , SEOC, DDMA, EFD, AGD, Animal Welfare Organizations	<ul style="list-style-type: none"> 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
13	Management of the Dead	Lead Agencies: MHA, NDMA, NDRF Support Agencies: MOD, CAPF, MHWF,	<ul style="list-style-type: none"> Provide guidance and support depending on the type of disaster and challenges faced by the state government Provide clarity when required in following the recommended international practices as prescribed in relevant NDMA guidelines⁶¹ and international norms such as those of the IRC 	Lead Agency: SDRF	<ul style="list-style-type: none"> Adopt SOP in SDMP and DDMF as per NDMA guidelines⁶² and implement it properly Establishing Dead Body Management Group in the IRS at state and district levels as per national guidelines

⁶¹ NDMA Guidelines – Management of the Dead in the Aftermath of Disasters, 2010

⁶² NDMA Guidelines, ibid

Preparedness and Response			
SN	Emergency Function *	Centre	Central/ State Ministries/ Departments and their Responsibilities
			Responsibility – Centre
	MHA, MORTH, MOR, ministries/ departments with hazard-specific responsibilities, CDEF	<ul style="list-style-type: none"> Facilitate the support from various national laboratories and institutions relevant for recording evidence and compiling data on the dead such as forensic, DNA studies, etc. If necessary, assist the state government to contain any public health challenges beyond the capabilities of the state administration 	<p>Support Agencies:</p> <ul style="list-style-type: none"> State/UT, SDMA, RD, DMD^{\$}, SEO, F&ES, DDMA, CDEF, all other relevant Depts. <ul style="list-style-type: none"> Deploy trained squads for detection and recovery of the survivors and the dead as early as possible after the event The recovery team will use basic personal protective kit and follow adequate precautions Follow the protocols for the identification of the dead, recording evidence, transport and burial (i.e., disposal as per norms) Follow protocols to maintain the dignity of the dead in all possible ways If required, establish temporary mortuaries with adequate facilities where it is possible In special cases, appropriate arrangements and relevant protocol must be followed for victims in certain types of disaster keeping in view the safety of survivors and emergency workers Inform the affected community by giving wide publicity to the procedure for the management of the dead Take urgent steps for release of ex-gratia payment Ensure to the extent possible ethical management of the dead, along with respect for religious and cultural sensitivities

Preparedness and Response					
SN	Emergency Function *	Centre	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State
			Responsibility – Centre		
14	Media Relations		<p>• 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</p> <p>Lead Agencies: MOIB, MHA, NDMA</p> <p>Support Agencies: MCOM, MOST, MOES, MOJS, MOEFCC, ministries/ departments with hazard-specific responsibilities</p>	<p>Lead Agency: IPRD</p> <p>Support Agencies: State/UT, SDMA, RD, DMD⁶³, SEO, DDMA</p>	<ul style="list-style-type: none"> • Deal with the psychological impacts as per the national guidelines on psycho-social support⁶³ • Ensure due documentation such as inventory record of the dead, dead body identification and all relevant information as given in the national guidelines • 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

⁶³ National Guidelines – Psycho-Social Support and Mental Health Services in Disasters, 2009

Preparedness and Response			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
Centre	Responsibility – Centre	State	Responsibility – State
15	Medical Care	<ul style="list-style-type: none"> Assess medical emergency needs (if central assistance is required) 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 years of age. Timely technical support to the State Governments for restoration of damaged hospitals as well as infrastructure Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 Develop specialized facilities to handle chemical, biological, radiological and nuclear emergencies Strengthening of emergency departments in all hospitals under the central administration <p>Lead Agencies: MHFW</p> <p>Support Agencies: MOD, CAPF, MOR</p>	<ul style="list-style-type: none"> Assess medical emergency needs in coordination with central agencies as per situation 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					
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	State	Responsibility – State	Responsibility – State
Centre	Responsibility – Centre				
		<ul style="list-style-type: none"> Mobilise Psycho-Social Support and Mental Health Services (PSSMHS) professionals, para-professionals and trained community level workers Assist state government in providing PSSMHS 		<ul style="list-style-type: none"> Plan for surge capacity in all the major hospitals in the state Develop specialized facilities to handle chemical, biological, radiological and nuclear emergencies Strengthening of emergency departments of all major hospitals in the state Deploy PSSMHS professionals, para-professionals and trained community level workers Identify those requiring immediate PSSMHS and organise PSSMHS 	
16	Power	<p>Lead Agencies: MPWR</p> <p>Support Agencies: MNRE, MPNG, Power generating/ distribution companies</p>	<p>Lead Agency: SEB, DISCOM</p> <p>Support Agencies: State/UT, SDMA, RD, DMD^{\$}, SEO^C, DDMA</p>	<ul style="list-style-type: none"> Assistance to the respective state government in repairing power infrastructure; restore power supply in the disaster-affected areas; help power 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 Arrangements with suppliers for emergency 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 	<ul style="list-style-type: none"> 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 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

Preparedness and Response			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
Centre	Responsibility – Centre	State	Responsibility – State
17	Public Health	<p>Lead Agencies: MHWF</p> <p>Support Agencies: MOD, CAPF, MOR</p> <ul style="list-style-type: none"> Assess public health (if central assistance is required) Helping to implement public health IRS Respond to biological emergencies Operating epidemiological surveillance systems Providing laboratory support Managing information systems Providing risk communication Support public health logistics (drugs and vaccines), non-pharmaceutical interventions Support immunisation, disinfection, vaccination and vector control measures 	<p>Lead Agencies: HFWD</p> <p>Support Agencies: State/UT, SDMA, RD, DMD[§], SEO, SDRF, F&ES, DDMA, CEDF, all other relevant departments</p> <ul style="list-style-type: none"> Activating Public Health IRS Assess public health needs in coordination with central agencies as per situation Coordinate with central agencies in case of biological emergencies Coordinate with central agencies for epidemiological surveillance Manage public health logistics (drugs and vaccines), non-pharmaceutical interventions Carry out immunisation, disinfection, vaccination and vector control measures
18	Relief Employment	<p>Lead Agencies: MORD, MOPR, MHA</p> <p>Support Agencies: MLBE, MOJS, MDWS, MAFW</p>	<p>Lead Agencies: COR</p> <p>Support Agencies: State/UT, AGD, DRD, DMD[§], SDMA, DDMA</p> <ul style="list-style-type: none"> 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 wages Carry out health check-up of those seeking work Draw from various funds including Disaster Response Fund to implement the employment schemes
19	Relief Logistics and Supply Chain Management	<p>Lead Agencies:</p>	<ul style="list-style-type: none"> Establish a mobilisation centre at the airport/railway station for the movement of relief supplies within the state
		<p>Lead Agencies: DMD[§]</p>	<ul style="list-style-type: none"> 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

Preparedness and Response					
SN	Emergency Function*	Central/ State Ministries/ Departments and their Responsibilities	Support Agencies:	State	Responsibility – State
	MHA, ministries with hazard-specific responsibilities	<p>Centre</p> <ul style="list-style-type: none"> 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 Establish a mobilisation centre at the airport/railway station for the movement of relief supplies Deploy special transportation 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 to reach relief supplies to the affected state/district 	<p>Support Agencies:</p> <ul style="list-style-type: none"> State/UT, SDMA, RD, SEO, DDMA, all other relevant Depts. 	<ul style="list-style-type: none"> Deploy special transportation 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, water) with Central ministries/ departments/ agencies Arrange alternative means of transportation to reach relief supplies to the affected locations if normal transport cannot reach 	<ul style="list-style-type: none"> Deploy special transportation 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, water) with Central ministries/ departments/ agencies Arrange alternative means of transportation to reach relief supplies to the affected locations if normal transport cannot reach
20	Search and Rescue of People and Animals	<p>Lead Agencies:</p> <ul style="list-style-type: none"> MHA, NDRF <p>Support Agencies:</p> <ul style="list-style-type: none"> MOD, CAPF, MHFW, MHA, MRTI, MOCI, MOR, ministries/ departments with hazard-specific responsibilities, CDEF 	<p>Lead Agencies:</p> <ul style="list-style-type: none"> DMD\$ <p>Support Agencies:</p> <ul style="list-style-type: none"> State/UT, SDMA, RD, SEO, SDRF, F&ES, DDMA, CDEF, all other relevant Depts. 	<ul style="list-style-type: none"> 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 Deploy Quick Response Teams (QRT) Deploy Quick Medical Response Teams (QMRT) MoU with suppliers for medicines, vaccines, disinfectants, 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 	<ul style="list-style-type: none"> 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,

Preparedness and Response			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
	Centre	Responsibility – Centre	Responsibility – State
		<ul style="list-style-type: none"> Support of Armed Forces and CAPF as per requirement Coordinate with the state government and district administration for deployment of QRTs and QMRTS SAR in coastal and marine waters 	<ul style="list-style-type: none"> Inflatable lights, torches, ropes, etc. with a condition that they will be supplied 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) Deploy Quick Response Teams (QRT) Deploy Quick Medical Response Teams (QMRT)
21	Transportation	<p>Lead Agencies: MRTH, MOR, MOCI</p> <p>Support Agencies: MHA, MOD, NHAI, MOSH, NDRF, MHFW</p>	<p>Lead Agencies: TRAD</p> <p>Support Agencies: State/UT, SDMA, RD, DMD^{\$}, SEO, DDMA, EFD, SPWD, Airport Officer, all other relevant Depts.</p> <ul style="list-style-type: none"> Adequately address the post-disaster transportation needs to ensure that the emergency response and recovery efforts are carried out in a timely manner; restore 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 <ul style="list-style-type: none"> 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 Requirement of transport for the transportation of 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

Preparedness and Response			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
Centre	Responsibility – Centre	State	Responsibility – State
		<ul style="list-style-type: none"> personnel and shifting affected population to safer places/ shifting stranded passengers in consultation with State Government Availability of diesel locos 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 having staff with experience of working in disaster situations Contingency plan is in place to deploy rail 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 	<ul style="list-style-type: none"> 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

<i>Preparedness and Response</i>			
SN	Emergency Function *	Central/ State Ministries/ Departments and their Responsibilities	Responsibility – State
SN	Centre	Responsibility – Centre	Responsibility – State
		<ul style="list-style-type: none"> • 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. 	

(*) The emergency functions are listed alphabetically and do not imply any sequence or order of priority. Many of these are executed concurrently and not sequentially.

(\\$) DMD-Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

9

Recovery and Building Back Better

9.1 Scope

Recovery is defined as:

"The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and "build back better", to avoid or reduce future disaster risk." (UNISDR 2016)

The recovery task of rehabilitation and reconstruction begins soon after the emergency phase ends, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. The focus of recovery is on restoring livelihoods, shifting to a path of sustainable development that reduces disaster risk. Recovery should be conceived as an integral part of ongoing developmental process at appropriate levels: national, regional, and local. The context in which it will take place will be necessarily shaped by the prevailing social and economic conditions and the vulnerability of the affected states and communities. Recovery processes are aimed at restoring the capacity of the government and communities to recover from the disaster, strengthen the capabilities to cope with disasters and reduce future disaster risk. Building back better envisages seizing the opportunity to rebuild to reduce development deficits of the affected areas going beyond restoration to the pre-disaster 'normal'. Recovery programmes, coupled with the heightened public awareness and engagement after a disaster, afford a valuable opportunity to develop and implement disaster risk reduction measures and to apply the "Build Back Better" principle.

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of building back better. 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 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, 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 building back better.

The plan for reconstruction and rehabilitation is designed keeping in view the worst-case scenarios 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 unmet critical needs of the affected population while evolving a comprehensive recovery plan.

9.2 Approach

The approach to reconstruction and recovery is guided by the NPDM 2009. Its salient clauses/ sections are given below:

Para 9.1.1 of the NPDM states that - the approach to the reconstruction process must be comprehensive 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, contribution of the NGOs and corporate sector will be encouraged. Reconstruction programme will be within the confines and qualitative specifications laid down by the Government.

Para 9.3.1 of NPDM states that 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. Relevant Central Ministries/Departments and the State Governments should create dedicated project teams to speed up the reconstruction process.

Para 9.3.2 of NPDM states that 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.

Para 9.5.1 of NPDM suggest that state governments should give emphasis to 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.

9.3 Recovery Process

Effective post-disaster recovery usually has the following three broad aspects:

- a) Physical aspects of recovery, i.e. restoration and reconstruction of damaged community infrastructure, critical infrastructure, private houses and cultural heritage buildings
- b) Economic aspects of recovery, i.e. livelihoods, productive activities and market services
- c) Social recovery, i.e. social and psychological aspects of personal, family and community functioning and wellbeing

The key interventions under recovery programmes can be classified under four broad heads:

- Physical
- Economic
- Social
- Cross Cutting Sectors

After a disaster, a Post-Disaster Needs Assessment (PDNA) must be undertaken, which will be a government-led exercise. Depending on the disaster, this may be undertaken by the state government and through joint efforts of the central and state governments. The PDNA will also provide a platform for the international community to assist in recovery and reconstruction, where such assistance is required. A systematic PDNA will provide a credible basis for recovery and reconstruction planning that incorporates risk reduction measures.

Typically, the PDNA comprises of a ‘Damage and Loss Assessment’ (DALA), a ‘Human Recovery Needs Assessment’ (HRNA) and a ‘Recovery Framework’. The DALA is quantitative in nature that can be used to value damages arising from a hazardous event, and the subsequent economic losses caused by the event. The DALA highlights the possible consequences on the growth of the economy, the external sector and the fiscal balances, as well as the impact due to decline of income and livelihoods of households or individuals. The HRNA focuses on the social impact of disasters, analysing how disasters affect local patterns of life, social structures and institutions. A HRNA includes analysis of primary data from household or other units of analysis and provides insight into the recovery and reconstruction from the viewpoint of the affected community. The Recovery Framework summarizes the recovery recommendations from the sectoral assessments within the PDNA. It outlines the short, medium and long-term priorities for the recovery including plans for financing the BBB.

The UNISDR consultative document on building back better (UNISDR 2017) in support of the Sendai Framework, states the following:

Recovery is the most complex of the disaster management functions, involving the greatest number and variety of stakeholders and affecting the greatest long-term impact on a community’s social and economic success. There are numerous relationships that must be formed and dependencies that must be fostered, many of which are wholly unfamiliar to the recovery stakeholders that typically operate outside of the post-disaster context. An inclusive and comprehensive disaster recovery framework serves as an agreed way forward to simplify the recovery process thereby maintaining or even improving development trajectories while ensuring adherence to Build Back Better principles. Recovery is most successful when the wide-ranging needs of communities, organizations, and individuals are addressed in the coordinated manner that recovery frameworks enable.

Disaster recovery process is rarely a set of orderly actions. It will consist of several related activities such as the following:

- Damage and needs assessments (PDNA, DALA, HRNA)
- Developing a recovery framework including institutional arrangements and financing plan
- Measures to ensure socially inclusive recovery
- Focus on sustainable development and climate change adaptation
- Demolition of damaged structures, debris clearance, removal and its environmentally safe disposal
- Restoration and even upgrading utilities including communication networks
- Re-establishment of major transport linkages
- Temporary housing and detailed building inspections
- Redevelopment planning
- Environmental assessments
- 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 9-1:

Table 9-1: Major Steps of the Recovery Process and the Key Processes Involved

	Major steps	Process
1	Post-Disaster Needs Assessment and Credible Damage Assessment	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • High level meetings as well as broad-based, wider consultations with experts, civil society, and key stakeholders • Build consensus among the range of stakeholders within and outside government
3	Ensure coherence of BBB with the development programs and goals	<ul style="list-style-type: none"> • 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	<p>Consultations and background studies on:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

9.4 Early, Mid and Long-term Recovery

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 DM 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 NPDM 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 9-2.

Table 9-2 Recovery Stages

Recovery Stage	Duration	Brief Description
Early	Within 18 Months	Cash for work, resumption of markets, commerce and trade, restoration of social services, transitional and temporary shelters
Mid-Term	Within 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 along with developmental plans: infrastructure strengthening, environmental, urban and regional planning

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 must 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.

9.5 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 which has been destroyed
- Restoration of jobs/ livelihood that was lost
- Restoration of the economic base of the disaster areas

9.6 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.

9.6.1 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

9.6.2 State Government

The damage assessment and all the phases of recovery and reconstruction (early 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

9.6.3 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

9.6.4 Voluntary Organizations and International Aid Agencies

They may participate in the following activities:

1. Joint need and damage assessment
2. Support government effort in reconstruction process especially in so far as the mandate requires them
3. Provide technical support to reconstruction and recovery efforts
4. Assist the government in disseminating public information regarding reconstruction and rehabilitation plan
5. Training and capacity development of local communities

9.7 Rehabilitation

9.7.1 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 reconstruction of damaged physical infrastructure and measures to address disaster-induced psychological problems, 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

9.7.2 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

9.7.3 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 employing criteria relevant to the nature of the calamity and the extent of damage. Relocation efforts should invariably include activities such as the following:

- Avoid secondary displacement as far as possible
- Ensure that relocation when it is unavoidable is undertaken in a socially inclusive manner taking the marginalised communities belonging to SC and ST into confidence
- Making the processes as gender-sensitive as possible and giving due consideration to the needs of sexual and gender minorities
- Gain consent of the affected communities
- Clearly define land acquisition and allocation process ensuring transparency and providing adequate grievance redressal as well as negotiation mechanisms
- 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

9.7.4 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.

9.7.5 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 workbooks 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

9.7.6 Rehabilitation of the Elderly, Women, Children and PWD

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
- Measures to support PWDs including providing facilities and health care
- 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

9.7.7 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 must give due importance to 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.

9.7.8 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

9.7.9 Restoration of Damaged Cultural Heritage Sites, their Precincts and Museums

Post disaster repairs and reconstruction of damaged sites/precincts should always be undertaken based on sound documentation and assessment practices. Poor reconstruction practices cause further physical damage to heritage structures, may worsen its structural vulnerability and carries the risk of erasing the heritage features. Reconstruction and rehabilitation approaches need to consider the legislative frameworks already in place for different typologies of heritage sites and precincts. In general, the following principles should be followed:

- An approach of minimal intervention should be undertaken for sites of historic and archaeological importance and any intervention should be based on sound documentation and research. Aspects of authenticity and visual integrity should form the basis of any reconstruction, repair, and retrofitting attempt.
- As far as possible, traditional skills and technologies where they still exist should be employed in the repair and restoration of damaged structures. This helps ensure continuity of building and crafts traditions.
- Many cultural heritage sites and precincts hold strong cultural/ socio-economic associations with the local population and restoring them instils a sense of normalcy after a disaster. These considerations should facilitate the conservation/ reconstruction of heritage within the overall recovery plan.
- The notion of 'build back better' applied to cultural heritage must not undermine the archeological and/ or cultural aspects, which means that retrofitting measures for improving the structural stability of cultural heritage sites, should be undertaken cautiously paying due attention to restoration of the original.
- All restoration and retrofitting of the cultural heritage must be undertaken only after carrying out due consultation among stakeholders to preserve the cultural, archeological and heritage aspects.

- The impact of retrofitting on integrity and cultural value of heritage structures must be discussed and properly evaluated with due weightage for restoration to pre-disaster status as closely as possible
- Restoration or reconstruction of heritage after disasters should go beyond buildings and it should look at heritage livelihood, traditional trades/ crafts etc.

9.8 Fund Mobilization

9.8.1 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:

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

9.8.2 Mobilizing, Disbursement and Monitoring

The domestic or internal sources of on-budget government funds usually consist of the following:

- Government operational and capital budgets
- Reallocation among the budget items to disaster-hit sectors
- Special levies or taxes; additional taxes or surcharge for recovery
- Contingency financing arrangements
- Issuing sovereign reconstruction or development bonds
- Introducing policy incentives for the private sector to share recovery costs
- Voluntary contributions from civil society and private philanthropies
- Insurance/ risk transfer mechanisms

External resources for post-disaster reconstruction can be sourced from multilateral development banks, regional development banks, bilateral development partners, international NGOs, private philanthropies and charities, and remittances. The possible multilateral financing resources for post-disaster recovery and reconstruction consist mostly of the following types:

- Credits or loans from multilateral development banks
- Reallocation of existing portfolio of international development institutions
- Multi-donor Trust Funds
- Debt relief
- Ex-ante contingent component of standard investment operations

- Risk Insurance
- Standby financing
- Catastrophic development Deferred Drawdown Option⁶⁴ (DDO)

Some of the important aspects of mobilizing and managing the funds of a large recovery programme consist of the following and are summarised in Table 9-3:

1. Review of the Damage and Loss Assessment (DaLA)
2. Developing a vision and specific time-bound goals for BBB
3. Estimate financial requirements of the recovery programme
4. Identify likely sources of funds and examine various options
5. Defining and enforcing robust financial norms for the financial management

Table 9-3: Important aspects in mobilizing and managing the funds of a recovery programme

	Major Step	Description
1	Review of the Damage & Loss Assessment	Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts
2	Developing a vision and specific time-bound goals for BBB	<ul style="list-style-type: none"> • Develop the scope and goals of BBB • Disaster resilient physical recovery • Options for fast economic recovery • Set phase-wise betterment targets
3	Estimate financial requirements of the recovery programme	<ul style="list-style-type: none"> • Prepare sector-wise and phase-wise financial estimates • Consultations and evaluation of various options • Finalization of financial estimates
4	Identify likely sources of funds and examine various options	<ul style="list-style-type: none"> • Domestic resources: <ul style="list-style-type: none"> – From the state (on budget) and additional fund-raising options (off budget) – Central grants and other options – on and off the budget • International including borrowing from IFI – facilitated by the central govt. • Other Sources: <ul style="list-style-type: none"> – Donors – Community contribution – Private sector CSR, PPP
5	Defining and enforcing robust financial norms for the financial management	<ul style="list-style-type: none"> • Setting norms and rules to allocate funds for new development, retrofitting, owner-driven reconstruction (mainly homes), • Defining norms efficient disbursement along with the degree of flexibility needed in recovery programs • Implementing mechanisms for monitoring proper utilization including an appropriate MIS

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:

⁶⁴ The catastrophe development loan with a Deferred Draw Down Option is a contingent credit line that provides immediate liquidity to IBRD member countries in the aftermath of a natural disaster. It is part of a broad spectrum of risk financing instruments available from the World Bank Group to help borrowers plan efficient responses to natural disasters.

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

9.8.3 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

10

Capacity Development – An Overview

10.1 Background

This chapter provides an overview of the capacity development measures described in appropriate contexts in the previous chapters presenting both a summary and a perspective to the capacity building aspects of the plan. The previous chapters describe specific aspects of capacity development in respective responsibility frameworks and discussion. The list given in this chapter is not exhaustive but indicative and illustrative supplementing the details present in the previous chapters. While the themes included are broadly in consonance with national, regional, and global practices, inevitably there will be changes that must be incorporated in the periodic revisions of the plan and during its implementation. All efforts must be made to follow the emerging best practices.

Capacity development covers strengthening of institutions, mechanisms, and capacities at all levels of all stakeholders. UNISDR defines 'Capacity Development' for DRR as follows:

"Capacity development is the process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals. It is a concept that extends the term of capacity-building to encompass all aspects of creating and sustaining capacity growth over time. It involves learning and various types of training, but also continuous efforts to develop institutions, political awareness, financial resources, technology systems and the wider enabling environment." (UNISDR, 2016).

The Sendai Framework challenges all stakeholders to focus on establishing and increasing capacity to manage their country's disaster risk. 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 Sendai 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 is a continuing process of enhancing 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. Mainstreaming of DRR is incomplete without mainstreaming of capacity building on DRR by different central Ministries/Departments and States/UTs. Capacity building should also include creating enabling environment by making relevant provisions in existing laws, rules and regulations etc.

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 across all time frames – recurring, short, medium 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 paying enough attention to organisational and institutional issues. Partnerships and collaborations are integral to institutional capacity building. In institutional capacity development, emphasis should also be on use of state-of-the-art technologies to upgrade the existing systems. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the disaster resilience. 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.” The capacity development being a continuous process, it must address challenges of staff turnover, task of educating new recruits, keeping pace with technical changes and incorporating the rapid advances in scientific knowledge.

The NPDM 2009 envisages a pivotal role for the National Institute of Disaster Management in capacity development. 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 including ministries, line departments 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.

10.2 NIDM, NDRF 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 of 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.

NDRF can also support capacity development and training needs of SDRF, Civil Defence, community and volunteers in preparedness and response. It is important that the SDRF and other agencies involved in response are able to work harmoniously for which NDRF must have a role in the training of all responders. There are several renowned institutes in various States, which are imparting training in DM. These will be strengthened with skilled resource persons and 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 National Training Academy 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. There are many other training

institutions belonging to various Ministries/ Departments/ Agencies/ PSUs, and they must include DRR in their training programmes and departmental examinations.

10.3 Capacity Development of Local Bodies – Rural and Urban

The capacities of PRIs and ULBs must 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 PRIs 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 must 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.

10.4 Training of 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 must 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. Community training programmes should be socially inclusive, and they should place special emphasis on building the capacities of women, children, elderly, SC/ST and PWD.

10.5 Disaster Resource Networks – National, State and District

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. 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. The resource network shall cover national level, state-level and district level agencies involved in disaster risk management.

10.6 Capacity Development Themes

The capacity development is applicable to all aspects of disaster management. The Central Ministries, departments and agencies as well as the State/UT Governments will take actions for capacity development of different stakeholders. It must be noted that the division of responsibilities between centre and state are described in greater detail in the responsibility framework given in separate chapters. The capacity development themes for DRR and related responsibilities are summarised in Table 10-1. The specifics corresponding to each Sub-Thematic Area are mentioned in the chapters shown in the last column of the table.

Table 10-1: Capacity Development for DRR Themes - Centre and State

SN	Thematic Area	Sub-Thematic Areas	Chapter (s) where Responsibilities are described
1	Deploying advanced technology and equipment	<ul style="list-style-type: none"> • Adopting the best global technologies • Identifying technology needs based on hazard risk and vulnerability and experiences • Procurements of best and most appropriate equipment 	3, 4, 5, 7, 8, 9
2	Disaster Information System	<ul style="list-style-type: none"> • Maintaining the resource network • Monitoring and maintaining the resource data • Regular updating the resource data • Developing fail-safe communications with advance technology • National and state level disaster information system • Improve data flows across Central Ministries/ Dept./ States and other authorised users • Integration of HRVCA data with disaster information systems • Ensuring reliable and credible database on disaster losses (direct and indirect) and post-disaster reconstruction 	3, 4, 5, 7, 8, 9
3	Disaster Risk Governance	<ul style="list-style-type: none"> • Mainstream and integrate DRR and strengthen institutional mechanisms for DRR • Promote participatory approaches, partnerships and networks • Promote quality standards, certifications, and incentives 	12
4	Disaster Risk Management	<ul style="list-style-type: none"> • Promote, encourage and facilitate appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions • 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 	3, 4, 5, 7, 8, 9
5	DM and DRR capacities at local levels	<ul style="list-style-type: none"> • Trainings in DRR at different levels of local governance • Improve awareness and preparedness of stakeholders at all levels • Preparing DM plans, regular updating, and mock drills 	3, 4, 5, 7, 8, 9
6	DRR– in education, research and professional disciplines	<ul style="list-style-type: none"> • Incorporate subjects of relevance to DRR in curriculum • Introduced specialized programs, degrees, courses and diplomas 	3, 4, 5, 7, 8, 9

SN	Thematic Area	Sub-Thematic Areas	Chapter(s) where Responsibilities are described
		<ul style="list-style-type: none"> • Promote relevant research projects, programs within institutes and through research grants • Technical and professional programs relevant to various specialized aspects of DRR • Develop ToTs • Research in diverse areas of DRR 	
7	Early Warning	<ul style="list-style-type: none"> • Deploy the state of art methods and technologies • Up-grade technical infrastructure and systems • Improve EW dissemination and ensure the last mile connectivity to the most remote parts • Improve the alerts system to make it more relevant to different regions and sections 	7
8	Emergency Operation Centres - Strengthening	<ul style="list-style-type: none"> • Enhance emergency response capabilities • Strengthen EOCs, improve infrastructure, upgrade equipment, adopt best available technologies • Improve capabilities based on experience after each disaster event • Deploy best of ICT • Conduct capacity audits of EOCs • Set up State and District level EOCs with adequately trained manpower • Regular reviews and improvement of SOPs, protocols, etc. • Mobile control rooms 	7, 8
9	Global Anthropogenic Climate Change Risks	<ul style="list-style-type: none"> • Recognise and address climate change risks in DRR • Strengthen adaptations to GACC 	3, 7
10	Mainstreaming DRR	<ul style="list-style-type: none"> • Incorporating DRR into development plans and programs • Incorporating PM's Ten Point Agenda for DRR into development plans • Making DRR as an inherent part of all ministry, department, state development plans • Extending convergence to the domain of DRR 	5
11	Non-Structural Measures for DRR	<ul style="list-style-type: none"> • Institutional arrangements, policies, legal support, and regulatory framework • Revision of building codes and standards for rehabilitation reconstruction practices both for urban and rural areas • Norms and incentives for retrofitting • Reinforce systems to implement, monitor, and enforce regulations for DRR to promote disaster-resistant built environment 	3, 4, 5, 7, 8, 9
12	Post-2015 Global Frameworks – coherence and mutual reinforcement across DRR themes	<ul style="list-style-type: none"> • Understanding post 2015 global frameworks and their implementation for DRR • Understanding Sendai Framework and its integration into the implementation of DMP at different levels • Understanding DRR aspects of SDG and its implementation for DRR • Understanding COP21 (Paris Agreement on Climate Change) and the integration of climate-related concerns into various DMPs 	3

SN	Thematic Area	Sub-Thematic Areas	Chapter(s) where Responsibilities are described
13	Preparedness and Response	<ul style="list-style-type: none"> • Institutional reforms, modernization, and changes in legal framework • Strengthening of Fire and Emergency Services • 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 • 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 • Preparedness and response plans at all levels • Community-based DRR and DM 	8
14	Recovery and Build Back Better	<ul style="list-style-type: none"> • Post-Disaster Needs Assessment (PDNA) 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 	9
15	Skill Development for Disaster Resilience	<ul style="list-style-type: none"> • Training and skill development for masons and other artisans • Promoting community-based DM considering specific needs, regional diversities and multi-hazard vulnerabilities • 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 	3, 4, 5, 7, 8, 9
16	Social Inclusion in DRR	<ul style="list-style-type: none"> • Gender-based vulnerabilities • Scheduled Castes and Scheduled Tribes • Elderly • Children • Persons with Disabilities 	4,7,
17	Understanding Risk	<ul style="list-style-type: none"> • Observation Networks, • Information Systems, • Research • Forecasting • Zoning/ Mapping • Monitoring • Hazard Risk Vulnerability and Capacity Assessment (HVCA) 	7

11

Financial Arrangements

11.1 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 FCs have reviewed various aspects of funding disaster management in the country in consultation with various stakeholders. 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 relevant recommendations.

The DM Act 2005 has also recommended the National Disaster Mitigation Fund, which has been under the consideration of the Government. As of now, the 14th Finance Commission (FC-XIV) has not made any recommendation regarding the National Disaster Mitigation Fund. However, the need for funds is being deliberated by the National Authority in consultation with the stakeholders. Appropriate measures will be taken accordingly.

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.

11.2 National Disaster Response Fund

The state government is primarily responsible for undertaking rescue, relief and rehabilitation measures in the event of a 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 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 for 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. A Sub-Committee of the NEC will examine the request under Section 6 of the DM Act, 2005. The NEC will assess the extent of assistance and expenditure, which can be funded from the National Disaster Response Fund as per norms and make recommendations. Based on the recommendations of Sub-Committee of the NEC, a High Level Committee (HLC) will approve the quantum of immediate relief to be released from National Disaster Response Fund. The Disaster Management Division of MHA will provide support to the HLC. The MHA shall oversee the utilisation of funds provided from the National Disaster Response Fund and monitor compliance with norms.

11.3 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 year in which National Disaster Response Fund is released and the expenses incurred by state in the previous fiscal year under State Disaster Response Fund. In case the same state faces another severe disaster during the same year, no reduction will be 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 per cent of the annual funds allocation of the State Disaster Response Fund. The two funds have provisions for the following:

- Gratuitous Relief
- Search and Rescue operations, 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 per cent 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 must meet the capacity development expenses from the State Disaster Response Fund and not National Disaster Response Fund, subject to a limit of 10 per cent 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 item 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.

11.4 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. 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.

11.5 Recommendations of the Fourteenth Finance Commission

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

11.6 Statutory Provisions

11.6.1 Financing Prevention, Mitigation, and Preparedness

The provisions relating to funding of prevention, mitigation, and preparedness, as per DM Act 2005 are listed below:

- i. Section 6 (g) provides that NDMA may recommend provision of funds for the purpose of mitigation;
- ii. Section 18 (2) (f) provides that SDMAs may recommend provision of funds for mitigation and preparedness measures;
- iii. Section 35 (2) (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 (2) (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

11.6.2 Allocation by Ministries and Departments

Section 49 of DM Act 2005 provides for Allocation of funds by Ministries and Departments. It states that:

- Section 49 (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.
- The provisions of sub-section (1) shall, mutatis mutandis, apply to departments of the Government of the State.

11.6.3 Provisions in the Act for Disaster Risk Reduction

Some of the statutory provisions incorporated in the Disaster Management Act, 2005 for mainstreaming DRR and financing thereof are reproduced below.

- i. Section 6 (2) (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 (2) (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 may 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 (b) provides that the departments of State Government may 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

11.7 Implementation of DRR – Financial Aspects

11.7.1 Public Funded Schemes

The primary mechanism for funding DRR related schemes and projects in India are through Public Funded 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 and other Training institutions for disaster management, Integrated Coastal Zone Management programme of MOEFCC, and flood management and flood forecasting programmes of MOJS. 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 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.

11.7.2 Flexi Funds as a part of Centrally Sponsored Schemes

As per Department of Expenditure, Ministry of Finance, the NITI Aayog has issued instructions for rationalization of Centrally Sponsored Schemes (CSS), vide OM No. O –11013/02/2015-CSS & CMC dated August 17, 2016. As per para 6 of the said OM, flexi-funds available in each CSS has been revised to 25% for States, and 30% for UTs, of the overall annual allocation under each scheme. The flexi-fund component within the CSS can be used to achieve the following objectives:

- a) To provide flexibility to States to meet local needs and requirements within the overall objective of any given Scheme at the sub-head level
- b) To pilot innovation to improve efficiency within the overall objective of any given Scheme at the sub-head level
- c) To undertake mitigation/ restoration activities in case of natural calamities, or to satisfy local requirements in areas affected by internal security disturbances

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 crosscutting themes that cover multiple sectors. The latter would be covered by setting up of National Disaster Mitigation Fund and State Disaster Mitigation Funds.

11.7.3 Externally Aided Projects

Besides the funds which are available through public funded 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.

11.8 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.

12 Strengthening Disaster Risk Governance

12.1 Background

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices (UNDP 2015). Governance encompasses the exercise of political, economic and administrative authority in the management of a country's affairs at various levels. It comprises mechanisms, process and institutions through which groups articulate their interest, exercise their legal rights, meet their obligations and mediate their differences. Governance transcends government. It goes beyond governmental systems and powers by encouraging pro-active citizen engagement. Risk governance encompasses the full range of risks recognized by human societies, including health and medical, safety and security, and environmental risks, such as hazards and disasters.

The concept of governance has its origins partly in the recognition that many functions carried out by public entities are now provided by several governmental as well as private-sector or civil society entities. Such systems rely on the development and diffusion of various types of norms such as state regulation, self-regulation and market mechanisms (Tierney 2012). It may also rely on other processes such as negotiation, participation, and engagement, which facilitate collective decision making and action. Disaster governance is nested within and influenced by overarching societal governance systems and various aspects such as state-civil society relationships, economic organization, and societal transitions have implications for disaster governance. Governance arrangements and stakeholder participation could vary across different disaster phases, adding to the complexity of governance challenges. Risk-spreading mechanisms, including insurance and reinsurance, are integral part of disaster governance.

UNDP describes disaster risk governance as:

"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." (UNDP 2013)

UNISDR defines it as:

"The system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy." (UNISDR 2016)

The concept has evolved considerably, 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-2000's 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. Effectiveness of

disaster governance can be judged from stakeholder participation, collaboration, accountability and transparency. 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 adequate legal provisions. These are of crucial importance in fostering development and promoting risk reduction.

The capacity of relevant individual actors and organisations comes into play when DRR policies – at various levels from the top to bottom – are implemented. Participation, rule of law, transparency, responsiveness, consensus orientation, equity, effectiveness, efficiency, accountability and strategic vision are key factors when implementing a governance structure aimed at sustainable development and disaster risk reduction (UNDP 2004).

12.2 Sendai Framework and Strengthening Disaster Risk Governance

The Sendai Framework emphasises the importance of governance at different levels for an effective and efficient management of disaster risk. Effective risk governance requires clear vision, plans, competence, guidance, and coordination within and across sectors, as well as participation of relevant stakeholders, as discussed earlier. 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 publicly 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 codes⁶⁵, 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.

⁶⁵ Building Codes: This implies the latest/ updated Indian Standards

- h) Empower local authorities, as appropriate, through regulatory and financial mechanism to work and coordinate with civil society, communities and indigenous peoples 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.

12.3 Responsibility Framework 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 framework. 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. To strengthen disaster governance, a DM Cell will be established in each Central Ministry and a nodal officer, not below the rank of Joint Secretary will be appointed.

The NDMP seeks to strengthen the entire system of disaster risk governance in the country using the framework presented here. As discussed in chapter-1, the NDMP envisages the implementation of various measures across the country over the short (T1), medium (T2), and long-term (T3), ending by 2022, 2027, 2030 respectively. 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 time frames for implementation while preparing plans or revising existing ones.

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

1. Mainstream and integrate DRR and Institutional Strengthening
2. Capacity Development, Empower Local Authorities and Strengthen Coordination Mechanism
3. Promote Participatory Approaches, Partnerships and Networks
4. Work with Elected Representatives
5. Grievance Redress Mechanism
6. Promote Quality Standards, Certifications, and Awards

Strengthening Disaster Risk Governance			
Central/ State Agencies and their Responsibilities			
Major Themes	Centre	Responsibility – Centre	State
1		<p>Short Term (T1)</p> <ul style="list-style-type: none"> Constituting a DM cell in each ministry/ dept. and designation of a nodal officer not below the rank of Joint Secretary Carry out assessment of the technical, financial and administrative capacity for disaster risk management Strengthen/ establish coordination and convergence mechanisms Promote the coherence and development of relevant laws, regulations, and public policies <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Adopt and implement disaster risk reduction strategies and plans, across different levels and timescale Make institutions efficient and responsive Develop mechanisms, and processes to ensure transparency and accountability Enhance relevant mechanisms and initiatives for transparency <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions Make institutions efficient and responsive; Improve work culture Integrate DRR into development policies and planning at all levels of administration and development 	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Empower local authorities Carry out assessment of the technical, financial and administrative capacity for disaster risk management at all levels within the state <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Improve work culture Promote the coherence and development of relevant laws, regulations, and public policies <p>Long Term (T3)</p> <ul style="list-style-type: none"> Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions

Major Themes				Strengthening Disaster Risk Governance			
				Central/ State Agencies and their Responsibilities			
	Centre	Responsibility – Centre	State		Responsibility – State		
2		<ul style="list-style-type: none"> • Develop mechanisms, and processes to ensure transparency and accountability 	<p>Recurring</p> <ul style="list-style-type: none"> • Guidance, technical support, oversight, and monitoring to departments, other agencies, and states • Strengthening of national integrated disaster risk reduction mechanisms • Facilitate coordination for DRR across sectors • Facilitating participation of civil society organizations, private sector, and educational institutions <p>Short Term (T1)</p> <p>Preparation of DMP/DRRP plans by all central ministries, departments, and agencies</p>	<p>Recurring</p> <ul style="list-style-type: none"> • Implementations in state ministries, departments, and agencies <p>Short Term (T1)</p> <p>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</p> <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Involve communities, PRIs, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational institutions • Develop necessary capacity to understand and effectively enforce regulatory norms and standards for DRR <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Develop necessary capacity to understand and effectively enforce regulatory norms and standards for DRR • Give special emphasis in supporting the state-level efforts • Strengthen the DRR capabilities of all central ministries and departments 	<p>Long Term (T3)</p> <ul style="list-style-type: none"> • Assess existing DRR capacities (all types) at various levels and implement capacity 		

Strengthening Disaster Risk Governance			
Major Themes	Central/ State Agencies and their Responsibilities		
	Centre	Responsibility – Centre	State
		<ul style="list-style-type: none"> Sensitise all central ministries, departments, and agencies about the importance of social inclusion in DRR Create awareness of the role of ecosystems and appropriate land-use in DRR <p>Long Term (T3)</p> <ul style="list-style-type: none"> Assess existing DRR capacities (all types) at various levels and implement capacity development programmes to address the requirements Assess current capacities to address the challenges posed by climate change and implement programmes to develop the required capacities Integrating environmental and appropriate land-use management in all DRR plans 	<ul style="list-style-type: none"> development programmes to address the requirements Assess current capacities at the state and local levels to address the challenges posed by climate change and implement programmes to develop the required capacities Integrating environmental and appropriate land-use management in all DRR plans
3 Promote Participatory Approaches, Partnerships and Networks		<p>Short Term (T1)</p> <ul style="list-style-type: none"> Facilitate the sound assignment of roles and tasks Provide guidelines and support to facilitate participatory approaches with accountability <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Promote international cooperation and partnerships (global, regional, SAARC) 	<p>Recurring</p> <ul style="list-style-type: none"> Promote for participation of communities, individuals, households, and businesses in all aspects of disaster management <p>Short Term (T1)</p> <ul style="list-style-type: none"> Implement participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location

Major Themes		Strengthening Disaster Risk Governance		
		Central/ State Agencies and their Responsibilities		
	Centre	Responsibility – Centre	State	Responsibility – State
		<ul style="list-style-type: none"> Promote dialogue and cooperation among experts, communities and practitioners of DRR Strengthen national, sectoral and regional networks of experts, managers and planners for DRR Encourage partnerships among stakeholders across all aspects of DRR <p>Long Term (T3)</p>		<p>Long Term (T3)</p> <p>Establish and strengthen government coordination forums composed of relevant stakeholders</p>
4	Work with elected representatives	<p>NIDM, NDMA, MHA, MOPA</p> <p>Recurring</p> <ul style="list-style-type: none"> Sensitize the political leadership in national levels in discussions on DRR 	<p>State/UT, SDMA, DMD^s, RD, DDMA, PRIs, ULBs, All departments involved in disaster management, especially DRD and UDD</p> <p>Recurring</p> <ul style="list-style-type: none"> Sensitize the political leadership in national levels in discussions on DRR 	<p>Recurring</p> <p>Sensitize the political leadership at state, district, block, and local levels in discussions on DRR</p>
5	Grievance Redress Mechanism (GRM)	<p>Nodal Ministries/ departments notified by the GOI hazard-wise for overall coordination and response</p>	<p>Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Review existing GRM applicable for state and centre, within state and inter-state needs Develop plans to strengthen GRM <p>Medium Term (T2)</p> <p>Implement plans for strengthening GRM</p>	<p>Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response</p> <p>Short Term (T1)</p> <ul style="list-style-type: none"> Review existing GRM applicable for state and centre and within state Develop plans to strengthen GRM <p>Medium Term (T2)</p> <p>Implement plans for strengthening GRM</p>

Major Themes		Strengthening Disaster Risk Governance		
		Central/ State Agencies and their Responsibilities		
		Centre	Responsibility – Centre	State
6	Promote quality standards, such as certifications and awards for disaster risk management	MIRTH, MOR, AERB, DAE, BIS, MORD, MHUA, MoHRD, Professional bodies, Various organizations involved in developing standards (Hazard-wise details in Chapter-7)	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Formulate laws, regulations along with wide public consultations Initiate consultations on national standards in the domain of DRR <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Institute systems of certifications and awards for DRR Develop enforcement mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> Develop techno-legal regimes Establish institutional arrangements for monitoring compliance Establish standards/ norms/ codes for disaster risk reduction 	<p>Recurring</p> <ul style="list-style-type: none"> Ensure implementation of standards Monitor compliance <p>Short Term (T1)</p> <ul style="list-style-type: none"> Formulate state-level regulations along with wide public consultations <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Develop suitable by-laws specifically for urban and rural areas Institute systems of certifications and awards for DRR Develop enforcement mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> Implement technico-Legal regimes Establish institutional arrangements for monitoring compliance

(§) DMD-Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

13

International Cooperation

13.1 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 remains committed to playing a leading role in strengthening regional and international cooperation efforts in mitigating and reducing the effects from 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.

13.2 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 decision on acceptance of all such offers vests solely with the Central Government. The primary responsibility for reviewing such foreign offers of assistance rests with the Ministry of External Affairs which will consult and coordinate with the Ministry of Home Affairs.

All offers of assistance from foreign governments will be routed through the Ministry of External Affairs. Offers of assistance in-kind, including technical assistance, emergency rescue teams, reconstruction assistance, etc. will be evaluated on a case-by-case basis, in consultation with the Ministry of Home Affairs, which will assess the requirements based on inputs from the concerned State governments.

In the case of contributions from NRIs, PIOs and foreign non-governmental bodies such as Foundations, etc. such donations may be accepted through the Prime Minister's and Chief Minister's relief funds. All other donations from foreign non-governmental entities to Indian non-governmental entities must be compliant with extant regulations, including the Foreign Contribution (Regulation) Act 2010.

13.3 Accepting Multilateral Assistance

In the case of an offer of assistance from UN Agencies, the Government of India will evaluate and consider all such offers on its merits. If accepted, GOI will issue directions to the respective Ministry

or State Government to coordinate with the concerned UN agency. India will permit UN agencies and international NGOs already operating in the country at the time of the disaster event to continue render their humanitarian assistance to people in the affected area in coordination with the relevant Central Ministries/Departments and the State Government in accordance with applicable norms and protocols.

13.4 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 looking forward to building 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 engaging with the international community in providing humanitarian assistance to other countries in need.

14

Maintaining, Monitoring and Updating the Plan

14.1 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 are 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.

14.2 Training and Drills

At different levels, the nodal agency tasked with developing res pective DM plan must disseminate it to all other agencies associated with the plan execution having 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, at least 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.

Mock drills and trainings must be organized to test their readiness to deploy within the shortest possible time following the activation of a disaster response. They shall be conducted in a manner like that of the drills carried out by fire-fighting department or 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.

14.3 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.

14.4 Monitoring by Central Ministries/Depts. and States/UTs

All central ministries, departments and States/UTs should prepare a checklist with verifiable indicators to regularly monitor the progress of the implementation of respective DM plans. The monitoring system must be aligned with the Sendai framework monitoring checklist (Annexure-III). Keeping the Sendai framework as a reference, they must develop specific checklists relevant to various hazards. The monitoring must include periodic reviews synchronised with the quasi-cyclic or recurring nature of hazards such as cyclone, or flood. They must also regularly review preparedness for disasters that tend to occur without warnings or are extremely rare such as earthquake or tsunami. For recurring or frequent hazards, they should employ check lists to assess preparedness before the onset of the season. For other hazards, this can be undertaken as an annual exercise. Ministries / Departments of Government of India should also conduct periodic review on the extent of financial provisions required for implementing their Plan.

14.5 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. Each DM plan must be reviewed periodically and updated. 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

- Bal, S. K., Saha, S., Fand, B. B., Singh, N. P., Rane, J., & Minhas, P. S. (2014). Hailstorms: Causes, damage and post-hail management in agriculture. National Institute of Abiotic Stress Management, Indian Council of Agricultural Research, Technical Bulletin, (5), 44.
- Benson, C., Twigg, J., & Rossetto, T. (2007). Tools for mainstreaming disaster risk reduction: Guidance notes for development organisations. ProVention Consortium.
- CSO (2016) Elderly in India. Central Statistics Office, MOSPI, Govt. of India, Delhi.
http://mospi.nic.in/sites/default/files/publication_reports/ElderlyinIndia_2016.pdf
- DesInventar (2016) <http://www.desinventar.net/definitions.html> (accessed Sep 20, 2019)
- FAO (2016) Livestock-related interventions during emergencies—The how-to-do-it manual. Animal Production and Health Manual No. 18., FAO, Rome.
- Fordham, M. (1999) "The Intersection of Gender and Social Class in Disaster: Balancing Resilience and Vulnerability." International Journal of Mass Emergencies and Disasters 17, no. 1 (1999): 15-36.
- Fothergill, A (1998). "The Neglect of Gender in Disaster Work: An Overview of the Literature." In: The Gendered Terrain of Disaster: Through Women's Eyes, edited by Elaine Enarson and Betty Hearn Morrow, 11-25. Miami, Florida: Laboratory for Social and Behavioral Research, 1998.
- GCF (2018) Global Catastrophic Risk Report 2018 <https://www.humanitarianfutures.org/global-catastrophic-risk-report-2018/> (accessed Sept. 30, 2019)
- GOI (2005) Disaster Management Act 2005
- GOI (2009) National Policy on Disaster Management
- Goswami, B.N., Venugopal, V., Sengupta, D., Madhusoodanan, M.S. and Xavier, P. K., (2006) Increasing trend of Extreme Rain Events over India in a Warming Environment, Science, 314, 5804, 1442-1445.
- HI (2015) Disability in Humanitarian Context: Views from Affected People and Field Organisations, Handicap International. <https://handicap-international.ch/sites/ch/files/documents/files/disability-humanitarian-context.pdf> (accessed 20 Sep 2019)
- IMD (2012) Annual Climate Summary 2012, National Climate Centre, Pune.
- 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 20 Sep 2019)
- IPCC (2012) Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, 582 pp.
- IPCC (2013) Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Inter-Governmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.
- Kothawale, D.R., Munot A A, Krishna Kumar K, (2010). Surface air temperature variability over India during 1901-2007, and its association with ENSO, Climate Research, 42, June 2010, 89- 104, doi:10.3354/cr00857 (no journal/ book etc.)
- Le Quesne, F., Tollmann, J., Range, M., Balogun, K., Zissener, M., Bohl, D., Souvignet M, Schuster S, Zwick S, Phillips J, and Wehnert, B. (2017). The role of insurance in integrated disaster & climate risk management: Evidence and lessons learned.
- LEGS (2014) Livestock and Emergency Guidelines Standards, Prelims—Livestock and Emergency Guidelines (LEGS)—2nd edition. In Livestock Emergency Guidelines and Standards (LEGS)-2nd Edition (pp. i-xvi). Practical Action Publishing.

- MA (2005) Millennium Ecosystem Assessment, Ecosystems and Human Well-being: Current State and Trends: Findings of the Condition and Trends Working Group, Island Press: Washington, D.C.
- MAFW (2016) Drought Management Manual, Ministry of Agriculture & Farmers Welfare, Govt. of India
- MOEFCC (2010) Climate Change and India: A 4x4 Assessment - A Sectoral and Regional Analysis for 2030s, INCCA Report #2, Ministry of Environment, Forests and Climate Change, p 164.
http://www.moef.nic.in/sites/default/files/fin-rpt-incca_0.pdf (Retrieved 30-Oct-2017)
- Oslo Policy Forum (2008) Changing the Way We Develop: Dealing with Disasters and Climate Change – Report on the findings of the conference. Oslo and Geneva: Norwegian Ministry for Foreign Affairs, ProVention Consortium and the United Nations Development Programme. Available at www.oslopolicyforum.no/front.cfm.
- Parkinson, D (2011). Gender and Disaster: Literature Review. Wangaratta, Australia: Women's Health Goulburn North East Inc., 2011.
- Pattanaik, D.R. and Rajeevan, M. (2010) Variability of extreme rainfall events over India during southwest monsoon season. Meteorological Applications, 17(1), 88-104.
- Rajeevan, M., Bhate, J. and Jaswal, A.K. (2008) Analysis of variability and trends of extreme rainfall events over India using 104 years of gridded daily rainfall data. Geophysical Research Letters, 35, L18707.
- Rathore, L. S., Attri, S. D., & Jaswal, A. K. (2013). State level climate change trends in India. Meteorological Monograph No. ESSO/IMD/EMRC/02/2013, Government of India Ministry of Earth Sciences, Earth System Science Organisation, India Meteorological Department, p 156.
- Rathore, L.S., Attri, S.D., and Jaswal, A.K. (2013) State Level Climate Change Trends in India, Meteorological Monograph No. ESSO/IMD/EMRC/02/2013
- Satendra and Kaushik, A.D. (2014): Forest Fire Disaster Management. National Institute of Disaster Management, Ministry of Home Affairs, New Delhi.
- Sen Roy, S., (2009) A spatial analysis of extreme hourly precipitation patterns in India. International Journal of Climatology, 29(3), 345-355.
- Singh, S.K. and Gupta, R.K. (2017) Monitoring of Glacial Lakes & Water Bodies in the Himalayan Region of Indian River Basins for 2016, CWC/CC&IAD/2016/TR 6. URL:
http://www.cwc.gov.in/main/downloads/CWC_lakes_monitor_report_2016.pdf (accessed Sep 20, 2019)
- Tierney, K. (2012), Disaster governance: Social, political, and economic dimensions. Annual Review of Environment and Resources, 37, pp.341-363.
- Turnbull, M., Sterrett, C.L. and Hilleboe, A. (2013) Toward Resilience: A Guide to Disaster Risk Reduction and Climate Change Adaptation (www.ecbproject.org), Practical Action Publishing Ltd., Warwickshire.
- UN (1989) Convention on the Rights of the Child <https://www.unicef.org/crc/> (accessed Sep 20, 2019)
- UN (2015) Transforming our world: the 2030 Agenda for Sustainable Development, General Assembly, Resolution 70/1.
<https://sustainabledevelopment.un.org/post2015/transformourworld> (accessed Sep 20, 2019)
- UNDESA (2008) Practical Strategies to Promote Social Integration. Paris, France, 10 -13 September 2007 Final Report of the Expert Group Meeting on "Creating an Inclusive Society: Practical strategies to promote social inclusion"
- UNDP (2004), Reducing Disaster Risk - A Challenge for Development, United Nations Development Programme, New York.
- UNDP (2012) Putting Resilience at the Heart of Development - Investing in Prevention and Resilient Recovery
- 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.

- UNFCCC (2015) Paris Agreement, FCCC/CP/2015/10/Add.1
<https://unfccc.int/process-and-meetings/conferences/past-conferences/paris-climate-change-conference-november-2015/cop-21/cop-21-decisions>
- UNISDR (2014) Charter 14 for Older People in Disaster Risk Reduction.
<https://www.unisdr.org/we/inform/publications/40218> (accessed Sep 20, 2019)
- UNISDR (2015a), Sendai Framework for Disaster Risk Reduction 2015-2030.
<http://www.unisdr.org/we/inform/publications/43291> (accessed Sep 20, 2019)
- UNISDR (2015b) Global Assessment Report 2015.
<https://www.unisdr.org/we/inform/publications/42809> (accessed Sep 20, 2019)
- UNISDR (2016) Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction.
<https://www.unisdr.org/we/inform/publications/51748> (accessed Sep. 20, 2019)
- UNISDR (2017) Build Back Better in Recovery, Rehabilitation and Reconstruction: Consultative Version
- WCDRR (2015) Mobilizing Women's Leadership in Disaster Risk Reduction, Third United Nations World Conference on Disaster Risk Reduction (3WCDRR), Sendai, Japan, 14-18 March 2015
- World Bank Group (2012), Turn Down the Heat: Why a 4°C warmer world must be avoided.

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

Source: <http://ndma.gov.in/en/ndma-guidelines.html> (as on Sep. 30, 2019)

1. Biological Disasters (Guidelines on Management of)
2. Boat Safety (Guidelines on)
3. Chemical Disasters (Guidelines on)
4. Chemical (Terrorism) Disasters (Guidelines on Management of)
5. Cultural Heritage Sites and Precincts (Guidelines on)
6. Cyclones (Guidelines on Management of)
7. Dead in the Aftermath of Disaster (Guidelines on Management of)
8. Disability Inclusive Disaster Risk Reduction (National Disaster Management Guidelines on)
9. Drought (Guidelines on Management of)
10. Earthquakes (Guidelines on Management of)
11. Fire Services (Guidelines on Scaling, Type of Equipment and Training of)
12. Floods (Guidelines on Management of)
13. Heatwave (Guidelines for Preparation of Action Plan – Prevention and Management of)
14. Hospital Safety (Guidelines on)
15. Incident Response System (Guidelines on)
16. Landslides and Snow Avalanches (Guidelines on Management of)
17. Medical Preparedness and Mass Casualty Management (Guidelines on)
18. Museums (Guidelines on)
19. National Disaster Management Information and Communication System (Guidelines on)
20. Nuclear and Radiological Emergencies (Guidelines on Management of)
21. Psycho-Social Support and Mental Health Services in Disasters (Guidelines on)
22. Relief (Guidelines on Minimum Standards of)
23. School Safety Policy (Guidelines on)
24. Seismic Retrofitting of Deficient Buildings and Structures (Guidelines on)
25. State Disaster Management Plans (Guidelines on Preparation of)
26. Temporary Shelters for Disaster -Affected Families (National Guidelines on)
27. Thunderstorm & Lightning/Squall/Dust/Hailstorm & Strong Winds (Guidelines on Prevention & Management of)
28. Tsunamis (Guidelines on Management of)
29. Urban Flooding (Guidelines on Management of)

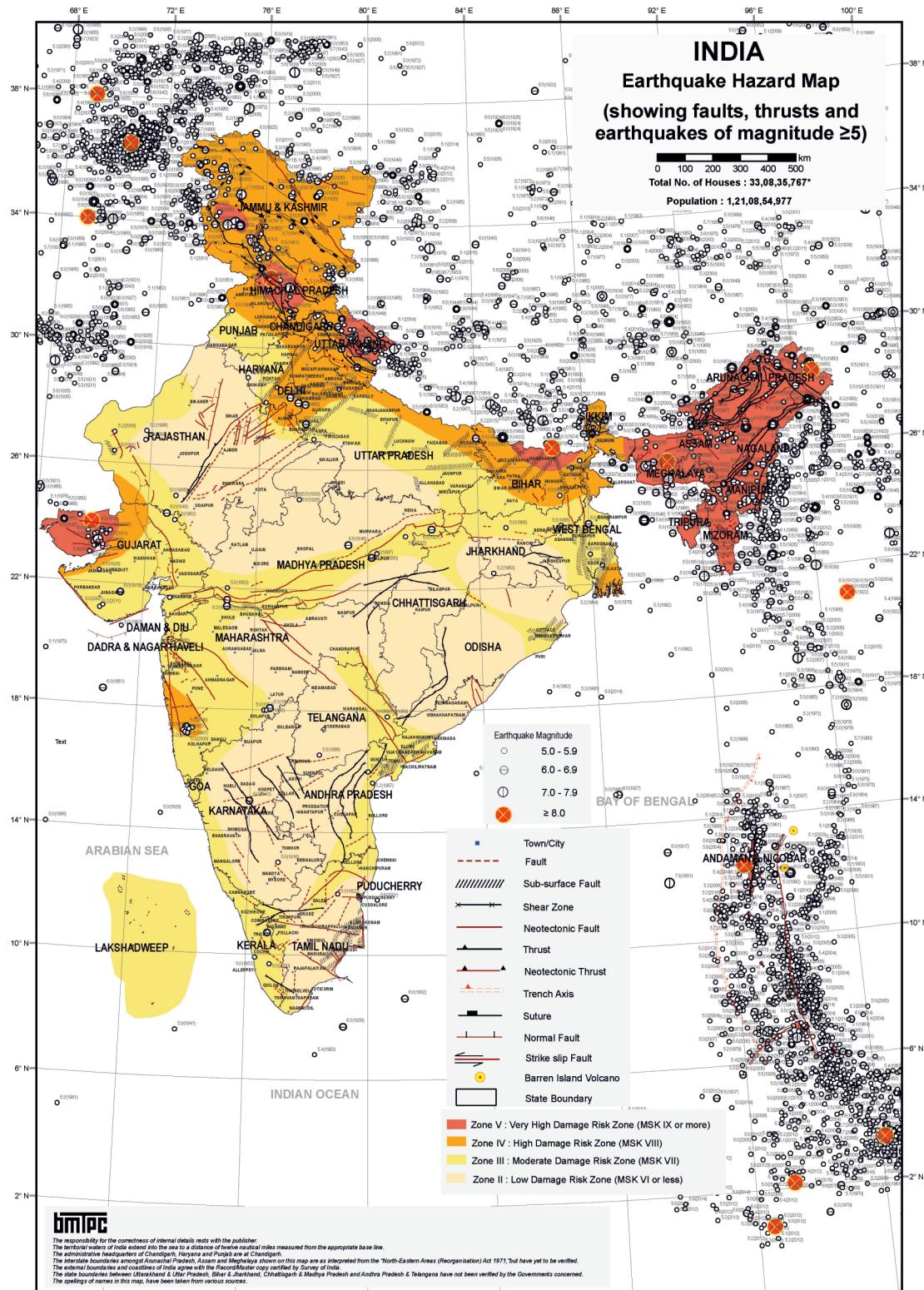
Annexure-II: Hazard Risk Maps for India

Vulnerability Atlas of India, Third Edition 2019, Building Materials and Technology Promotion Council (BMTPC)

<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/Index.html> (accessed Oct 15, 2019)

Earthquake Hazard Map

(<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/eq.html>, accessed Oct 15, 2019)



BMTPC : Vulnerability Atlas - 3rd Edition : Peer Group, MoHUA, GOI; Map is Based on digitised data of SOI; Seismic Zones of India Map IS 1893 (Part I); 2002, BIS; Earthquake Epicentre from IMD; Seismotectonic Atlas of India and its Environs, GSI; Houses/Population as per Census 2011; *Houses including vacant & locked houses. Disclaimer: The maps are solely for thematic presentation.

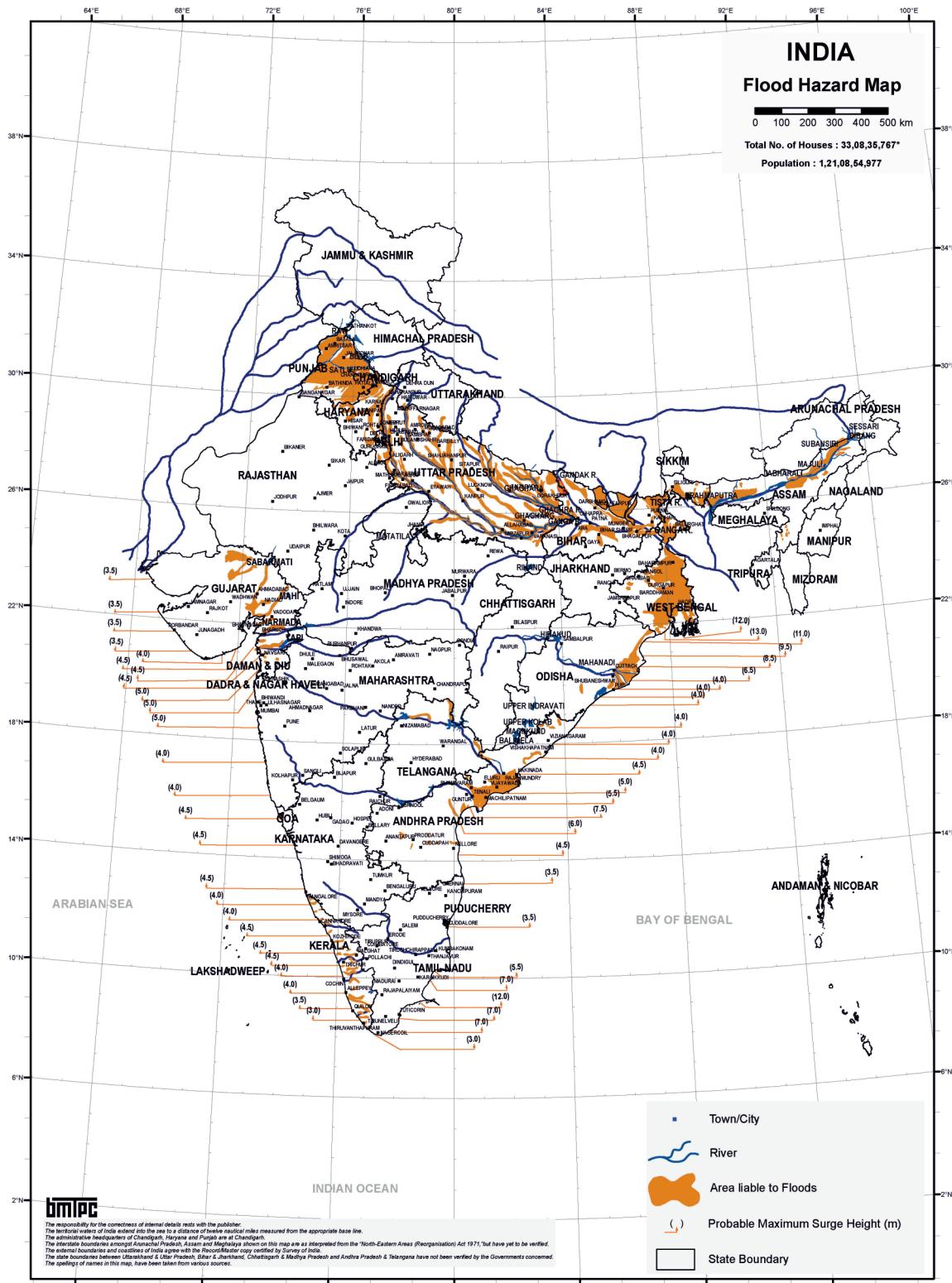
Wind Hazard Map

(<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/wind.html>, accessed Oct 15, 2019)



Flood Hazard Map

(<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/flood.html>, accessed Oct 15, 2019)



BMTPC : Vulnerability Atlas - 3rd Edition; Peer Group, MoHUA, GOI; Map is Based on digitised data of SOI, GOI; Census of India 2011; Flood Atlas (1987), Task Force Report (2004), C.W.C., G.O.I. Houses/Population as per Census 2011; * Houses including vacant & locked houses. Disclaimer: The maps are solely for thematic presentation.

Landslide Incidence Map

(<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/landslide.html> , accessed Oct 15, 2019)



Thunderstorm Incidence Map

(<http://www.bmtpc.org/DataFiles/CMS/file/VAI2019/th.html>, accessed Oct 15, 2019)



BMTPC: Vulnerability Atlas - 3rd Edition: Peer Group, MoHUA, GOI; Map is Based on digitised data of SOI; Thunderstorm data from IMD. Disclaimer: The maps are solely for thematic presentation.

Annexure-III: Sendai Framework Indicators

A set of 38 indicators was identified to measure global progress in the implementation of the Sendai Framework for Disaster Risk Reduction. The indicators will measure progress in achieving the global targets of the Sendai Framework, and determine global trends in the reduction of risk and losses.

Global target A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared with 2005-2015.

A-1 (compound)	Number of deaths and missing persons attributed to disasters, per 100,000 population.
A-2	Number of deaths attributed to disasters, per 100,000 population.
A-3	Number of missing persons attributed to disasters, per 100,000 population. <i>The scope of disaster in this and subsequent targets is defined in paragraph 15 of the Sendai Framework for Disaster Risk Reduction 2015-2030 and applies to small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risk.</i>

Global target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.

B-1 (compound)	Number of directly affected people attributed to disasters, per 100,000 population.
B-2	Number of injured or ill people attributed to disasters, per 100,000 population.
B-3	Number of people whose damaged dwellings were attributed to disasters.
B-4	Number of people whose destroyed dwellings were attributed to disasters.
B-5	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters.

Global target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.

C-1 (compound)	Direct economic loss attributed to disasters in relation to global gross domestic product.
C-2	Direct agricultural loss attributed to disasters. <i>Agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure.</i>
C-3	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters.

	<i>Productive assets would be disaggregated by economic sector, including services, according to standard international classifications. Countries would report against those economic sectors relevant to their economies. This would be described in the associated metadata.</i>
C-4	Direct economic loss in the housing sector attributed to disasters. <i>Data would be disaggregated according to damaged and destroyed dwellings.</i>
C-5	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters. <i>The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.</i>
C-6	Direct economic loss to cultural heritage damaged or destroyed attributed to disasters.

Global target D: 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

D-1 (compound)	Damage to critical infrastructure attributed to disasters.
D-2	Number of destroyed or damaged health facilities attributed to disasters.
D-3	Number of destroyed or damaged educational facilities attributed to disasters.
D-4	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters. <i>The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.</i>
D-5 (compound)	Number of disruptions to basic services attributed to disasters.
D-6	Number of disruptions to educational services attributed to disasters.
D-7	Number of disruptions to health services attributed to disasters.
D-8	Number of disruptions to other basic services attributed to disasters. <i>The decision regarding those elements of basic services to be included in the calculation will be left to the Member States and described in the accompanying metadata.</i>

Global target E: Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.

E-1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
E-2	Percentage of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies. <i>Information should be provided on the appropriate levels of government below the national level with responsibility for disaster risk reduction.</i>

Global target F: Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.

F-1	Total official international support, (official development assistance (ODA) plus other official flows), for national disaster risk reduction actions. <i>Reporting of the provision or receipt of international cooperation for disaster risk reduction shall be done in accordance with the modalities applied in respective countries. Recipient countries are encouraged to provide information on the estimated amount of national disaster risk reduction expenditure.</i>
F-2	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided by multilateral agencies.
F-3	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided bilaterally.
F-4	Total official international support (ODA plus other official flows) for the transfer and exchange of disaster risk reduction-related technology.
F-5	Number of international, regional and bilateral programmes and initiatives for the transfer and exchange of science, technology and innovation in disaster risk reduction for developing countries.
F-6	Total official international support (ODA plus other official flows) for disaster risk reduction capacity-building.
F-7	Number of international, regional and bilateral programmes and initiatives for disaster risk reduction-related capacity-building in developing countries.
F-8	Number of developing countries supported by international, regional and bilateral initiatives to strengthen their disaster risk reduction-related statistical capacity.

Global target G: Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

G-1 (compound G2-G5)	Number of countries that have multi-hazard early warning systems.
G-2	Number of countries that have multi-hazard monitoring and forecasting systems.
G-3	Number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms.
G-4	Percentage of local governments having a plan to act on early warnings.
G-5	Number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels.
G-6	Percentage of population exposed to or at risk from disasters protected through pre-emptive evacuation following early warning. <i>Member States in a position to do so are encouraged to provide information on the number of evacuated people.</i>

Source: <https://www.preventionweb.net/sendai-framework/sendai-framework-monitor/indicators>

