



सत्यमेव जयते

NATIONAL AGRICULTURE DISASTER MANAGEMENT PLAN

NOVEMBER 2020

Department of Agriculture, Cooperation and Farmers Welfare
Ministry of Agriculture and Farmers Welfare
Government of India
New Delhi



NATIONAL AGRICULTURE DISASTER MANAGEMENT PLAN

NOVEMBER 2020

Department of Agriculture, Cooperation and Farmers Welfare
Ministry of Agriculture and Farmers Welfare
Government of India
New Delhi

नरेन्द्र सिंह तोमर

NARENDRA SINGH TOMAR

D.O. No. 1473 /AM



सत्यमेव जयते


कृषि एवं किसान कल्याण,
ग्रामीण विकास और पंचायती राज मंत्री
भारत सरकार
कृषि भवन, नई दिल्ली
**MINISTER OF AGRICULTURE & FARMERS WELFARE,
RURAL DEVELOPMENT AND PANCHAYATI RAJ
GOVERNMENT OF INDIA
KRISHI BHAWAN, NEW DELHI
06 NOV 2020**

Preface

Agriculture plays a vital role in India's economy. As much as 54.6% of the total workforce of the country is engaged in agricultural and allied sector activities. The Indian agriculture sector is greatly affected by natural and human-induced hazards and disasters such as droughts, floods, cyclones, hailstorms, frosts, diseases, pest attacks, fire, land degradation, animal menace, chemical pollution, migration, post-harvest damages/losses and so on. All these hazards and disasters run the risks of loss of human lives and agricultural production, thus causing irreparable damage to agriculture sector and, in turn, national economy. The frequency and severity of natural disasters are continuously increasing, which is adversely affecting the agricultural production to a very large extent as it is highly susceptible to climate variability. The adverse impacts of climate change on agriculture threaten food security and may inhibit certain livelihood activities upon which most of the rural population is totally dependent.

The National Agriculture Disaster Management Plan highlights preparedness and response measures for various disasters, details Standard Operating Procedures for dealing with disasters and deliberates on a systematic approach for post disaster recovery and reconstruction while emphasizing on resilient and sustainable recovery.

I am sure that the implementation of National Agriculture Disaster Management Plan prepared by DAC&FW with the help of National Institute of Disaster Management (NIDM) will be useful for all the stakeholders. I request all the concerned public and private agencies to use the Plan Document for better management of all the hazardous or disaster situations. I believe that this plan will go a long way in addressing multi-hazard risks and vulnerabilities, and building disaster-resilience for all aspects of agricultural systems in India as a whole. I complement the team at NIDM and other experts who have contributed in preparing this plan.


(Narender Singh Tomar)

परशोत्तम रूपाला
PARSHOTTAM RUPALA



राज्य मंत्री
कृषि एवं किसान कल्याण
भारत सरकार

Minister of State For
Agriculture & Farmers Welfare
Government of India

D.O. No...614.....MOS(A&FW)/VIP/2019-20/



FOREWORD

Indian agriculture is vulnerable to multiple disasters of natural and anthropogenic nature and is also aggravated by the impact of climate change. Unlike any time in the past, challenges to the agriculture sector in India have to be understood concurrently in many dimensions. The increased frequency and severity of climate-related hazards and risks induced by climate change are adding a new dimension to the existing disaster risk profile of India. Though, there is visible improvement brought by the adoption of management practices through on-farm and off-farm operations in this sector, there is also a growing risk of disaster-related damages and losses to the agriculture systems.

National Agriculture Disaster Management Plan (NADMP), brought out by the National Institute of Disaster Management (NIDM) for the Ministry of Agriculture and Farmers Welfare (MoAFW), aims to strengthen the resilience of the farming community to deal with disasters and weather uncertainties. The document guides MoAFW to manage the risks of disasters before, during, and after a disaster. These include assessing the sectoral and departmental risks of disasters, mitigating the existing risks of disasters, preventing the creation of new risks of disasters, presenting the status of its preparedness to perform its role and responsibilities as defined in the State DM Policy and State DM Plan, measures proposed for strengthening capacity-building and preparedness, etc.

I am happy to learn that the team from the NIDM with technical support and the MoAFW has come up with this plan, describing the roadmap towards building resilient agriculture in India. I believe, the NADMP will help MoAFW in understanding the challenges being faced by Indian agriculture concerning climate change and natural disasters. I complement NIDM and experts for their valuable contribution and support in developing the NADMP.


(Parshottam Rupala)

Delhi Office : Room No. 322, 'A' Wing, Krishi Bhawan, Dr. Rajendra Prasad Road, New Delhi-110 001

Tel. : +91-11-23383975/76 Fax : +91-11-23383971, E-mail : mosrupala@gmail.com

Gujarat Office : Plot No. 219, Sector-20, Gandhinagar-382 020 Tele. : 079-23260013

Sanjay Agarwal
Secretary



भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
Government of India
Ministry of Agriculture & Farmers Welfare
Department of Agriculture, Cooperation
& Farmers Welfare

Dated the 04th November, 2020

FOREWORD

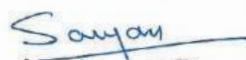
Agriculture sector is a critically important sector of Indian economy, as nearly two-thirds of our population is dependent on agriculture and its allied activities for their livelihoods. However, it is under continuous threat of risks, which are exacerbated by a variety of factors ranging from frequent natural disasters, climate variability, uncertainties in yields and prices and imperfect markets to lack of appropriate financial services including design of risk mitigation instruments such as credit and insurance. All these challenges, hazards and disasters have the potential to cause immense damage to the lives and livelihoods of people in the rural areas particularly when they have pre-existing vulnerabilities in their physical, economic, social and environmental domains.

Various studies show that the impact of climate change on agriculture may further aggravate the issues associated with the food security for a large segment of Indian population and may threaten various agricultural and related non-agricultural activities that provide livelihoods to much of the rural population. It can affect crop yields (both positively and negatively), as well as the types of crops that can be grown in certain areas. It can significantly change requirements of agricultural inputs such as water for irrigation, micro and macro nutrients for soil, and for controlling pests and insects. Climate change also alters the qualitative and quantitative characteristics of natural disasters like floods, droughts, hailstorms and pest attacks, which can cause irreversible harm to agricultural systems across the country.

Several measures are being taken by the Department of Agriculture, Cooperation and Farmers Welfare for addressing the above situations. Additionally, in order to be better prepared for such situations and to avoid potential new risks, National Agriculture Disaster Management Plan has been prepared by National Institute of Disaster Management, which aims to reduce the existing risks of disasters, and manage the actual and potential events of disasters more effectively. This Plan is designed as a practical guidance document, a work agenda, and a roadmap to include key aspects of Disaster Risk Reduction (DRR) into the sustainable development agenda of agriculture, especially for crop production, sustainable land management and post-harvest management within the scope and mandate of Ministry of Agriculture and Farmers Welfare. The plan seeks the synergy of resources and efforts to holistically address disaster risk reduction, climate change adaptation, and sustainable development goals related to the sector. I congratulate the National Institute of Disaster Management team and all the experts for bringing out a comprehensive and user-friendly Plan document.

The Plan will further help in achieving the Sustainable Development Goals to build resilient infrastructure and adaptation to climate change impacts by strengthening resilience and adaptive capacity as per the Paris Agreement adopted at the COP- 21. This plan also encompasses the very principles of Sendai Framework for Disaster Risk Reduction, Prime Minister's 10 point Agenda for efforts towards DRR, Disaster Management Act, 2009 and Disaster Management Policy, 2009.

I hope that the Plan will be useful for all the stakeholders and practioners at various levels for making Indian Agriculture sector disaster resilient.


(Sanjay Agarwal)

ACKNOWLEDGEMENT

Preparation of National Agriculture Disaster Management Plan was coordinated by the team from Ministry of Agriculture and Farmers Welfare comprising of the then Joint Secretary (Drought Management), **Shri Amitabh Gautam** and present Joint Secretary (Drought Management) **Dr. Namita Priyadarshee**, under the guidance of **Smt. Vasudha Mishra**, the then Special Secretary and Central Drought Relief Commissioner.

The preparation of plan was facilitated by National Institute of Disaster Management and steered by **Prof. Anil Kumar Gupta** (Head, ECDRM). The core team for the development of plan comprised of **Ms. Richa Srivastava** (Research Consultant), **Dr. Sanayanbi Hodam** (Research Fellow), **Ms. Swati Singh** (Consultant) and **Ms. Shweta Bhardwaj** (Junior Research Fellow) under the guidance of **Maj. Gen. Manoj Kumar Bindal** (Executive Director) along with the technical support of National Institute of Disaster Management. The coordination from Ministry of Agriculture and Farmers Welfare for the preparation of plan was facilitated by **Shri B. P. Bimal**, Deputy Secretary and **Shri Vijay Soni**, Under Secretary.

A working group was formed by National Institute of Disaster Management (NIDM) to support in developing the Hazard Risk Vulnerability and Capacity Analysis format and review inputs from time to time in the draft plan. The working group comprised of **Dr. G. Ravindra Chary**, Project Coordinator, AICRP for Dryland Agriculture, ICAR-CRIDA, Hyderabad, **Dr. S. Bhaskar**, Assistant Director General (Agronomy, Agro-Forestry and Climate Change), Division of Natural Resources Management, Indian Council of Agricultural Research, New Delhi, **Prof. V. K. Sehgal**, Principal Scientist, Indian Agricultural Research Institute (IARI), **Dr. Shibendu S. Ray**, Director, Mahalanobis National Crop Forecast Centre (MNCFC), **Ms. Preeti Tahlani**, Scientist SD, Mahalanobis National Crop Forecast Centre (MNCFC), **Dr. Himanshu Pathak**, Director, ICAR – NRRI, **Dr. Ch. Srinivasa Rao**, Director, NAARM, **Dr. P. Krishnan**, Principal Scientist, NAARM, **Shri Anup Kumar Srivastava**, Sr Consultant, National Disaster Management Authority (NDMA), **Dr. Mrutyunjay Mohapatra**, Director General of Meteorology, India Meteorological Department, **Dr. K. K. Singh**, Head (Agromet Services), IMD and **Dr. S. D. Attri**, Scientist F, India Meteorological Department (IMD) and steered by **Prof. Anil Kumar Gupta**.

The plan has been prepared with the encouragement of **Dr. Alka Bhargava**, Additional Secretary, MoAFW, **Dr. K. Alagusundaram**, DDG (NRM), ICAR, **Shri Sanjeev Kumar Jindal**, Joint Secretary, Disaster Management Division, Ministry of Home Affairs and **Shri B. H. Anil Kumar**, Former ED, NIDM, **Shri. B. Pradhan**, the then Special Secretary, MoAFW along with the technical support of National Institute of Disaster Management.

Nodal officers from various divisions of DACFW, Department of Agriculture Research and Education (ICAR and CAUs), National Bureau of Plant Genetic Research were appointed to coordinate in drafting the plan. Their support has been very instrumental in finalizing the plan document.

We are thankful to the **National Disaster Management Authority** (NDMA) for providing feedback and valuable suggestions especially to **Shri G. V. V. Sarma**, IAS, Member Secretary (NDMA), **Shri Kamal Kishore**, Member (NDMA), **Shri Krishna Vatsa**, Member (NDMA) and **Dr. V. Thiruppugazh**, IAS, Additional Secretary (Policy and Plan, NDMA) in the process of the approval of plan.

The review inputs from other stakeholders and experts specially **Dr. S. N. Pandey** and **Shri Anand Kumar** has been very insightful in the development of plan.

Contents

Abbreviations	i-xi
Executive Summary	1-3
Approach Adopted for Making the Plan	4-7
Part I National Component	9- 315
Chapter 1: Preliminaries	10
1. Protecting Indian Economy and Food Security	10
1.1. Profile of the Ministry	19
1.1.1. Role/Functions of The Division	20
1.1.2 Business Rules of MoAFW and allocation	23
1.1.2.1 Department of Agriculture, Cooperation and Farmers Welfare.	23
1.1.2.2 Department of Agriculture Research and Education	26
1.2 Rationale	27
1.2.1 Legal Mandate	27
1.2.2 Linkages with National and Internationals Agendas	28
1.2.3 Purpose and Objectives	29
1.2.4 Specific Objectives	29
1.3 Scope of the Plan	29
1.4 Vision	30
1.5 Time Frame	30
1.6 Institutional Framework for Disaster Management	31
1.6.1 National Level	31
1.6.2 State Level	37
Chapter 2: Hazard, Risks, Vulnerabilities and Capacity Analysis (HRVCA)	42
2.1 Introduction	42

2.2	Disaster Risks, Vulnerabilities and Challenges	42
2.3	Understanding Disaster Risks	45
2.3.1	Analysis of Sectoral and Departmental Risks	45
2.3.2	Elements at Risks	47
2.3.3	Seasonality Analysis of the Identified Hazard	48
2.3.4	Vulnerability Analysis and Emerging Concerns of the MoAFW	49
2.3.5	Vulnerability Analysis of DoACFW	61
2.3.5.1	Environmental Vulnerability	61
2.3.5.2	Social Vulnerability	62
2.3.5.3	Physical Vulnerability	62
2.3.5.4	Economic Vulnerability	63
2.3.6	Vulnerability Analysis of DARE	64
2.3.6.1	Environmental Vulnerability	64
2.3.6.2	Social Vulnerability	65
2.3.6.3	Economic Vulnerability	65
2.3.6.4	Physical Vulnerability	66
2.3.7	Capacity Analysis	67
	Chapter 3: Hazard Specific Prevention and Mitigation Measures	72
3.1	Background	72
3.2	Drought	73
3.2.1	Understanding Vulnerabilities and Risk	73
3.2.2	Inter-Agency Coordination	77
3.2.3	Structural Measures	78
3.2.4	Non-Structural Measures	80
3.2.5	Capacity Development	83
3.2.6	Climate Change Risk Management	86

3.3	High Intensity Rainfall/Flood Risk Management	89
3.3.1	Understanding Risk	89
3.3.2	Inter-Agency Coordination	93
3.3.3	Investing in DRR– Structural Measures	95
3.3.4	Investing in DRR–Non-Structural Measures	98
3.3.5	Capacity Development	101
3.3.6	Climate Change Risk Management	104
3.4	Cyclone and Wind Risk Mitigation	107
3.4.1	Understanding Risk	107
3.4.2	Inter-Agency Coordination	110
3.4.3	Investing in DRR– Structural Measures	112
3.4.4	Investing in DRR–Non-Structural Measures	114
3.4.5	Capacity Development	116
3.4.6	Climate Change Risk Management	119
3.5	Tsunami	121
3.5.1	Understanding Risk	121
3.5.2	Inter-Agency Coordination	123
3.5.3	Investing in DRR–Structural Measures	125
3.5.4	Investing in DRR–Non-Structural Measures	126
3.5.5	Capacity Development	129
3.5.6	Climate Change Risk Management	131
3.6	Heat Wave	134
3.6.1	Understanding Risk	134
3.6.2	Inter-Agency Coordination	136
3.6.3	Structural Measures	138
3.6.4	Non-Structural Measures	139

3.6.5	Capacity Development	140
3.6.6	Climate Change Risk Management	142
3.7	Earthquake	145
3.7.1	Understanding Risk	145
3.7.2	Inter-Agency Coordination	147
3.7.3	Structural Measures	148
3.7.4	Non-Structural Measures	149
3.7.5	Capacity Development	150
3.8	Landslides	153
3.8.1	Understanding Risk	153
3.8.2	Inter-Agency Coordination	155
3.8.3	Structural Measures	156
3.8.4	Non-Structural Measures	157
3.8.5	Capacity Development	159
3.8.6	Climate Change Risk Management	162
3.9	Fire	164
3.10	Pest Attack	168
3.10.1	Understanding Vulnerabilities and Risk	168
3.10.2	Inter-Agency Coordination	169
3.10.3	Structural Measures	170
3.10.4	Non-Structural Measures	170
3.10.5	Capacity Development	171
3.10.6	Climate Change Risk Management	172
3.11	Cold Wave and Frost	172
3.12	Hailstorm and Cloudburst	177

Chapter 4: Mainstreaming Disaster Risk Reduction	184
4.1 Introduction	184
4.1.1 International Perspective for CCA and DRR Integration	184
4.1.2 National Perspective for Integrating CCA and DRR	186
4.2 Programs and Policies of the Ministry/Department Contributing to DRR	187
4.2.1 Department of Agriculture and Farmers Welfare	187
4.2.2 Department of Agriculture Research and Education (DARE)	198
4.3 Mainstreaming Organic Farming, Traditional Knowledge and Low Input Technology	200
4.4 Strategic Actions for Sustainable Management of Agriculture System	200
Chapter 5: Inclusive Disaster Risk Reduction	214
5.1 Introduction: Importance of Special Focus on more Vulnerable Groups	214
5.1.1 Gender Based Vulnerabilities	214
5.1.2 Sexual and Gender Minorities	215
5.1.3 Schedule Castes and Schedule Tribes	216
5.1.4 Children	216
5.1.5 Persons with Disability (PWD)	217
5.1.6 Farm Labours	217
5.2 Different Schemes and Programs of MoAFW Addressing the Vulnerable Population	218
Chapter 6: Coherence of Disaster Risk Management Across Resilient Development and Climate Change Action	224
6.1 Introduction	224
6.1.1 Sendai Framework for Disaster Risk Reduction	224
6.1.2 Sustainable Development Goals	225
6.1.3 Paris Climate Agreement and Disaster Resilience	227
6.1.4 United Nations Convention to Combat Desertification (UNCCD)	228
6.2 Synergizing SDGs, Paris Climate Agreement, Sendai Framework and UNCCD	229

6.2.1	The framework	229
6.2.2	Ministry of Agriculture and Farmers Welfare Initiatives Relevant for DRR Across the three Global Frameworks	231
Chapter 7: Capacity Development and Communication		234
7.1	Capacity Development	234
7.1.1	Capacity Development Themes	235
7.1.2	Role of National Institute of Disaster Management (NIDM) and other Institutions	237
7.1.3	Capacity Gaps	237
7.1.4	Capacity Need	238
7.1.5	Capacity Development - Ministries and States	243
7.2	Communication Strategy	246
7.2.1	Communication Channel	246
7.2.2	Internal Communication	247
7.2.3	External Communication	247
7.3	Scenario Based Mock Drills	249
Chapter 8: Coordination – Horizontal and Vertical Linkages		252
8.1	Introduction	252
8.2	Inter-Agency Coordination	252
8.2.1	Cyclone	252
8.2.2	Flood Risk Management/High Intensity Rainfall	253
8.2.3	Earthquake/Seismic Risk Reduction	254
8.2.4	Landslides	255
8.2.5	Drought Risk Mitigation	256
8.2.6	Cold Wave, Frost Risk Reduction, Hailstorm	257
8.2.7	Heat Wave Risk Reduction	258
8.2.8	Pest Attack	259

8.2.9	Fire Risk Reduction	260
8.3	Division wise Roles and Responsibilities	261
Chapter 9: Preparedness and Response		264
9.1	Preparedness	264
9.2	Early Warning/ Alert System	271
9.2.1	Central Agencies Designated for Natural Hazard-Specific Early ...	271
9.2.2	Role of Central Agencies/ Departments	271
9.3	Hazard Specific Response Plans	272
9.3.1	Fire	272
9.3.1.1	Action Points	272
9.3.2	Cold Wave/ Frost	273
9.3.2.1	Action Points	274
9.3.3	Heat Wave	274
9.3.3.1	Action Points	274
9.3.4	Cyclone	275
9.3.4.1	Action Points	275
9.3.5	Pest Attack	277
9.3.5.1	Cultural Practices	277
9.3.5.2	Mechanical Practices	278
9.3.5.3	Regulatory Practices	279
9.3.5.4	Biological Practices	279
9.3.5.5	Parasitoids	279
9.3.5.6	Predators	280
9.3.5.7	Bio-Pesticides	280
9.3.5.8	Chemical Practices	281
9.3.5.9	Action Points	283

9.3.6	Earthquake	283
9.3.6.1	Action Points	284
9.3.7	Drought	285
9.3.7.1	Action Points	286
9.3.8	Landslide	286
9.3.8.1.	Action Points	287
9.3.9	Flood	288
9.3.9.1	Action Points	288
9.3.10	Tsunami	289
9.3.10.1	Action Points	289
9.4	Activation of Response Plan	290
9.5	Logistics / Service Delivery Mechanism During Disaster	291
Chapter 10: Recovery and Reconstruction		294
10.1	Introduction	294
10.2	Post Disaster Need Assessment (PDNA)	294
10.2.1	Create Pre-Disaster Baseline Information	295
10.2.2	Assess Damages	296
10.2.3	Damage Data Collected by Different Departments of the MoAFW	296
10.3	Built Back Better Approach for Recovery	297
10.3.1.	Early, Mid and Long Term Recovery	298
10.3.2.	Major Steps of Recovery Processes (Applicable to all ...	299
Chapter 11: Budgetary Provisions		302
11.1	Introduction	302
11.2	Implementation of DRR in Planned Schemes	304
11.2.1	Flexi Funds as a part of Centrally Sponsored Schemes	304
11.2.2	Externally Aided Projects	305

11.3	Risk Transfer and Disaster Insurance	307
11.4	Proposed Institutional Framework for Further Strengthening Budgetary Provision	309
Chapter 12: Plan Management		312
12.1	Introduction	312
12.2	Monitoring and Evaluating the Plan	313
12.3	Updating the Plan	313
12.4	Incorporating the Plan into Other Planning Mechanisms	314
12.5	Continued Public Involvement	314
Part II Emergency Contingency and Business Continuity Plan for the Ministry		316- 319
Mainstreaming PM's 10 Point Agenda on DRR in the Plan		320
Operational Framework		323
References		325
Annexure I: List of Existing Documents Referred and Integrated)		327
Annexure II: Dos and Don'ts		328
Annexure III: Follow up activities proposed		336
Annexure IV: Organizations under DARE		337
Annexure V: List of Existing Resources with DoAC&FW and DARE		341
Annexure VI: Disaster Management Plan Template for the CAUs/ ICAR Institutes / Research Centres		343

Abbreviations

AAI : Airports Authority of India

ACCA: Advance Climate Change Adaptation

ADWR : Airborne Doppler Weather Radar

AGD : Agriculture Department

AHD : Animal Husbandry Department

AICRPDA -All India Coordinated Research Project for Dryland Agriculture

AICRPAM -All India Coordinated Research Project on Agrometeorology

AICTE : All India Council of Technical Education

AMCDRR : Asian Ministerial Conference on Disaster Risk Reduction

AP : Andhra Pradesh

AR5 : IPCC's Fifth Assessment Report

ARG : Automatic Rain Gauge

ARHD : Archaeology Department

ASI : Archaeological Survey of India

ATI : Administrative Training Institute

AWS : Automatic Weather Station

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

BRO : Border Roads Organisation

BSF : Border Security Force

CACP : Commission for Agricultural Costs & Prices

CADA : Coastal Area Development Authority

CAPF : Central Armed Police Forces

CARA : Central Adaptation Resource Authority

CAU : Central Agricultural University
CAZRI : Central Arid Zone Research Institute
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
CGIAR : Consultative Group for International Agricultural Research
CIAE- Central Institute for Agricultural Engineering
CIAH - Central Institute for Arid Horticulture
CICR -Central Institute for Cotton Research
CISF : Central Industrial Security Force
CITH - Central Institute for Temperate Horticulture
CMG : Crisis Management Group
CoA : Council of Architecture
COP : Conference of the Parties
COR : Commissioner of Relief
CPCRI - Central Plantation Crops Research Institute
CTCRI- Central Tuber Crops Research Institute
CRIDA : Central Research Institute for Dryland Agriculture
CRPF : Central Reserve Police Force
CRRRI : Central Road Research Institute
CRZ : Coastal Regulation Zone
CSIR : Council of Scientific and Industrial Research

CSO : Central Statistics Office
CSS : Centrally Sponsored Schemes
CWC : Central Water Commission
CWPRS : Central Water and Power Research Station
CWWG : Crop Weather Watch Group
CZMA : Coastal Zone Management Authority
DACP-District Agriculture Contingency Plan
DADF : Animal Husbandry, Dairying & Fisheries
DARE : Department of Agriculture Research and Education
DDMA : District Disaster Management Authority
DEOC : District Emergency Operation Centre
Dept. : Department
DES : Directorate of Economics & Statistics
DFIN : Finance Department
DFRI : Disaster Risk Financing Instruments
DM : Disaster Management / Drought Management
DMC : Drought Monitoring Cell
DMD : Disaster Management Department
DMP : Disaster Management Plan
DoACFW: Department of Agriculture, Cooperation and Farmers Welfare
DOS : Department of Space
DRD : Department of Rural Development
DRF: Depreciation Reserve Fund
DRM : Disaster Risk Management
DGR: Directorate of Groundnut Research, Junagarh
DRMR-Directorate of Rapeseed & Mustard Research
DRR : Disaster Risk Reduction
DSR - Directorate of Soybean Research
DSJE: Department of Social Justice and Empowerment

DSS : Decision Support System
DST : Department of Science and Technology
DWR : Doppler Weather Radar
EDD : Education Department
EFD : Environment and Forest 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 Organization
FC : Finance Commission
FCI : Food Corporation of India
FCSD : Food and Civil Supply Department
FES : Fire and Emergency Services
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 Redressal Mechanism
GSI : Geological Survey of India
HAP : Heat (Wave) Action Plan
HF : High Frequency

HLC : High Level Committee
HP : Himachal Pradesh
HRVCA : Hazard Risk, Vulnerability and Capacity Assessment
ICAR : Indian Council of Agricultural Research
ICG : Indian Coast Guard
IGFRI - Indian Grassland Fodder Research Institute
IIFSR- Indian Institute of Framing Systems Research
IIHR- Indian Institute of Pulses Rsearch
IIWBR: Indian Institute of Wheat & Barley Research
IIMR - Indian Institute of Millets Research
IIOR- Indian Institute of Rice Research
IIPR - Indian Institute of Pulses Research
IISR- Indian Institute of Sugarcane Research
IISS- Indian Institute of Soil Science
IISS- Indian Institute of Spices Research
IIVR -Indian Institute of Vegetable Research
ICMBA : Important Coastal and Marine Biodiversity Areas
ICR-ER : Integrated Control Room for Emergency Response
ICT : Information Communication Technology
IDMC : India Drought Management Centre
IDRN : Indian Disaster Resource Network
IDS : Integrated Defense Staff
IDSP : Integrated Disease Surveillance Programme
IEC : Information Education Communication
IITM : Indian Institute of Tropical Meteorology
IMD : India Meteorological Department
INCOIS : Indian National Centre for Ocean Information Services
INM: Integrated Nutrient Management
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 Organization
IWRM : Integrated Water Resources Management
LBSNAA : Lal Bahadur Shastri National Academy of Administration
LLOF :Landslide Lake Outburst Flood
LSA : Landslide and Snow Avalanches
M&E : Monitoring and Evaluation
MoAFW : Ministry of Agriculture and Farmers Welfare
MAH : Major Accident Hazard
MAI : Moisture Adequacy Index
MANAGE : National Institute of Agricultural Extension Management
MCAFPD : Ministry of Consumer Affairs, Food and Public Distribution
MCM : Million Cubic Meters
MCOM : Ministry of Communications
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
MHRD : Ministry of Human Resource Development
MLBE : Ministry of Labour and Employment
MNCFC : Mahalanobis National Crop Forecast Centre

MNRE : Ministry of New and Renewable Energy
MoAFW: Ministry of Agriculture and Farmers Welfare
MOCA : Ministry of Civil Aviation
MOCI : Ministry of Commerce and Industry
MoCIT : Ministry of Communications and Information Technology
MoEFCC : Ministry of Environment, Forests and Climate Change
MoES : Ministry of Earth Sciences
MoHFW : Ministry of Health and Family Welfare
MoHRD : Ministry of Human Resource Development
MoIB : Ministry of Information and Broadcasting
MoJS : Ministry of Jal Shakti
MoLJ : Ministry of Law and Justice
MoM : Ministry of Mines
MoPR : Ministry of Panchayati Raj
MoRD : Ministry of Rural Development
MoRTH : Ministry of Road Transport and Highways
MoSDE : Ministry of Skill Development and Entrepreneurship
MoSJE: Ministry of Social Justice and Empowerment
MoSPI : Ministry of Statistics and Programme Implementation
MoST : Ministry of Science and Technology
MoU : Memorandum of Understanding
MoUD : Ministry of Urban Development
MoWCD: Ministry of Women and Child Development
MoWR : Ministry of Water Resources
MP : Madhya Pradesh
MPFI : Ministry of Food Processing Industries
MRTH : Ministry of Road Transport and Highways
MSJE: Ministry of Social Justice and Empowerment
MTEx : Ministry of Textiles

MTOU : Ministry of Tourism
MTRA : Ministry of Tribal Affairs
NABARD : National Bank for Agriculture and Rural Development
NADMP : National Agriculture Disaster Management Plan
NAPCC : National Action Plan on Climate Change
NATMO : National Atlas and Thematic Mapping Organization
NBCC : National Buildings Construction Corporation
NCDC : National Centre for Disease Control
NCERT : National Council of Educational Research and Training
NCFC : National Crop Forecasting Centre
NCMC : National Crisis Management Committee
NCMRWF : National Centre of Medium Range Weather Forecasting
NCPCR : National Commission for Protection of Child Rights
NCS : National Centre for Seismology
NDC : Nationally Determined Contributions
NDMA : National Disaster Management Authority
NDRF : National Disaster Response Force
NDVI : Normalized Differential Vegetation Index
NEC : National Executive Committee
NECN : National Emergency Communication Network
NER : North East Region
NERC : National Emergency Response Centre
NFSM : National Food Security Mission
NGO : Non-Governmental Organization
NHAI : National Highways Authority of India
NIC : National Informatics Centre
NICRA : National Innovations in Climate Resilient Agriculture
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

NIRM: National Institute of Rock Mechanics

NISA : National Institute of Security Academy

NLRTI : National-Level Research and Technical Institutions

NLSDA : National Level Skill Development Agencies

NPDM : National Policy on Disaster Management

NRAA : National Rainfed Area Authority

NRM: Natural Resource Management

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

O&M : Operation and Maintenance

PP : Plant Protection

PRD : Panchayati Raj Department

PRI : Panchayati Raj Institutions (District, Block and Village levels)

PWD : Persons with Disabilities

PWD : Public Works Department

R&D : Research and Development

RBI: Reserve Bank of India

RD : Revenue Department

RFS : Rainfed Farming System

RMI : Risk Management and Insurance

RTSMN : Real Time Seismic Monitoring Network

SAARC : South Asian Association for Regional Cooperation

SAU : State Agricultural University

SDG: Sustainable Development Goals
SDMA: State Disaster Management Authority
SDMC : State Drought Monitoring Cell
SDRF : State Disaster Response Force
SDRN : State Disaster Resource Network
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
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
TAA : Thematic Area for Action
TN : Tamil Nadu
ToT : Transfer of Technology
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

UNCCD: United Nations Convention to Combat Desertification

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,

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

WMO : World Meteorological Organization

WRD: Water Resource Department

WSD : Water and Sanitation Department

Executive Summary

Agriculture is one of the most important elements of Indian Economy as more than 75% of the workforce earns their livelihood through agriculture. But the sector is under continuous threat of risks, which are exacerbated by a variety of factors, ranging from frequent natural disasters, climate variability and change, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and lack of appropriate financial services including design of risk mitigation instruments such as credit and insurance. These factors have a multiplier impact on the farmers' livelihood and income and also undermine the ability of the agriculture sector and its potential to become a part of the solution to the problem of endemic poverty of the farmers and the agricultural labour (NITI Aayog Report, 2012). Increasing population and related socio-economic problems including poverty and hunger, poor water use efficiency, water scarcity, extreme weather events like flood as well as drought and unequal access to the water are a common concern of the agriculture sector. Every year Indian agriculture is being challenged by natural disasters like floods, droughts, hailstorms, pest attacks, etc. Also, the low frequency high intensity disasters like pandemic, tsunamis, pest attack, etc. have the potentials to create risk of disasters when exposed to vulnerable physical, economic, social and environmental conditions. Frequency and severity of natural disasters are continuously increasing and agriculture is easily affected at large extent by these disasters as it depends directly on the climate, weather, water and land.

The Indian Government has set a target of doubling farmers' income by the year 2022, 5 trillion dollar economy and ease of living by 2024. These targets can be achieved by improving the scenario of Indian agriculture and protecting them from natural disasters through proper mitigation and going in accordance with Prime Minister's Ten-Point Agenda on Disaster Risk Reduction. To better prepare for these impacts and to avoid potential new risks, reduce the existing risk of disasters, and to manage the actual and potential events of disasters, National Agriculture Disaster Management Plan (NADMP) has been prepared with the following objectives:

1. To ensure the protection of infrastructure, assets, property and resources under the ministry and its departments/establishments from disasters and extreme events;
2. To ensure that the activities (including physical development and systematic practices/operations) do not aggravate hazards, risks and vulnerabilities for disasters;
3. To ensure that the activities/programmes and schemes under the ministry/sector increase resilience against the risk of disasters and extreme events, and

4. To ensure that the Ministry and associated sector and constituents at all levels are prepared to deal with the situations arising out of any disaster or emergencies.

This NADMP is designed as a practical guidance document, a work agenda, and a roadmap to include key aspects of disaster risk reduction (DRR) into the sustainable development agenda of agriculture, especially for crop production, sustainable land management and post-harvest management within scopes and mandate of Ministry of Agriculture and Farmers Welfare. The plan seeks the synergy of resources and efforts to holistically address disaster risk reduction, climate change adaptation, and sustainable development goals related to the sector. The plan comprises of 12 Chapters and is very much in accordance with the guidelines of the National Disaster Management Plan of National Disaster Management Authority.

Chapter 1 is the introduction which provides an overview of the agriculture scenario in India, comprising of key challenges of Indian agriculture, including climate change and disaster-related specific challenges, institutional mechanisms to deal with the agriculture sector in India, primarily looking at the role and functions of Ministry of Agriculture and Farmers Welfare in dealing with various aspects of agriculture. The chapter also gives the context, rationale purpose and objectives of preparing the National Agriculture Disaster Management Plan (NADMP).

Chapter 2 is on Hazard Risk Vulnerability and Capacity Analysis (HRVCA) and analyses the hazards, risks and vulnerabilities of various elements of the agriculture sector from disaster and climate change perspective. It gives an overview of key elements of vulnerability which the agriculture sector faces such as exposure, sensitivities and adaptive capacity. It details out the environmental, social, physical and economic vulnerabilities of the agriculture sectors. The chapter also analyses the existing capacities and knowledge gaps and suggests key areas for improving the capacities to deal with the impacts of disasters and climate change.

Chapter 3 presents the disaster prevention and mitigation measures for each hazard such as drought, flood, cyclone etc, highlighting the roles and responsibilities of agencies at the national and state level.

Chapter 4 is about mainstreaming different aspects of Disaster Risk Reduction(DRR) into the plans, policies and schemes of the Ministry.

Chapter 5 emphasizes the importance of Disaster Risk Management in context of the vulnerable groups. It highlights 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. It details out the various programmes and schemes of MoAFW for vulnerable groups and their linkages with disasters.

Chapter 6 gives an overview of the policy framework for disaster management, climate change and sustainable development. It details out the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs) and Paris Agreement on Climate Change and establishes the linkages with these policies through a framework. It shows the MoAFW's initiatives contributing to these policy frameworks.

Chapter 7 gives an overview of Capacity Development Activities for Disaster Risk Reduction (DRR). It entails the capacity-building themes for disaster management, role of NIDM in capacity building on disaster risk reduction.

Chapter 8 presents the institutional framework along with the role and responsibilities of the concerned departments to deal with the various disasters.

Chapter 9 mentions about the preparedness and response measures for various disasters. It details out the standard operating procedures (SoPs), including specific tasks, responsibilities and timeframe for preparedness and response for dealing with the various disasters.

Chapter 10 talks about post-disaster need assessment, sustainable recovery framework and build back better approach for the agriculture sector.

Chapter 11 is about financial provisions.

Chapter 12 mentions about plan review and updating mechanisms.

The overall goal of the NADMP is to develop a roadmap and devise a strategy to understand the impact of climate change on the population dependent on agriculture and generate knowledge base for better adaptation measures. Along with this, it will further help in achieving the Sustainable Development Goals by eradicating extreme poverty (Goal no.1.1), by ending hunger through sustainable food production system (Goal no.2.4 and to combat climate change impacts by strengthening resilience and adaptive capacity (Goal no.13.1) which will be based on Paris Agreement adopted at the COP 21 in Paris. This plan also encompasses the very principles of Sendai Framework for Disaster Risk Reduction, Prime Minister's Ten-Point Agenda on Disaster Risk Reduction, DM Act 2009 and DM Policy 2009 as well as the National Disaster Management Plan-2019.

Approach Adopted for Making the Plan

Plan has been developed under the participatory process, facilitated by NIDM with professional support in drafting the plan, conducting detailed HRVA process (assessment including risk mapping), components of prevention, mitigation and response, recovery plans, etc. and finalizing through consultative process- workshops/meetings. The detail process is highlighted in the table given below:

Sl. No.	Steps	Date	Participation / Remarks
1.	Development of NADMP framework and formation of Working Group	June 2019	Coordinators from NIDM and MoAFW
2.	Working Group meeting and sectoral workshop. The objective of the meeting included a)- defining the guiding principles for NADMP b)-finalized practical template/framework to conduct Hazards-Risk, Vulnerability and Capacity Assessment(HRVCA) at the National Level c)- Develop better understanding of capacity needs and scoping exercise	12 th July 2019	Nodal officer from IMD, CRIDA, NAARM ICAR institutes, officials from DARE and MoAFW
3.	HRVCA process with all the divisions of MoAFW (DoACFW and DARE)	August-September 2019	NIDM team's one to one consultation with all the nodal officers for review and finalization of HRVCA exercise
4.	HRVCA WORKSHOP	17 th September	Nodal officers from all the divisions of DoACFW and DARE participated and completed the exercise under the supervision of JS-DM, MoAFW and ED-NIDM
5.	Submission of NADMP Draft-1	October 2019	Reviewed by all nodal officers and JS-DM and suggested comments were incorporated in Draft 2
6.	Submission of NADMP Draft-2	November 2019	Reviewed by all nodal officers, working group members and JS-DM and suggested comments were incorporated in Draft 3
7.	Second Working Group Meeting was organized at ICAR- Centre for Research on	15 th November 2019	All the inputs and suggestions came from the working group

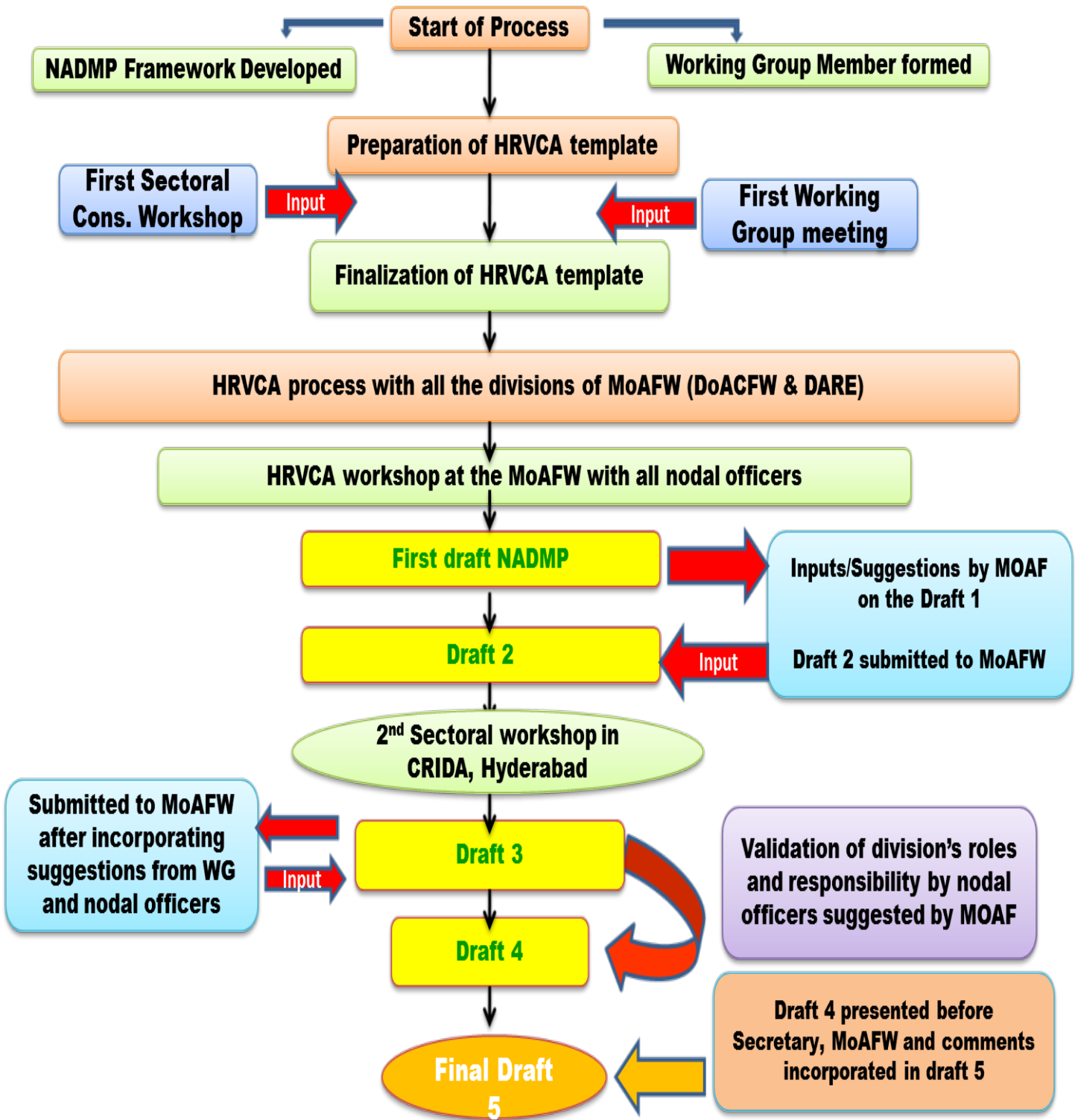
Sl. No.	Steps	Date	Participation / Remarks
	Dryland Agriculture, CRIDA, Hyderabad The objectives of the workshop was a) to review the draft plan b) Define the practical strategy for resilient agriculture and action plan and c) Discussion among the working group members and other experts to make it robust		members and other experts were incorporated in finalizing the plan.
8.	Submission of NADMP Draft-3	December 2019	Reviewed by JS-DM and all division's nodal officers, few more suggestions came from the MoAFW which were incorporated in Draft 4
9.	Submission of NADMP Draft- 4	13 th January 2020	Plan was submitted and presented before Hon'ble Secretary of MoAFW for approval. He recommended few points which were incorporated and finalized as Draft 5 Some additional tables and annexures have been incorporated as per the NDMA template
10.	Submission of NADMP Draft-5	March 2020	Final Draft 5 was submitted to MoAFW which was further submitted to NDMA for approval
11.	Approval of National Disaster Management Authority (NDMA).	25 th September 2020	NDMA approved the Plan as required under Disaster Management Act, 2005.
12.	Administrative approval of Hon'ble Agriculture Minister.	6 th November 2020	Hon'ble Agriculture Minister approved the Plan

Formation of Working Group on Preparation of National Agriculture Disaster Management

Formation of working group from different Government agencies and Institutes was the initial step on the road to the preparation of NADMP. Towards preparing the Plan more robust, the role of the working group members have been very guiding and supporting with their diverse expertise. They helped guiding the process of NADMP preparation by the project team which included HRVCA exercise, data collection etc. Working group members have continuously provided the inputs while preparation of the plan in terms of review comments, suggestions and recommendations starting from Draft 1 till Final Draft 5.

ORGANIZATION	REPRESENTATIVE
▪ ICAR- Central Research Institute for Dryland Agriculture (CRIDA)	▪ Dr. G. Rabindra Chary, Director
▪ India Meteorological Department (IMD)	▪ Dr. S. D. Attri, Scientist G, Dr K.K. Singh, Scientist G
▪ Mahalanobis National Crop Forecasting Centre (MNCFC)	▪ Dr. Shibendu Shankar Ray, Director
▪ ICAR – National Rice Research Institute (NRRI)	▪ Dr. Himanshu Pathak, Director
▪ National Academy for Agricultural Research and Management (NAARM)	▪ Dr. P. Krishnana, Principal Scientist
▪ Indian Agricultural Research Institute (IARI)	▪ Prof V. K. Seghal, Principal Scientist
▪ Dept. of Agri. Coop. & FW (MoAFW)	▪ Shri Vijay Soni, Under Secretary
▪ National Institute of Disaster Management (NIDM)	▪ Dr Anil K. Gupta, Professor, Head ECDRM, PD- NADMP and NADMP team
▪ Expert of Agriculture and Disaster Managemnet	▪ Shri Anup K Srivastava, Senior Consultant

Process of Making the Plan



CHAPTER 1

Chapter 1: Preliminaries

This chapter provides an overview of the agriculture scenario in India, comprising of key challenges of Indian agriculture, including climate change and disaster-related specific challenges, institutional mechanisms to deal with the agriculture sector in India, primarily looking at the role and functions of Ministry of Agriculture and Farmers Welfare in dealing with various aspects of agriculture. The chapter also gives the context, rationale, purpose and objectives of preparing the National Agriculture Disaster Management Plan (NADMP).

1. Protecting Indian Economy and Food Security

Agriculture and allied sectors have been considered as the cornerstone of the Indian agriculture where 54.6% of the total population is engaged (Annual Report, MoAFW, 2017-18) to support their livelihoods. India's arable land area of 159.7 million hectares (394.6 million acres) is the second-largest in the world. Its gross irrigated crop area of 82.6 million hectares (215.6 million acres) is the largest in the world. Agriculture is an important sector of the Indian economy as it contributes about 17% of the total GDP. India's population has grown and doubled from 541 million in 1971 to 1210 million in 2011 (Census, 2011). To support its large and growing population, India made significant progress in agricultural production, doubling its food grain production capacity from 108 million tons in the 1970s to 264 million tons in 2013-14 (Swaminathan and Bhawani, 2013) and has reached from a stage of self-sufficiency to surplus agricultural produce (Ahmad and Haseen, 2012; Swaminathan and Bhawani, 2013). The credit for such progress goes to "Green Revolution" that started in the late sixties and made India from a country of food grain importer to food grain exporter. However, attaining a level of food sufficiency has been at the cost of high extraction of water together with higher consumption of energy in agriculture coupled with many other issues like soil degradation, loss of biodiversity, climate change, overdraft of groundwater and socioeconomic disparities. It has been projected that the population of India will reach 1.7 billion by 2050 and would require 450 million tons (Gol Report, 2006) of food grains annually to support its population.

Role of Agriculture in Strengthening Indian Economy

Agriculture is the primary source of livelihood for about 58 per cent of India's population. Gross Value Added by agriculture, forestry and fishing is estimated at Rs 18.53 trillion (US\$ 271.00 billion) in FY18. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly

within the food processing industry. The Indian food and grocery market are the world's sixth-largest, with retail contributing 70 per cent of the sales. The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment. India is expected to achieve the ambitious goal of doubling farm income by 2022. The agriculture sector in India is expected to generate better momentum in the next few years due to increased investments in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Furthermore, the growing use of genetically modified crops will likely improve the yield for Indian farmers. India is expected to be self-sufficient in pulses in the coming few years due to concerted efforts of scientists to get early-maturing varieties of pulses and the increase in minimum support price. The government of India targets to increase the average income of a farmer household at current prices to Rs 219,724 (US\$ 3,420.21) by 2022-23 from Rs 96,703 (US\$ 1,505.27) in 2015-16. (APEDA, Union Budget 2018-19,)

The impact of Indian agriculture on Indian Economy is evident by a) The capacity of foreign exchange earnings, b) Share of agriculture in total Gross Domestic Product (GDP), and c) Role in supplying capital and labours to other labour-intensive sectors. Agriculture along with allied sectors i.e., livestock, Agro-forestry and fishing & aquaculture account for 18.5% of the total GDP of India in the year 2005-06 (to update this info, if possible). India's total export from Agriculture and allied sectors is about 10.95 %. The agricultural activity engages 46% of the total landmass and provides 58% of the country's total employment (CSO, 2007).

Currently, India stands largest producer of Jute, milk & pulses, second largest producer of cotton, fruits, groundnut, rice, sugarcane, vegetables and wheat and also leads in the production of fish, livestock, plantation crops, poultry & spices. In 2017-18, total estimated food grain production was 275 million tonnes. India is the world's largest producer, consumer and importer of pulses. India produces 25% of world production, 27% of the total global consumption & imports 14% of pulses. India's milk production in 2017-18 was 165 million tones & accounts to the world's largest milk production. India has the world's second largest cattle population and accounts for 10.9% of the world's fruit and 8.6% of the world's vegetable production (FAO, 2018)

Role of Agriculture in Ensuring Food Security

Food security, as defined by the United Nations' Committee on World Food Security, means that all people, at all times, have physical, social, and economic access to sufficient, safe, and

nutritious food that meets their food preferences and dietary needs for active and healthy life (IFPRI, 2020). Food security incorporates a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors including droughts, shipping disruptions, fuel shortages, economic instability, and wars.

Hazards such as floods, tsunamis, droughts and other risks can weaken food security and severely impact agricultural activities. Consequently, this has an impact on market access, trade, food supply, reduced income, increased food prices, decreased farm income and employment. To improve food security, agricultural development is important. Natural disasters create poverty, which in turn increases the prevalence of food insecurity and malnutrition (Tirivangasi, 2018). The poorest people in the community are affected by food insecurity and disasters; hence, there is a need to be prepared as well as be in a position to manage disasters. Food insecurity following any disaster is not only because of damage of food reserves but also damage to means of living and livelihood assets of people. Disasters and crises that affect food and nutrition security go beyond natural disasters; therefore, FAO promotes a multi-hazard approach to strengthen the resilience of livelihoods against disasters and ensure food and nutrition security.

On the other hand, the increase of population has caused a massive shrinkage of land for agriculture but created a greater demand for agricultural products; this has led to a sharp increase in food prices. The marginal and the small holdings together constitute over 78 per cent of the total land holdings. The problem of food security is compounded by our increasing tendency to depend on a narrow mix of food crops. Thus, food production systems have become vulnerable to biotic and abiotic stresses. The cultivators in the early periods of civilization managed such stresses by adopting sustainable agronomic practices like shifting cultivation, mixed cropping, crop rotations and so on. As such, to ensure food security, sustainable agriculture development is needed. Agriculture plays a critical role in transforming economies to reach the goal, along with achieving other essential development goals like ensuring food security and improving nutrition.

Key Challenges of Indian Agriculture

In 2016, harvest and post-harvest loss of India's major agricultural products/ produces were estimated at Rs 92,651 crore (\$13 billion) - almost three times as high as the 2016-17 budget for the agriculture sector. About 16 per cent of fruits of vegetables, valued at Rs 40,811 crore (\$6 billion), were lost between 2012 and 2014.

Poor access to reliable and timely market information for the farmers, absence of supply and demand forecasting, poorly structured and inefficient supply chains, inadequate cold storage facilities and shortage of proper food processing units, large intermediation between the

farmers and the consumers are some of the major causes for the losses. One of the biggest issues facing the agricultural sector in India is low yield. India's farm yield is 30-50% lower than that of developed nations. Poor infrastructure, low use of farm technologies and best farming techniques, decrease of soil fertility due to over-fertilization and sustained pesticide use, are leading contributors to low agricultural productivity. Indian farms are small (70% are less than 1 ha, the national average is less than 2 ha) and therefore have limited access to resources such as financial services, credit, support expertise, educational services or irrigation solutions.

In the short-term, agriculture production/ crop yields directly impacts a farmer's cash flow and the ability to respond to fluctuations in the market. Long-term, yield limits a farmer's ability to invest into their farm's future to increase productivity and decrease risks associated with their crops (via inputs such as seeds, fertilizer, crop insurance, market/weather info, livestock health support, etc.) but also to invest into their families in areas such as education, healthcare, training, etc.(<https://www.startupindia.gov.in/content/sih/en/agriculture>). These factors have a multiplier impact on the farmer's livelihood and incomes and also undermine the ability of the agriculture sector and its potential to become a part of the solution to the problem of endemic poverty of the farmers and the agricultural labour (NITI Aayog Report, 2012). Agriculture in India is largely depending on monsoon. As a result, production of food-grains fluctuates year after year. Increasing population and related socio-economic problems including poverty and hunger, poor water use efficiency, water scarcity, extreme weather events like a flood as well as drought and unequal access to the water are a common concern of the agriculture sector. Importantly, farming revenues is not raising much even as India's income rises. The ratio of total agriculture income to total population is relatively flat across countries regardless of per capita income. Rising GDP means the growth of non-agricultural incomes.

The Indian Government has set a target of doubling farmers' income by the year 2022, 5 trillion-dollar economy and ease of living by 2024. However, these targets can be achieved by improving the scenario of Indian agriculture and protecting them from natural disasters through adaptation. To ensure food security and also to strengthen our Indian economy, different challenges before, during and after the process of cultivation needs to be understood and addressed. Indian agriculture, like India's agricultural-landscapes, is vulnerable to multiple disasters of natural and anthropogenic nature, and also aggravated by the impact of climate change and vulnerability. Unlike any time in the past, India's agriculture challenges have to be understood concurrently in many dimensions.

Challenges	Description
Food insecurity	<ul style="list-style-type: none"> • Chronically undernourished population • Increasing population, limited land • Rampant urbanization • Burgeoning middle class, unsustainable lifestyle, food wastage • Declining agricultural land • Changing food demand profile
Water insecurity	<ul style="list-style-type: none"> • Growing water stress • Declining per capita water availability • Agriculture becoming water intensive • Overexploitation of groundwater • Drought and flood • Upstream-downstream dependence on water • Rain dependent river systems in low and medium rainfall regions
Energy insecurity	<ul style="list-style-type: none"> • Food production becoming energy intensive • Energy required in transportation, storage
Social insecurity	<ul style="list-style-type: none"> • Forced migration/reverse migration issues • Small and marginal farmers and landless poor • Education and awareness • Gender
Climate change and variability	<ul style="list-style-type: none"> • Shift in climates (semiarid to arid; sub humid to semiarid etc.) • Changing minimum and maximum temperatures during crop growing seasons • Increasing extreme events such as droughts, high rainfall events, hailstorms, floods, heat wave etc. • Glacial melt water • Uncertainty in water availability

The challenges faced by Indian agriculture could be divided into three sub-groups as per the crop cycle, though all these are interrelated.

- a. **Crop Production related challenges:** These challenges can be divided into three parts as shown in the table below:

Infrastructure	Input facilities	Investment issues
Inequality in Land Distribution	Poor quality Seeds, Manures, Fertilizers and Biocides	Poor credit management in farm sector
Sub-division & divided small and fragmented land holdings & land ownership	Efficient irrigation facility and critical irrigation requirement, Inadequate water supply	Farm price realization
Fragmentation of land holdings Land Tenure System	Skill gap in agricultural labor	Presence of money lenders
Inadequate availability of efficient farm machinery/implements	Poor value realization	Lack of investment in logistics and supply chain
Farm level infrastructure	Increasing input cost	Poor in investment in agriculture marketing infrastructure
Poor market, storage, processing, value addition infrastructure	High dependency on monsoon Inadequate Irrigation facilities Access and control over resources (Land tenancy)	Credit flow in agriculture and its value chain activities Instability in Agricultural Prices Poor realization of repayment capacity by farmers

Challenges During Storage and Transportation

Storage facilities in rural areas are either totally absent or grossly inadequate. Under such conditions, the farmers are compelled to sell their produce immediately after the harvest at the prevailing market prices which are bound to be low. Such distress sale deprives the farmers of their legitimate income. Scientific storage is, therefore, very essential to avoid losses and to benefit the farmers and the consumers alike. At present, there are several agencies engaged in warehousing and storage activities. The Food Corporation of India (F.C.I.), the Central Warehousing Corporation (C.W.C.) and State Warehousing Corporation are among the principal agencies engaged in this task. These agencies help in building up buffer stock, which can be used in the hour of need.

b. Challenges of Backward and Forward Linkages

Agricultural marketing continues to be in a bad shape in rural India. In the absence of sound marketing facilities, the farmers have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at a throw-away price. In most cases, these farmers are forced, under socio-economic conditions, to carry on distress sale of their produce. In most of the small villages, the farmers sell their produce to the moneylender from whom they usually borrow money. According to an estimate 85 per cent of wheat and 75 per cent of oilseeds in Uttar Pradesh, 90 per cent of Jute in West Bengal, 70 per cent of oilseeds and 35 per cent of cotton in Punjab is sold by farmers in the village itself. Such a situation arises due to the inability of the poor farmers to wait for long after harvesting their crops. To meet his commitments and pay his debt, the poor farmer is forced to sell the produce at whatever price is offered to him. The Rural Credit Survey Report rightly remarked that the producers, in general, sell their produce at an unfavorable place and at an unfavorable time and usually they get unfavorable terms.

In the absence of an organized marketing structure, private traders and middlemen dominate the marketing and trading of agricultural produce. The remuneration of the services provided by the middlemen increases the load on the consumer, although the producer does not derive similar benefit.

Disaster and Hazard-Specific Challenges

Every year Indian agriculture is being challenged by natural disasters like floods, droughts, hailstorms, pest attacks, etc. Other than these natural disasters, there are some disasters which are of low frequency but high intensity like pandemics, epidemics, etc. Frequency and severity of natural disasters are continuously increasing, and agriculture is easily affected at large extent by these disasters since it depends directly on the climate, weather, water and land. Some of the impacts are loss of crops, contamination of water bodies, increased risk of getting a disease, destruction of agricultural infrastructures, etc. Types of disasters that are affecting the Indian agriculture are as given below:

- i) Creeping disasters: For example drought
- ii) Sudden onset disasters: For example earthquake
- iii) Low-frequency high-intensity disaster: For example pandemic, pest attack, tsunamis etc.

Creeping disasters are those which by the time is identified, it is usually already well under way, the costs to fix it are mounting, and the opportunity to take proactive action has already been

missed. A sudden-onset disaster is one triggered by a hazardous event that emerges quickly or unexpectedly. Sudden-onset disasters could be associated with, e.g., earthquake, volcanic eruption, flash flood, chemical explosion, critical infrastructure failure, transport accident. Low-frequency high-intensity events are those events that occur very rarely, but its impacts are very high. Some of the disasters which come under this section are pandemic, pest attack, tsunamis etc. This also affects the agriculture sector by disrupting its supply chain system.

The Agriculture Disaster-Related Challenges are highlighted as follows:

Disaster	Challenges
Drought	Decline in cultivated area thereby decreasing the production, fall in employment sector, fall in purchasing power, scarcity of drinking water for human and animal population, food-grains and fodder, rise in inflation rate, intake of food and widespread malnutrition, health and spread of diseases due to malnutrition, hunger and starvation, migration of people from drought affected areas to other areas in search of livelihoods, food, etc.
Flood	Massive losses like crop loss specially standing crops and yield reduction, damage to soil, damage to machineries, damage to stored inputs, damage to roads, physical damage to perennial horticulture and tree based systems, damage livestock, fisheries and animal based production systems etc.
Cyclones	Direct damage by high speed wind, torrential rain and extensive flooding. High tide may also affect the agriculture by bringing in saline water and sand mass making the fields unsuitable for agriculture. Physical damage to standing crops and horticulture, livestock and other animal systems and their health and shelter, The indirect effects include pest and diseases attack in crops, damage to existing infrastructure in agriculture and allied sectors, disruption in agricultural marketing and trade and are adversely affected due to lean season of animal, fish and crop production.
Hailstorms	Hailstorm with very strong winds physically damage all the crops, majorly horticulture crops particularly orchards, livestock.
Heat waves/ cold waves	Affect the crop production both in quantity and quality and that crop loss is usually encountered due to flower drop and higher mortality in new plantations.
Pest attack	Some species feed on endosperm causing loss of weight and quality, while other species feed on the germ or on the entire plant material like locust. Other pest like fall armyworm larvae can also eat buds and tunnel into and feed on fruit. Larger larvae can cut plants off at the base
Fire	Damage to infrastructures, agriculture production facilities, crops and livestock
Earthquake	Damage to infrastructures like agriculture offices, warehouse, transport facilities etc.
Landslide	Damage to seed stocks thereby destroying the seeds, loss of lives of people and livestock, damage to land and loss of natural resources
Tsunami	Affects agricultural lands, destroys irrigation canals and systems, reduces soil fertility.
High Intensity Rainfall	Causes flash flood, soil erosion, water logging
Low Frequency High Intensity disasters	Causes disruption in food supply chain system

Source: Gupta et al. 2019

1.1 Profile of the Ministry

Ministry of Agriculture and Farmers Welfare constitutes of two departments, namely, the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW) and Department of Agricultural Research and Education (DARE). Recently, the Department of Animal Husbandry, Dairying & Fisheries (DAHD&F) has been carved out and made a separate Ministry for better management of animals and allied sectors.

The DAC&FW is organized into 28 divisions (Figure 1) and has five attached offices and twenty-one subordinate offices which are spread across the country for coordination with state-level agencies and implementation of Central Sector Schemes in their respective fields. Further, one Public Sector Undertaking, eight autonomous bodies, ten national-level cooperative organizations and two authorities are functioning under the administrative control of the Department.

DARE was established in the year 1973 and coordinates and promotes agriculture research and education in the country. The department has four autonomous units under its administrative control, namely, Indian Council of Agricultural Research (ICAR), Central Agricultural University (CAU) Imphal, Dr. Rajendra Prasad Central Agricultural University (PUSA) Bihar, and Rani Laxmi Bai Central Agricultural University, Jhansi. DARE also has other attached organizations which are given in Annexure-IV. The list of existing resources with DAC&FW and DARE is given in Annexure-V.

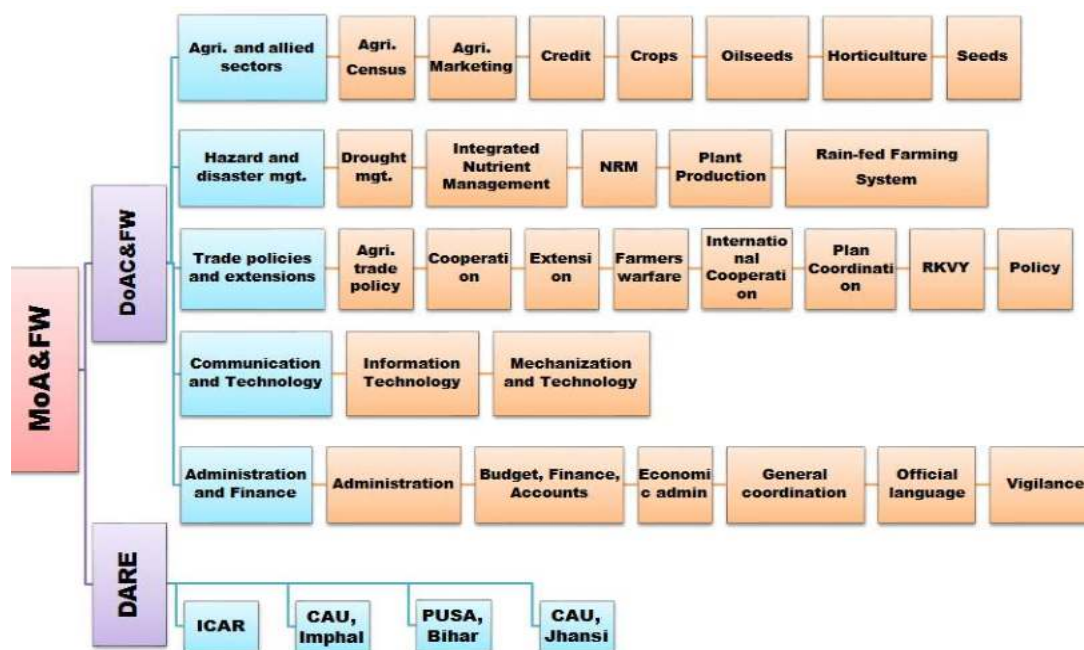


Figure 1: Organizational Structure of Ministry of Agriculture and Farmers Welfare

1.1.1 Role/Functions of the Division

Department of Agriculture Cooperation and Farmers Welfare is the controlling authority for the entire agricultural system of India. Each division of the department has a deep impact on Indian agriculture. Therefore, any kind of disaster can hamper this system and consequently Indian Economy. Overview of the Department of Agriculture and Farmers Welfare and domain of activities has been provided in Table 1.

Drought Management Division deals with 4 major disasters i.e. drought, hailstorm, pest attack and cold wave/frost. The division is mandated to coordinate relief measures necessitated by drought, hailstorm, pest attack and cold wave/frost.

Table 1: Functions of Department of Agriculture Cooperation and Farmers Welfare

S.no.	Division	Functions
1	Administration	Takes care of all administrative, establishment and service matters of the officers and staffs posted in DAC (Proper), Cadre management, promotions, appointment /transfer/ postings of CSS/CSSS/CSCS officials in the Department and its 5 other participating units. Allocates work among various Divisions and issue of orders relating to structural reorganization of the Department
2	Agriculture Census	The main source of information on basic characteristics of operational holdings such as land-use, cropping pattern, irrigation status, tenancy, terms of leasing and dispersal of holdings etc.
3	Agricultural Marketing	New Model Agricultural produce and Livestock Marketing (Promotion & Facilitation) Act, 2017 Provisions include inter alia private markets, direct marketing, farmer-consumer markets, special commodity market yards, declaring warehouses/silos/cold storages or such structures as market sub yards so as to reduce the number of intermediaries between producer and buyer and increase the share of the farmer in consumer's rupee.
4	Budget, Finance & Accounts	Looks into the sanction of grants, finance, accounts, budgets
5	Cooperation	The area of disbursing agricultural credit providing market support to farmers, distribution of agricultural inputs and imparting cooperative education and training etc. Agriculture Marketing: The basic objective of the Cooperation Division is to design long term and short-term strategies for reducing economic disparities between the

S.no.	Division	Functions
		down-trodden rural people and the rural rich as well as regional imbalances, including rural and urban differences. Central Sector Integrated Scheme on Agriculture Cooperation having two sub-components (i) Assistance to NCDC programmes for development, including assistance to Multi-State Cooperative Societies and (ii) Assistance for Cooperative Education & Training.
6	Credit	Agricultural credit: Availability and access to adequate, timely and low-cost credit from institutional sources is of great importance especially to small and marginal farmers. The major concern of the Government is therefore; to bring all the farmer households within the banking fold and promote complete financial inclusion.
7	Crops	In convergence with national food security mission (NFSM). Five components: i) NFSM- Rice; (ii) NFSM-Wheat; (iii) NFSM-Pulses, (iv) NFSM-Coarse cereals and (v) NFSM-Commercial Crops.
8	Drought Management	Monitors progress of south west monsoon to determine the monsoon deficit areas, reviews and updates crisis management plan every year.
9	Economic Administration	Deals with all administrative & financial matters relating to Directorate of Economics & Statistics (DES) and the Commission for Agricultural Costs & Prices (CACP). Finalizes budget and release funds
10	Extension	Helps farmers to get information regarding scientific research and new knowledge in agricultural practices. It assists and encourages the State Governments in organizing, maintaining and operating professional Extension Services. It coordinates with Prasar Bharati and All India Radio in effective running of DD Kisan channel and Krishi Vani programmes respectively. The schemes of Extension Division are encompassed under the broad umbrella of NMAET (National Mission on Agricultural Extension and Technology) Information to farmers regarding agro-advisories through Kisan Call Centers, m-kisan portal.

S.no.	Division	Functions
11	General Coordination	Manages all kinds of coordination including processing comments on Draft Cabinet Notes, organizing the National level conference on Agriculture, coordination work relating to Agriculture Department of the Union Territories
12	Official Language	Implements the Official Language Policy of the Union Government
13	Horticulture	Increase productivity/output
14	Information Technology	Aims to improve awareness and knowledge efficiency of farmers. A comprehensive ICT strategy has, therefore, been developed not only to reach out to farmers in an easy and better way but also for planning and monitoring of schemes so that policy decisions can be taken at a faster pace and farmers can be benefited quickly
15	Integrated Nutrient Management	Assessment of requirement of fertilizers Availability of Fertilizers (ministry of fertilizers)
16	International Cooperation	Promotes the growth of mutually beneficial partnerships with other countries of the world in multilateral as well as bilateral format
17	Mechanization and Technology	Providing access to mechanical agricultural inputs to small and marginal farmers.
18	Natural Resource Management	Integrated Nutrient Management Conservation of land resources can promote sound land use to match with the land capabilities or suitability and to initiate correct land resources, development/suitability in the country
19	Oilseeds	Assistance for oilseed cropping
20	Plan Coordination	Entrusted primarily with time bound formulation and finalization of Five-Year Plans and Annual Plans of DAC in consultation with various Divisions within the Department and Planning Commission.
21	Plant Protection	The major thrust areas of plant protection are promotion of Integrated Pest management, ensuring availability of safe and quality pesticides for sustaining crop production from the ravages of pests and diseases, streamlining the quarantine measures for accelerating the introduction of new high yielding crop varieties, besides eliminating the chances of entry of exotic pests and for human resource development including empowerment of women in plant protection skills.
22	Policy	Formulation of overall policy and strategy for agricultural development in a long-term perspective; development of vision for agriculture over the next 20 years or so;

S.no.	Division	Functions
		preparation of Action Plans for achieving the same;
23	Rainfed Farming System	Manages the complexity, diversity and associated risk of the Rainfed agriculture system in India to utilize the potential of this system and contribute more in faster agricultural growth and enhance food production
24	Rashtriya Krishi Vikas Yojana	An umbrella scheme for ensuring holistic development of agriculture and allied sectors
25	Seeds	Ensure production and multiplication of high yielding certified/quality seeds of all crops in sufficient quantities and make the seeds available to farmers, including those in remote areas, not easily accessible by rail/road on time and at affordable price. Import and export of seeds India is a part OECD Seed scheme
26	Agriculture Trade Policy, Promotion and Logistics Development Division	Entrusted with the responsibility of making policy recommendations on export and import of agricultural commodities.
27	Vigilance	Prevents improper practices or commission of misconduct; examining audit; inspection
28	Farmers Welfare	Entrusted with the formulation, implementation, monitoring and evaluation of the Pradhan Mantri KisanSamman Nidhi (PM-KISAN)

Source: Ministry of Agriculture and Farmers Welfare

1.1.2 Business Rules of MoAFW and Allocation

1.1.2.1 Department of Agriculture, Cooperation and Farmers Welfare (DoACFW)

Major functions and objectives as per the allocation of business rules, are as under:

Table 2: Businesses of Department of Agriculture, cooperation and Farmers Welfare

Categories	Description	Part
International collaboration	Linkages with international Agri-Organisations like FAO (Food and Agriculture Organization) of the United Nations	1
	Participation in international conferences, associations and other bodies concerning agriculture and implementation of decisions made thereat.	1
	Convention on Locust Control	1
	Plant Quarantine.	1
Infrastructure development	Development of agricultural industries including machinery, fertilizer and seeds	1

Categories	Description	Part
	Shellac Industry	1
	Infrastructure for post-harvest management of agriculture and horticulture.	4
	Mechanized Farms	4
	Setting up of agricultural markets in rural areas.	4
	Warehousing in rural areas including rural godowns	4
Disaster management	Indian People's Natural Calamity Trust.	1
	Prevention of the extension from one State to another of infectious or contagious diseases or pests affecting plants including locusts.	2
	Administration of the Dangerous Machine (Regulation) Act, 1983 (35 of 1983).	2
	Adulteration of agricultural products other than foodstuffs.	2
Disaster management	Agriculture (Other than agricultural education and research) protection against pests and prevention of plant diseases.	3
	National Rainfed Area Authority	4
	Matters relating to damage to crops and co-ordination of relief measures necessitated by drought, hailstorm and pest-attacks, cold wave and frost	5
	Matters relating to loss of human life due to drought	5
Economics and finances	Economic Planning (Agricultural Economics and Statistics)	2
	Price control of agricultural commodities except food grains, sugar, vanaspati, oil seeds, vegetable oils, cakes and fats, jute, cotton and tea.	2
	Financial assistance to State Soil Conservation Schemes.	4
	Agricultural credit and indebtedness.	5
	Crop Insurance	5
Property/assets	Agricultural Implements and Machinery.	4
	Co-operation in agricultural sector	3
	Training of personnel of co-operative departments and co-operative institutions (including education of members, office bearers and non-officials)	3

Categories	Description	Part
Policy and schemes	General Policy relating to the marketing of agricultural produce including pricing, exports etc.	3
	General Policy in the field of Co-operation and Co-ordination of co-operation activities in all sectors.	3
	Agricultural Schemes received from States and Union Territories for landless agricultural labour.	5
	Schemes for welfare of farmers	
Environmental	Bio-aesthetic Planning.	4
	Land Reclamation.	4
	National Land Use and Conservation Board.	4
	Soil Survey in connection with development programmes.	4
	Organic Farming	4
	On Farm Water Management.	4
Fertilizers and pesticides	Projection of demand of fertilizers and manures at all-India, zone or region level; fixation of targets, nutrient-wise, for zones or regions.	4
	Administration of the Fertilizer (Control) Order, 1957.	4
	Monitoring of Pesticides Residues at National Level.	4
	Administration of the Insecticides Act, 1968 (46 of 1968).	
Agriculture and allied sectors	Agriculture and horticulture	4
	Agricultural Production-Grow more food.	4
	Development of Cotton, Jute and Sugarcane.	4
Education and awareness	Organization and Development of extension education and training in the country.	4
	Crop campaigns, crop competitions and farmers organizations including Farmer Producer Organizations	5
Others	Agricultural Census	1
	Professions	2
	Technology Mission on Oilseeds and Pulses.	2
	Production of oil seeds	4

Source: Ministry of Agriculture and Farmers Welfare

1.1.2.2 Department of Agriculture Research and Education

Table 3: Businesses of Department of Agricultural Research and Education (DARE)

Categories	Description	Part
International Cooperation	International cooperation and assistance in the field of agricultural research and education including relations with foreign and international agricultural research and education institutions and organizations.	1
Education, research and training	Fundamental, applied and operational research and higher education including coordination of such research and higher education in agriculture, agroforestry, animal husbandry, dairying, fisheries, agricultural engineering and horticulture including agricultural statistics, economics and marketing.	1
	Sugarcane research	1
	Agricultural Education and Research.	2
	All India Soil and Land Use Survey relating to research training, co-relation, classification, soil mapping and interpretation.	3
	Research and Development on production and improvement of bio-fuels plants	3
	Indian Council of Agricultural Research and its constituent Institutes, National Research Centres, Project Directorates, Bureaus and All India Coordinated Projects.	3
Human Resources	Development of Human Resources in Agricultural Research/Extensions and Education.	1
Finances	Financing to the Indian Council of Agricultural Research and the Commodity Research Programmes other than those relating to tea, coffee and rubber.	1
	Financial assistance to State Governments and Agricultural Universities in respect of agricultural research and educational schemes and programmes.	3
Others	Coordination and determination of standards in institutions for higher education or research and scientific and technical institutions in so far as	3

Categories	Description	Part
	they relate to food and agriculture including animal husbandry, dairying and fisheries.	
	Plant, animal and fish introduction and exploration.	3
	National Demonstrations	3

Source: Ministry of Agriculture and Farmers Welfare

The Department of Animal Husbandry and Dairying (AH&D) renamed as Department of Animal Husbandry, Dairying & Fisheries (DADF) was one of the Departments in the Ministry of Agriculture. It came into existence w.e.f. 1st February 1991, by converting two divisions of the Department of Agriculture and Cooperation, namely, Animal Husbandry and Dairy Development into a separate Department.

1.2 Rationale

The National Agriculture Disaster Management Plan (NADMP) provides an outline and direction to the Ministry of Agriculture and Farmers Welfare for all phases of the disaster management cycle. It is in accordance with the provisions of the Disaster Management Act 2005. The NADMP is a dynamic syllabus for MoAFW in the sense that it will be periodically updated with the global best practices and knowledge base in disaster management.

1.2.1 Legal Mandate

Prime Minister's Ten-Point Agenda on Disaster Risk Reduction draws integrated approach towards implementing the Sendai Framework for Disaster Risk Reduction, Paris Agreement on climate change and the SDGs, through its Agenda 1, i.e. all sectors to imbibe the principles of disaster risk management and utilize the legal mandate under the Disaster Management Act 2005 and the National DM Policy 2009. DM Act under its Section 35 calls for the (i) measures for disaster prevention through risk mitigation, mainstreaming into developmental plans and projects, preparedness and financial resources, at the level of Ministries of Central Government. Its Section 36 is on the role of Ministries to comprise of: prevention, mitigation and preparedness for disasters, to review the policies, laws, rules and regulations, to integrate provisions for disaster prevention, mitigation and preparedness, whereas 37(i) delineates the manner each Ministry shall draw its plan for prevention and mitigation (accordance with National Plan), integration of risk mitigation into developmental plans and programmes, preparedness and capacity building, financial provisions, and roles and responsibilities. National Institute of Disaster Management (NIDM) is mandated under the DM Act 2005 to support Government/Ministries and related agencies in developing their policies, plans, capacity building and research, etc.

1.2.2 Linkages with National and International Agendas

Integration with Sustainable Development Goals (SDGs)

The socio-economic growth and development of any country largely depend on optimal utilization and management of natural resources related to farming practices including water along with the Package of Practices (PoPs) on sustainable and resilient agriculture. Further, it shall be only prudent and pertinent to devise a strategy to understand the impact of changing weather patterns on the population dependent on agriculture and allied sectors and generate knowledge base for better adaptation measures. Subsequently, it will help in achieving the Sustainable Development Goals by eradicating extreme poverty (SDG Goal no.1.1), by ending hunger through sustainable food production system (SDG Goal no.2.4), by implementing Integrated Water Resources Management through trans-boundary cooperation (SDG Goal no.6.5), and to combat climate change impacts by strengthening resilience and adaptive capacity (SDG Goal no.13.1) which will be based on Paris Agreement adopted at the COP 21 in Paris and India's Nationally Determined Contributions (NDCs).

Integration with Sendai Framework

The NADMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework. By 2030, the Sendai Framework aims to achieve a substantial reduction of disaster risk and losses in lives, livelihoods, and health and the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NADMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for DRR. The framework states that to realize this outcome, it is necessary to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

Integration with National and International policies and flagship programs

The NADMP incorporates an integrated approach towards Disaster-related plans, viz. Manual for Drought Management, Drought Management Plan, Crop Contingency Plans prepared by CRIDA, Disaster Management Plan of Dept. of Animal Husbandry, Drought Proofing Plans, Relief Manual, National Initiative on Climate Resilient Agriculture (NICRA), National Mission for Sustainable Agriculture (NMSA), India Nationally Determined Contribution (NDCs), guidelines prepared by NDMA for various disasters, etc. which have been drawn under various initiatives to address risk and impacts of disasters, extremes and climate change. The list of such existing documents is given in Annexure 1. Strategies/policies at international levels such as Sendai Framework for Disaster Risk Reduction (SFDRR), Paris agreement on climate change, UNCCD,

SDGs, where India is a signatory/party and knowledge support along with the national policies concerning Agriculture and allied sectors are kept in the background while developing the plan.

1.2.3 Purpose and Objectives

The basic purpose of NADMP is to guide all the divisions within the department to manage the risks of disasters before, during, and after disasters. These include assessing the risks of disasters, mitigating the existing risks of disasters, preventing creation of new risks of disasters, presenting the status of its preparedness to perform its role and responsibilities as defined under the Disaster Management Act 2005 and the National DM Policy 2009.

1.2.4 Specific Objectives

The specific objectives of NADMP are to facilitate the Agriculture Department in the following:

- (i) Assessment of the sectoral and departmental risks;
- (ii) Undertake measures for mitigating the existing risks of disasters to agriculture sector;
- (iii) Prevention of creation of new risks of disasters in agriculture sector in the state;
- (iv) Undertake preparedness measure;
- (v) Assigning role and responsibilities for various tasks to be performed by the department following the Disaster Management Policy and Plan;
- (vi) Undertake measures proposed for strengthening capacity-building and preparedness of farmers and other stakeholders of agriculture sector;
- (vii) Facilitate coordinated response at various levels.

1.3 Scope of the Plan

Indian agriculture sector is greatly affected by natural and human induced hazards and disasters, like, Drought, Flood, Cyclone, Hails, Frost, Diseases, Pest attacks, Fire, Land degradation, animal menace, Chemical pollution, Migration, post-harvest damages/losses, Agro-industrial risks, damage to infrastructure, establishments and services etc. All these hazards have the potentials to create risks of disasters when exposed to vulnerable physical, economic, social and environmental conditions. National Agriculture Disaster Management Plan (NADMP) has been prepared to avoid potential new risks, reduce the existing risk of disasters, and manage the actual and potential events of disasters.

The Disaster Management Plan of the Ministry of Agriculture and Farmers Welfare is addressing Multi-hazard risk and vulnerabilities, Multi-layer approach to resilience building, and covering all aspects of agriculture system in India as a whole with focus on agriculture sector as depicted under the allocation of business to the Ministry. It includes infrastructure / establishments, resources, people, services and activities associated with the mandates of the MoAFW including

Dept. of Agriculture & Cooperation (DoACFW), Dept. of Fisheries, Dairy, etc. and Dept. of Agriculture Research & Education (DARE), their interdependence among and with other sectors/Ministries/Departments and stakeholders at various levels. The plan includes blend of descriptive and prescriptive approach. It also addresses the disaster safety and resilience of physical assets and resources associated with the sector.

1.4 Vision

The basic purpose of NADMP is to guide all the divisions within the departments (DoACFW and DARE) of Ministry of Agriculture and Farmers Welfare (MoAFW) to manage the risks of disasters before, during, and after disasters. These include assessing the risks of disasters, mitigating the existing risks of disasters, preventing creation of new risk of disasters, presenting the status of its preparedness to perform its role and responsibilities as defined under the Disaster Management Act 2005 and the National DM Policy 2009.

1.5 Time Frame

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.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 NADMP is also 2030. The reference to ‘Short’, ‘Medium and ‘Long’ is 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 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.

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 concerning the types of recovery programmes. The time frame for disaster prevention, mitigation and capacity development are described in Chapter 4 and Chapter 7.

1.6 Institutional Framework for Disaster Management

1.6.1 National Level

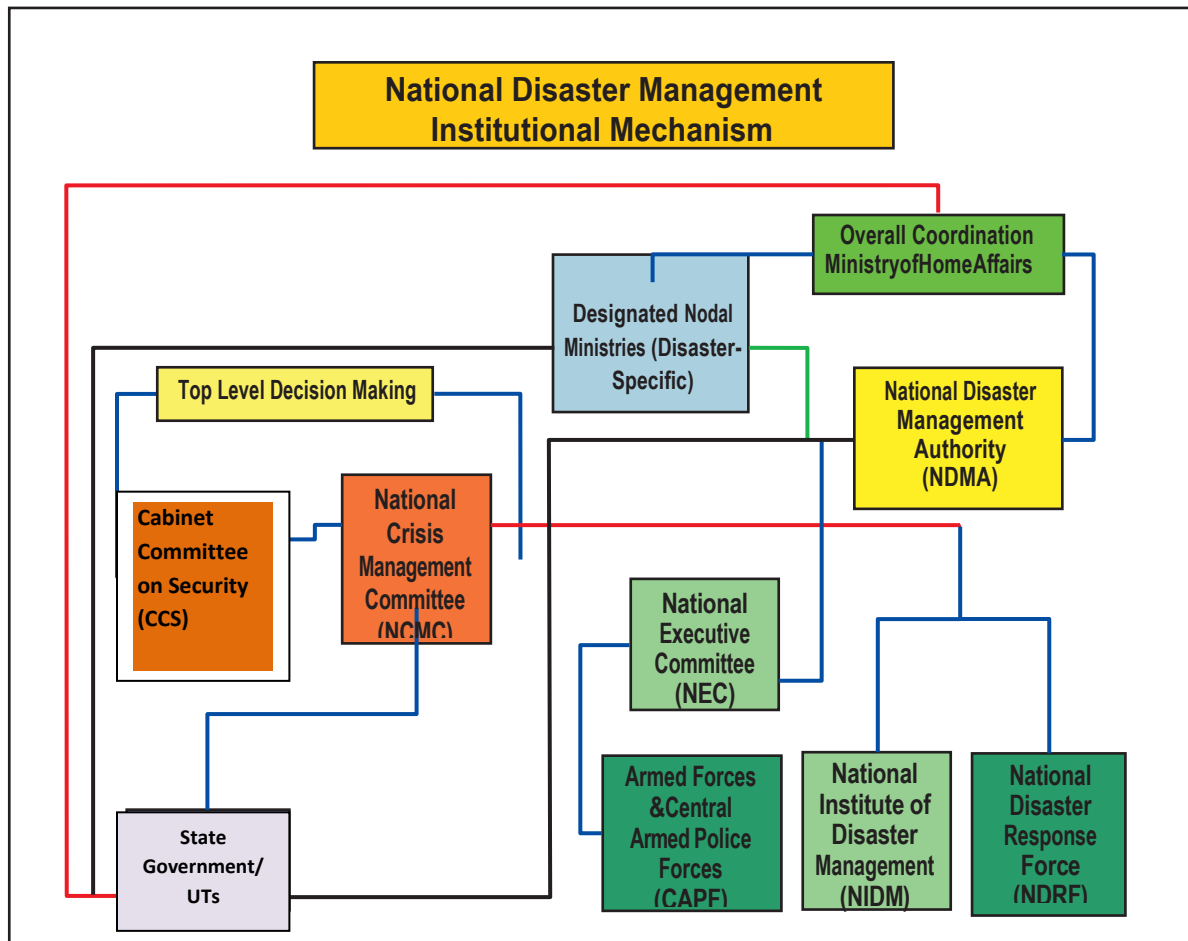


Figure 3: National-level disaster management - basic institutional framework

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 NADMP and facilitating its implementation. Figure 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.

Table 4: Key National-Level Decision-Making Bodies for Disaster Management

Sl. No.	Name	Composition	Vital role
1	Cabinet Committee on Security (CCS)	<ul style="list-style-type: none"> 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
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 through out 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 Agriculture, Drinking Water and sanitation, Environment, Forests and Climate Change Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources, River Development and Ganga Rejuvenation. 	<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 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 SDMA's 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

Sl. No.	Name	Composition	Vital role
		<ul style="list-style-type: none"> Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, 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"> Direct the relevant Ministries/ Departments of the GOI, the State Governments and the SDMA's 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 Forces (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 defence volunteers, home guards and fire services, through the relevant administrative departments of the State Governments
5	National Disaster Response Force (NDRF)	<ul style="list-style-type: none"> Specially trained force headed by a Director General. Structured like paramilitary forces for rapid deployment 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national levels scientific, research and technical organizations, besides eminent scholars, scientists and practitioners. 	<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 and undertake research Formulate and implement a comprehensive human resource development plan Provide assistance in national policy formulation, assist other research and training institutes, state governments and other organizations for successfully

Sl. No.	Name	Composition	Vital role
			discharging their responsibilities <ul style="list-style-type: none"> • 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 5).

Table 5: Current list of disaster-specific nodal ministries notified by GOI

SN	Disaster	Nodal Ministry/ Department
1.	Cold-Wave	Min. of Agriculture and Farmers Welfare (MoAFW)
2.	Cyclone	Min. of Earth Sciences (MOES)
3.	Drought	Min. of Agriculture and Farmers Welfare (MoAFW)
4.	Earthquake	National Centre for Seismology (NCS), Min. of Earth Sciences (MOES)
5.	Flood/ High Intensity Rainfall	Min. of Jal Shakti (MOJS)
6.	Floods – Urban	Min. of Housing and Urban Affairs (MHUA)
7.	Fire	Min. of Environment, Forests, and Climate Change (MEFCC)
8.	Frost	Min. of Agriculture and Farmers Welfare (MoAFW)
9.	Hailstorm	Min. of Agriculture and Farmers Welfare (MoAFW)
10.	Landslides	Min. of Mines (MOM)
11.	Pest Attack	Min. of Agriculture and Farmers Welfare (MoAFW)
12.	Tsunami	Indian National Centre for Ocean Information Services (INCOIS), 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 the disaster.

NDMA has the power to authorize 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 are 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 are 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. 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 specialized 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.

1.6.2 State Level

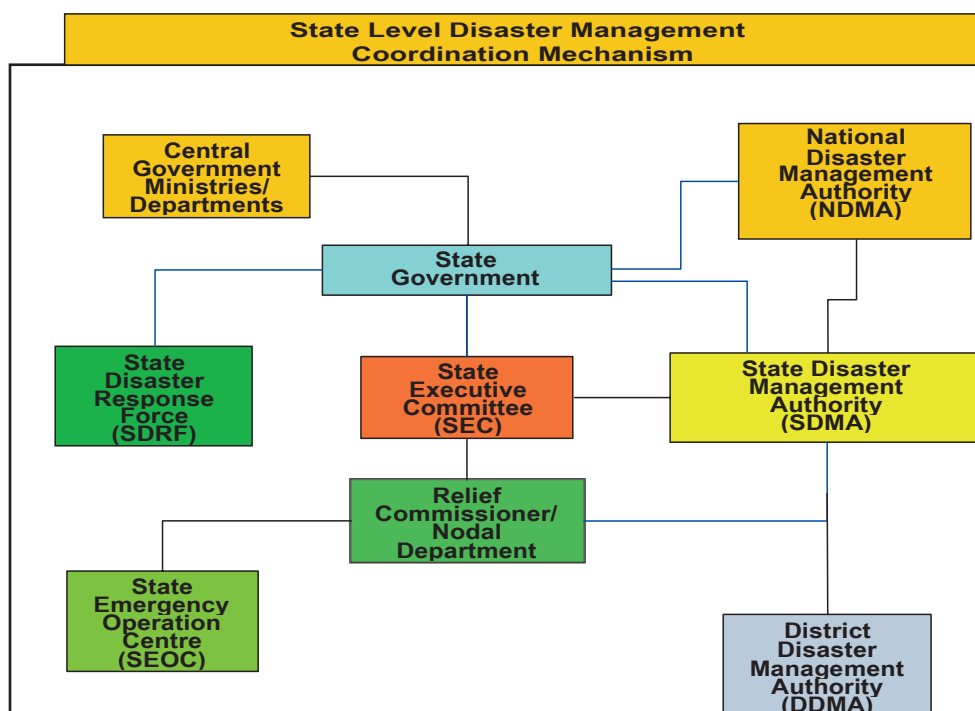


Figure 4: State-level disaster management - basic institutional framework

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 here as DM department (DMD), although the name and department are 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 Early Warning System(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 -4 provides a 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 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 Disaster Management Authority. In the case of 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 following 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 of DM following 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.

CHAPTER 2

Chapter 2: Hazard, Risks, Vulnerabilities and Capacity Analysis (HRVCA)

2.1 Introduction

This chapter analyses the hazards, risks and vulnerabilities of various elements of the agriculture sector from disaster and climate change perspective. It gives an overview of key elements of vulnerability which the agriculture sector faces such as exposure, sensitivities and adaptive capacity. It details out the environmental, social, physical and economic vulnerabilities of the agriculture sectors. The chapter also analyses the existing capacities & knowledge gaps and suggests key areas for improving the capacities to deal with the impacts of disasters and climate change.

2.2 Disaster Risks, Vulnerabilities and Challenges

Agriculture is the source of livelihood for nearly two-thirds of the population in India. It is predominantly rainfed covering about 60% of the country's net sown area and accounts for 40% of the total food production. Droughts and floods are frequent, and the sector is already facing high degree of climate variability. The performance of agriculture sector has a direct bearing on food supplies and food security. India is projected to become the most populated country by 2030 and will need to produce an additional 100 million tonnes of food grains to feed the large population (NDC). Agriculture sector is under continuous threat of risks, which are exacerbated by a variety of factors, ranging from frequent natural disasters, climate variability, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and lack of appropriate financial services including design of risk mitigation instruments such as credit and insurance. These factors have multiplier effect on the farmer's livelihood and income and also undermine the ability of this sector's potential to become a part of the solution to the problem of endemic poverty of the farmers and the agricultural labor (NITI Aayog Report, 2012).

Every year Indian agriculture is being challenged by natural disasters like floods, droughts, hailstorms, pest attacks, etc. Frequency and severity of natural disasters are continuously increasing, and agriculture is affected at large extent by these disasters since it depends directly on the climate, weather, water and land. Some of the impacts are loss of crops, contamination of water bodies, increased risk of getting disease, destruction of agricultural infrastructures, etc. The agriculture disaster related challenges are highlighted in Table 6.

Table 6: Disaster Related Challenges in Agriculture

S. No	Nature of Disaster	Frequency	Intensity
1	Flood	Regular	High
2	Drought	Regular	High
3	Heat waves/Cold waves	Regular	Moderate to high
4	Pest attack/diseases	Regular	Moderate to high
5	Hail storms	Regular	Low to moderate
6	Landslides	Regular	Low
7	Cyclones	Regular	High
8	Tsunami	Rare	Moderate to low
9	Fire	Regular	Moderate to low
10	Earthquake	Intermittent	Moderate to very high
11	High intensity rainfall pattern	Regular	High
12	Lightning and Thunderstorm	Intermittent	Moderate

For in depth understanding of the risks related to India's agriculture, it is pertinent to analyse it from the perspective of crop cycle and crop calendar (Fig.5 & 6), which has been explained as below:

- 1) **Seed Selection:** The most important step towards getting best crop yield is seed selection. It should be ensured that good quality seeds are selected based on the cultivation environment. This will ensure in improvement of yield, resistance to pests and insects and drought and increase in germination rate. Seed selection is also preferably done considering the preferences of market and therefore, it should also be ensured that high yielding variety seeds are selected.
- 2) **Land Preparation:** Land preparation is done to bring the land to optimum condition for growing crops. Primary and secondary tillage operations are done to pulverize the soil so that the crops can develop a good root system. Also, a good prepared land helps in controlling weeds and recycling of nutrients. Land preparation is mainly done with tractors or with the help of cattle and buffaloes.
- 3) **Crop Establishment:** It includes both direct seeding and transplantation. Depending on the type of crops, seeds are sown directly on the field or transplanted. During this stage, nutrients are also provided so that the plants get germinated fast and they don't get wilted.
- 4) **Irrigation:** The artificial application of water to land for agricultural production is defined as irrigation. Irrigation is a very important stage in the crop cultivation cycle. Effective irrigation helps in proper germination, root growth and proper utilization of nutrients, etc.

- 5) **Crop growth:** After establishment of crops, the crops are exposed to certain hazards, like pest and insect attack, attack by rodents, etc. The plants need to be protected from hazards by taking up precautionary measures like using pesticides or insecticides and giving more nutrients. The farmers should adopt proper time, frequency and method for applying fertilizers. Also, for better and fast crop growth, farmers should reduce density of the crop.
- 6) **Harvesting:** The process of cutting the crop and gathering from the field is a very important stage. Depending on the type of crops grown, the time of harvesting also differs. Crops are either harvested manually or using farm equipments/machineries depending upon the type of crops.
- 7) **Post Harvest Processes:** The harvested crops are stored in the storage structures. The storage structures and also the time of storage are different from one crop to another. For example, grains are usually dried after harvesting and are stored for longer duration. However, vegetables and fruits are stored for shorter period. Other processes like cleaning, milling, packaging, marketing, etc., come under this stage.

The figure below illustrates the process of crop lifecycle, resources associated with each phase of crop cycle and related hazards, capable of disrupting the process of crop cycle.

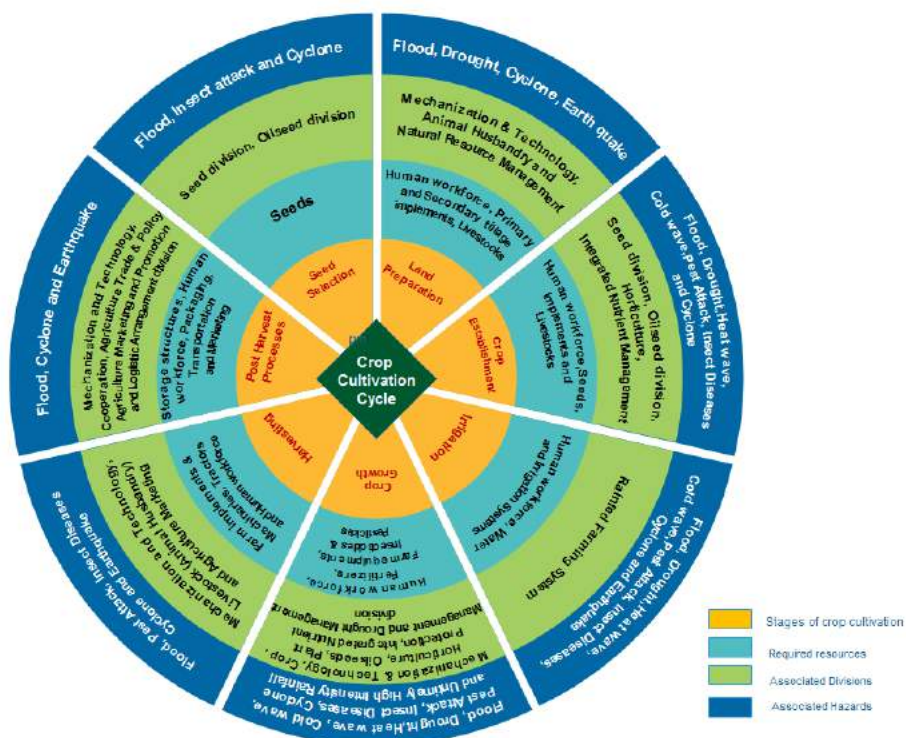


Figure 5: Crop cycle and associated hazards

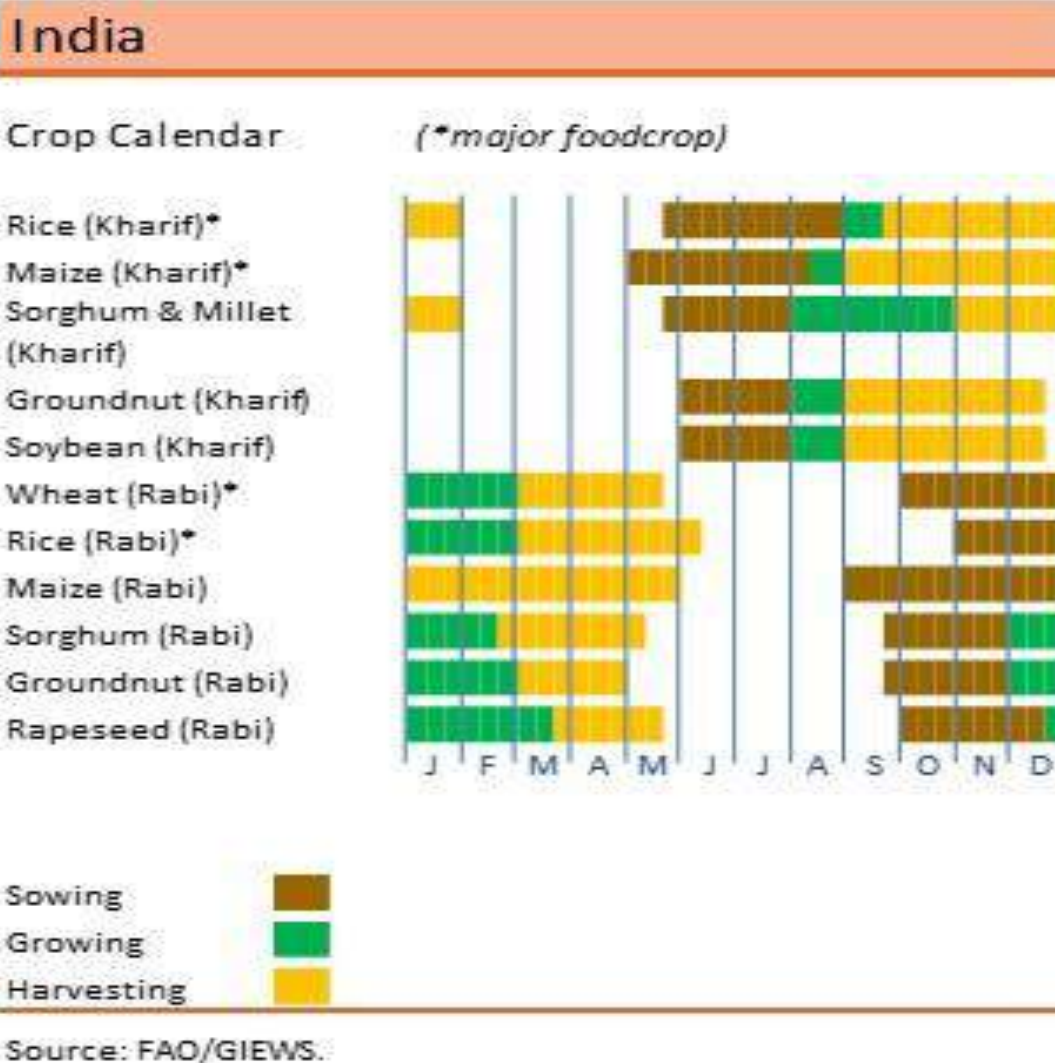


Figure 6: Crop calendar for major crops of India

2.3 Understanding Disaster Risks

2.3.1 Analysis of Sectoral and Departmental Risks

The sectoral risks of disasters consist of the risks for the entire sector that the Ministry of Agriculture and Farmers Welfare represents. The departmental risk of disasters consist of the risks arising out of the exposure of vulnerable departmental assets to the natural or manmade hazards. An analysis of stages of crop cultivation and the concerned divisions of MoAFW have been shown in Table 7. Each stage of the crop cycle is associated with different divisions of the MoAFW.

Table 7: Risk associated with different division of Ministry of Agriculture and Farmers Welfare

Stages of Crop Cultivation	Required Resources	Related Divisions	Related Hazards
Seed Selection	Seeds	Seed Division, Oilseeds Division	Floods, Insect Attack, Cyclone
Land Preparation	Human workforce, Primary and Secondary Tillage Implements, Live stocks	Mechanization and Technology, Livestock (Animal Husbandry) and Natural Resource Management	Flood, Drought, Cyclone, Earthquake
Crop Establishment	Human workforce, Seeds, Implements and Livestock	Seed Division, Oilseeds, Horticulture Division, Integrated Nutrient Management	Flood, Drought, Heat wave, Cold wave, Pest Attack, Insect Disease, Cyclone
Irrigation	Human workforce, Water and Irrigation systems	Rainfed Farming System	Flood, Drought, Heat wave, Cold wave, Cyclone, Earthquake
Crop Growth	Human Workforce, Fertilizers, Farm Equipments, Insecticides, Pesticides	Mechanization and Technology, Crop Division, Horticulture Division, Oilseeds, Plant Protection, Integrated Nutrient Management, Drought Management	Flood, Drought, Heat wave, Cold wave, Pest Attack, Insect Disease, Cyclone, Untimely High Intensity Rainfall
Harvesting	Farm Implements and machineries, Tractors, Human Workforce	Mechanization and Technology, Livestock (Animal Husbandry), Agricultural Marketing	Flood, Pest Attack, Insect Disease, Cyclone, Earthquake
Post Harvest Processes	Storage Structures, Human Workforce, Packaging, Transportation and Marketing	Mechanization and Technology, Agriculture Marketing, Cooperation, Agriculture Trade Policy, Promotion and Logistics Development Division	Flood, Cyclone, Earthquake

2.3.2 Elements at Risks

When hazard strikes at vulnerable areas or amidst a vulnerable population, it leads to disasters and pose risk to the affected area or population. At this juncture, the capacity or resources available within the area or with the population help them cope up with or reduce this risk. The identified hazards pose a different level of risk depending on various factors such as frequency of occurrence and probable impact. Table 8 below categories hazards based on the level of risk they pose (high-red, medium-orange and low-green). It also shows major elements at risk of the agriculture sectors including cropping resources, human resources, infrastructure resources, property and assets as well as different services provided by the Ministry of Agriculture and Famers Welfare.

Table 8: Different elements at risks of agriculture department

Category	Hazards/Risks	Flood	Drought	Heat waves	Cold waves	Pest Attack/	Hail storms	Landslides	Cyclones	Tsunami	Fire	High intensity rainfall	Earthquake
Cropping Resources	Damage to very large areas (>50%)	H	H	M	M	L	H	L	H	H	L	M	
	Crop submergence (> 7 days)	H							H	H		M	
	Partial (25%) or complete crop damage (>70%)	H	H			L	M	L	H	H	M	M	
	Saline inundation	M							H	H			
	Sand cast and soil erosion	H							H	H		H	
	Reduction in crop production	H	H			L	M	M	H	H	M	M	
	Lodging of crop				L		M					M	
	Shattering of flowers/pollens/grains					M	M				M	H	
	Reduction in crop quality	H	H	H	H	H	H	H	H	H	H	H	
	Irrigation resources	H							H	H			
Infrastructure/property resources	Roads	H							H	H			
	Communication channels	H							H	H		M	
	Storage facilities (cold storage, seed banks etc)	H					H		H	H	H		H
	Establishments (buildings)	H					H		H	H	H		H

Category	Hazards/Risks	Flood	Drought	Heat waves	Cold waves & Frost	Pest Attack/	Hail storms	Landslides	Cyclones	Tsunami	Fire	High intensity rainfall	Earthquake
Human Resources	Marginalised farmers	H	H	M	M	M	H	M	H	H	H	M	M
	Vulnerable social groups	H	H	M	M	M	M	M	H	H	H	M	M
Services	Advisory	H	L	L	L	L	L	L	H	H	L	L	H
	Financial	H	H	L	L	L	L	L	H	H	L	L	L
	Market	H	M	L	L	M	M	M	H	H	M	M	L

Source: Based on HRVCA and response strategy analysis (H=High, M=Medium, L=Low)

2.3.3 Seasonality Analysis of the Identified Hazard

Natural hazards like flood, drought, cyclone, etc. have a seasonal occurrence while hazards like earthquake along with various man-made hazards occur at any point of time of a year. Hazard seasonality map of different associated hazards with agricultural activity is made based on the history of occurrence of various disasters in the year and also on the possibility of occurrence of hazards in future. Table 9 displays the possibility of occurrence of these hazards. The table also differentiates month-wise occurrence of these hazards by bold and dotted lines which show the occurrence of events on particular months of the year as well as their small probability of occurrence throughout the year respectively.

Table 9: Seasonality analysis of the identified hazard

S. no	Hazards	Month of the Year											
		J	F	M	A	M	J	J	A	S	O	N	D
1	Drought	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	Flooding						.....	.....	.....	.....
3	Heat waves					.....	.....	.....		
4	Cold waves	.....											.....
5	Hail storms					.....	.....	.....	.....	.....
6	Landslides						.....	.....	.....	.....	.....
7	Cyclone									.....	.....	.....	.....
8	Fire	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Sea/coastal Erosion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	Saline Water Intrusion					.....	.....	.....			.....	.....	.....
11	Pest attack/disease outbreaks	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	Tsunamis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Earthquake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

2.3.4 Vulnerability Analysis and Emerging Concerns of the MoAFW

Agriculture is one of the most disaster-affected sectors. Agricultural activity is adversely affected by any unforeseen weather change or variations in physical conditions. This gets accentuated in case of cyclones, floods and droughts resulting in disruption of people's livelihood and adding to the risk, damage and stress of disasters as a substantial part of the population depends on agriculture for its livelihood. Crop losses due to pests, disease, wild animals etc are also considerable. One of the key drivers behind such increasing economic loss due to disasters is the lack of appropriate disaster management strategy, including risk reduction strategy based on knowledge about hazard impacts and access to risk information. The increased frequency and severity of climate-related hazards and risks induced by climate change are adding a new dimension to the existing disaster risk profile of India. The Agriculture

Ministry in a recent report (2018) has claimed that climate change is projected to impact agricultural productivity with increasing severity from 2020 onwards and could rise as much as 40% by 2100 unless appropriate adaptation measures are undertaken in the agriculture sector.

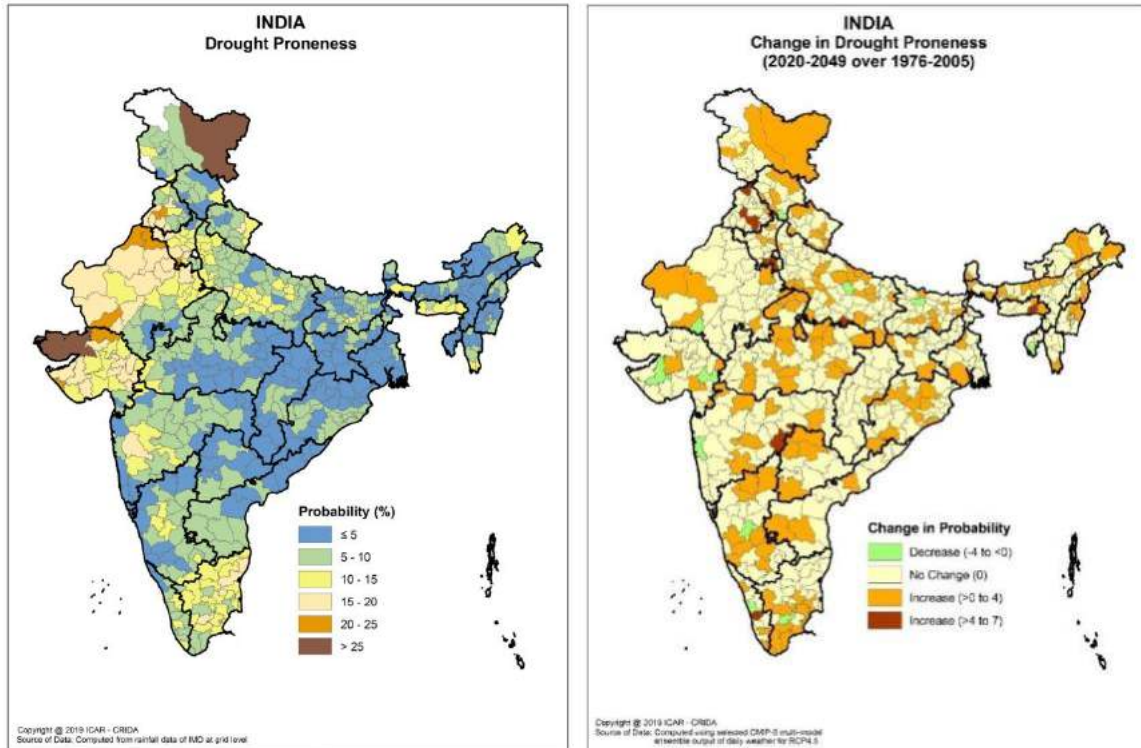
There are multiple types of vulnerabilities associated with the agriculture sector owing to varied root causes like high population growth, rapid urbanization, increasing industrialization, rapid development within high-risk seismic zone, environmental degradation, etc. These vulnerabilities have been categorized into four major types viz environmental vulnerability, social vulnerability, economic vulnerability and physical vulnerability.

Vulnerability profile of India Based on Different Hazards may be seen below:

Drought: In a developing country like India, droughts have a wide range of effects and its impact (physical, agriculture and socio-economic) is specifically conspicuous in view of the tropical monsoon character of the country. Since agriculture is the backbone of the Indian economy, the impact on agriculture is to be given utmost importance. Indian agriculture still largely depends upon monsoon rainfall where about two-thirds of the arable land lack irrigation facilities and is termed as rainfed. The effect is manifested in the shortfalls of agricultural production in drought years (Mohita, 2013). India's more than 68% net sown area is prone to drought, which varies temporally and spatially. Over the past 200 years, a series of drought events have occurred. Agricultural drought often leads to decline in the cultivated area thereby decreasing the production, fall in the employment sector, fall in purchasing power, scarcity of drinking water, food-grains and fodder, rise in the inflation rate, intake of food and widespread malnutrition, health and spread of diseases like diarrhoea, dysentery, cholera and ophthalmia caused by malnutrition, hunger and starvation, migration of people from drought-hit areas to other areas in search of livelihood and food, etc. It is the weaker sections of the society that is affected much by drought.

Drought Proneness:

Computed as in terms of per cent incidence of meteorological drought using the IMD grid data, drought proneness is more than 15 per cent in 48 districts of the country out of which 26 are located in Rajasthan and Gujarat. Since this indicator is expressed in terms of severe drought which is equivalent to two moderate droughts, it follows that the probability of occurrence of drought is 30 per cent in these 48 districts. Further, it is projected to increase in about 302 districts and to decrease in 144 districts. Many of the districts where drought incidence is projected to increase are in Uttar Pradesh, Madhya Pradesh, Bihar, Rajasthan, Tamil Nadu, Maharashtra, Assam, Odisha, and Uttarakhand.



Source: Rama Rao et al. 2019)

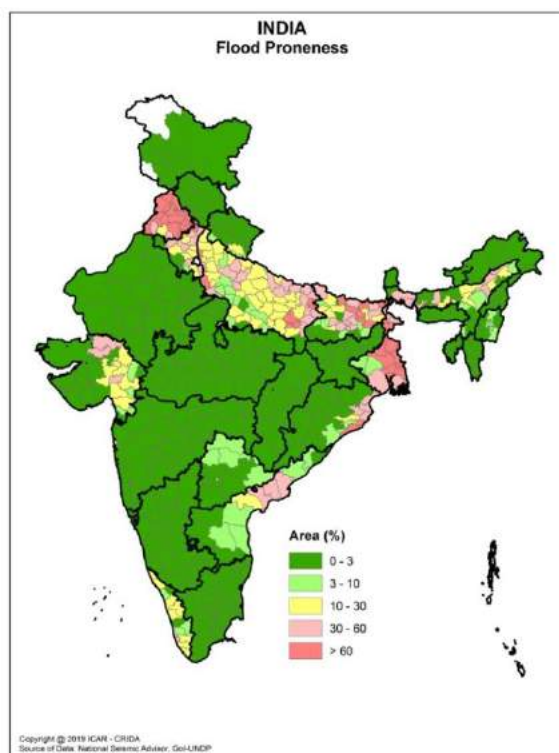
Flood and High Intensity Rainfall

In addition to drought, a flood is another important challenge that is affecting the agriculture sector. Flood is one of the most common and costly natural disasters around the world. Under the influence of climate change and economic development, the extent of flood events is expected to increase (Jonkman and Kelman, 2005; IPCC, 2007). The tangible and intangible losses due to floods in India are increasing due to the speedy growth of population and increased encroachments of the flood plains for habitation, cultivation and other developmental activities. Due to flood exposure, Indian agriculture has experienced massive losses like crop loss especially standing crops and yield reduction, damage to soil, damage to machinery, damage to stored inputs, damage to roads, etc. Agricultural areas are frequently located in floodplain areas and therefore this area is particularly targeted. The driving factors for flood are usually population growth, the construction of infrastructure and urbanization. Climate change is also another driver which intensifies the hydrological cycle thereby increasing the magnitude and frequency of extreme floods.

The flood can be classified as Early Season Flood, Mid-Season Flood and Late-Season Flood as shown in Table 10 depending upon its time of occurrence in June-July, August- September and October-November, respectively.

Flood proneness:

Districts with larger areas subjected to flooding face high hazard. More than 60 per cent of the area is prone to flood incidence in 39 districts and another 58 districts have flood-prone area in the range of 30 – 60 per cent. Many of these flood prone districts are in Bihar, Uttar Pradesh, Punjab and West Bengal.



Source: Rama Rao et al. 2019

Table 10: Types of Flood

Flood Type	Risks involved with crop cycle
Early Season Flood	<ul style="list-style-type: none"> • Damage of paddy in nursery, standing crop of vegetables, pulses and oilseeds. • Early-transplanted and standing direct sown paddy is affected by flood.
Mid-Season Flood	<ul style="list-style-type: none"> • Incidence of pest and diseases to standing crop that escaped or resisted flood. • Damage of upland non paddy crops like vegetables, pulses and oilseeds at fruiting stage. • Damage of short duration paddy at maturity stage and medium and late duration paddy at growth stage.

Flood Type	Risks involved with crop cycle
Late-Season Flood	<ul style="list-style-type: none"> • Lodging and Germination of grains in the field. • Incidence of disease and pest in crops that escaped or resisted water logging. • High value vegetables are also affected. • Grain discoloration and quality deterioration.

Source: Agriculture Disaster Management Plan (Odisha)

Cyclone

All the components of the agriculture sector especially those which are in coastal areas are affected by cyclone through direct damage by high-speed wind, torrential rain and extensive flooding. High tide may also affect agriculture by bringing in saline water and sand mass thereby making the fields unsuitable for agriculture. The indirect effects include infection and disease of crop plants. Agricultural marketing and trade is adversely affected due to lean season of animal, fish and crop production. Past cyclones have brought about so much of destruction in Indian agriculture. Other associated risk is given in Table 11. Super cyclone in 1999 and phailin in 2013 have severely affected crop production and livelihood of farmers in coastal areas in the Eastern Coast of India (Rautary et al., 2014). The recent Cyclone Fani's damage to standing crops was estimated to peg at around 150 crores and it also severely damaged the harvested crops stored in the open (The Hindu, 2019). As such, the Government's support is needed for the revival of agriculture at the time of disaster.

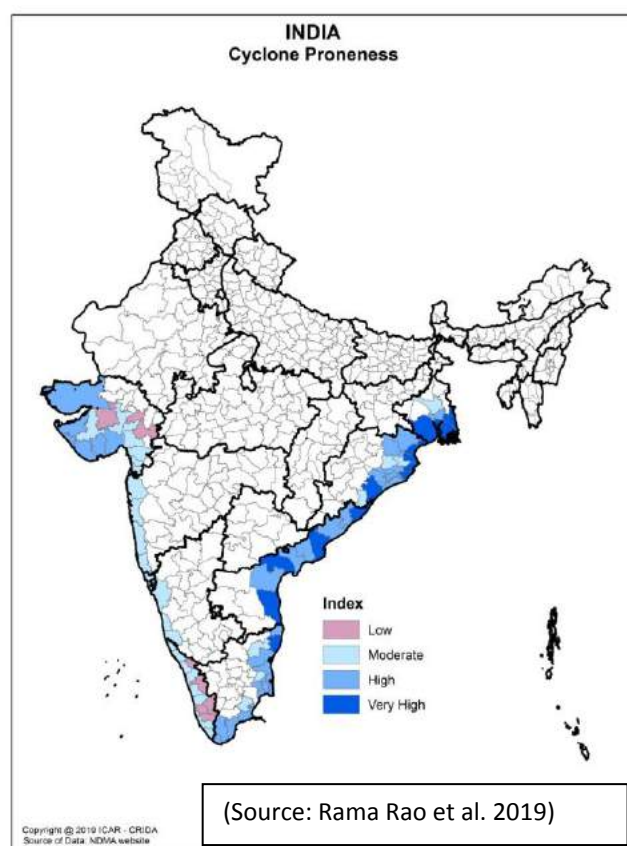


Table 11: Cyclone related risks

S. No.	Risks involved
1	The crops are submerged due to heavy downpours associated with a cyclonic weather which is worsened by the impact of high wind.
2	The crops at flowering and fruiting stage are affected to a greater extent due to lodging and shattering of pollens, many a times complete damage of the crop.
3	There is problem of sand casting in the coastal areas.
4	There is also risk of saline inundation due to sea water ingress in the coastal tracts.
5	The supporting infrastructures are likely to suffer severe damage impairing the restorative measures.
6	The loss to life and properties are so great that the restoration of agriculture is relegated to a lower priority.
7	The disruption of communication, power and transport is likely to delay the restorative efforts and require large funds and co-ordination of all functionaries.

Source: Agriculture Disaster Management Plan (Odisha)

Hailstorm

Hailstorm is another natural disaster which is a threat to Indian Agriculture. Hailstorm with powerful winds can physically damage crops across large areas. The falling hailstones and strong winds bend and break plants and also strip them of leaves and bark. A small piece of hail can even destroy vegetables like cabbage, lettuce, tomatoes, etc. Thus a farmer, who depends heavily on such produce suffer heavy losses during such storms. Months of hard work by farmers can be destroyed almost instantly (Nag, 2018). The rural households are badly affected by hailstorms especially those which are uninsured for potentially unexpected income shocks.

Heatwaves/ Coldwaves:

The effect of extremes (heat waves and cold waves) has been rising in India and in the past 2 years, the rise is manifold. Numbers of deaths and casualties have also been reported increasing by 14 times in 2017 as compared to 2016. Agriculture, which is dependent much on the weather/climate, is affected to large extent by these extremes. Heatwaves affect the crop production both in quantity and quality and that crop loss is usually encountered due to flower drop and higher mortality in new plantations (Guleria and Gupta, 2016). It is also reported that as Kharif crops are sown in May to June and harvested in September to October; any extreme change in temperature is bound to affect the productivity of these crops. Also, poor and marginal farmers are more affected by heatwaves and coldwaves. The extent of damage caused

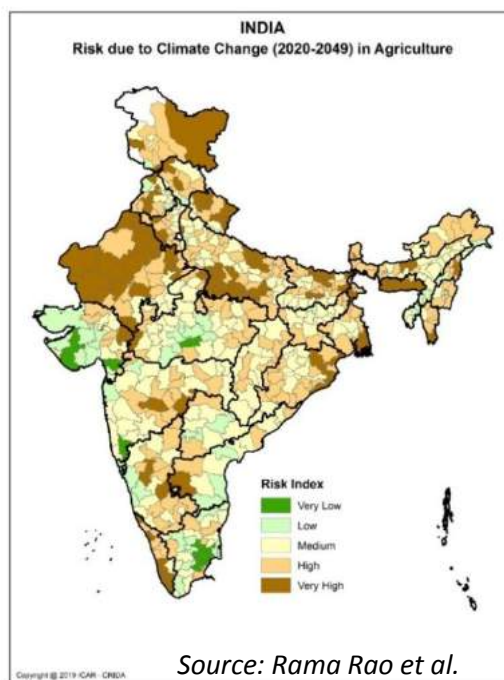
by cold wave depends on temperature, length of exposure, humidity levels, and the speed at which temperature reaches freezing points. It is difficult to predict a definite temperature level up to which crops can tolerate cold wave/frost because many other factors also affect this aspect.

Climate Change Risk

An assessment of climate change risk computed as an aggregate of indices of exposure, vulnerability and hazard, indicates 'very high' risk for 109 districts. Many of which are located in Uttar Pradesh, Rajasthan, Bihar, etc. The climate change risk was found to be 'high' in 201 districts. These districts have to be given high priority while planning for measures for protecting agriculture and farmers from the adverse impacts of climate change.

Pest Attack

Farmers have been battling pests on the field since ages. When we talk about pests it could be anything that is harming the agriculture crops like insects, mites, rodents, animals and birds. However, the most dangerous of all the pests are insect pests, which cause damage to stored products mainly by direct feeding. Some species feed on endosperm, causing loss of weight and quality, while other species feed on the germ. Such diseases can be prevented by building healthy soil, planting of a resistant variety of crops, spacing the plants scientifically, planting on time, planting a variety of crops, changing crop pattern, watering the plants from below and spraying with natural pesticides. One of the recent pest attacks was the fall armyworm attack in Chhattisgarh which later invaded crops in more than 9 states. Another recent pest attack is the locust attack which came from Iran and Pakistan. Locusts, which are part of the grasshopper family, are highly mobile insects that can migrate across different countries and cause extreme damage to crops. The Food and Agriculture Organization (FAO) of the United Nations is the international agency that monitors and manages locust invasions. It says a swarm of locusts, which contains about 40 million insects, can eat the same amount of food in one day as 35,000 people, 20 camels or six elephants (Jain, 2020). Also, there has been a number of suicides of farmers over pest attack while numbers of farmers died from inhalation of spurious pesticides while spraying. The Scientist from the National Rice Research Institute reported that it is the rise in temperature and humidity that is creating a conducive environment for pests to lay eggs.



Fire

Fires can start due to human activities or from natural causes 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 an earthquake and they 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 the 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 up-gradation of the staff and modernization of the entire fire service system. The NDMA guideline 13 on fire services indicates that the Standing Fire and Advisory Council (SFAC) have stressed the urgent need to strengthen the Fire and Emergency Services (FES) and overcome major shortcomings in the response and its capabilities (SFAC 2016).

Tsunami

Tsunamis are usually generated by sudden displacements in the seafloor caused by earthquake, landslides, or volcanic activity. 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 the deep ocean remains only a few decimeters 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 with an increase in wave height. In shallow waters, a large tsunami crest height may rise rapidly by several meters, even in excess of 30 m causing enormous destruction in a very short time.

As seen on Indian Ocean shores in December 2004, a 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 10s of minutes of the triggering event. The earthquake and resulting tsunami in the Indian Ocean on 24 December 2004 had devastating effects on India. Many people died and millions were displaced. The hardest-hit areas were on Southern

coast and the Andaman and Nicobar Island. Tsunamis have the potential of causing significant casualties, widespread property damage, massive infrastructure loss and long-term negative economic impacts. People caught in the path of a tsunami often have little chance of survival. People die from drowning or by debris crushing them.

Earthquake

Nearly 59 per cent of India's territory is vulnerable to earthquakes. The last 3 major earthquakes shook Gujarat in January 2001, Jammu and Kashmir in October 2005 and Sikkim in 2011. Much smaller- quakes have been occurring in various parts of India. 7 states in North East (Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), the Andaman and Nicobar Islands, parts of 3 states/UTs in the North/North-West (Jammu and Kashmir, Uttarakhand and Gujarat) are in Seismic Zone V. Wide-spread human and material losses, the collapse of infrastructure and services may be the major consequences of the earthquake. Hundreds of thousands of people may be displaced, often in remote mountainous areas in the North and North-East.

Landslide

Landslides occur in the hilly regions of India such as the Himalaya, North-East India, the Nilgiris, Eastern Ghats and the Western Ghats. It is estimated that 30 percent of the World's landslides occur in the Himalayan ranges. The Himalayan range, which constitutes the youngest and most dominating mountain system in the World, is not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3,400 kilometres. Landslides are also common in Western Ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about 100 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 2 landslides per sq. km. The mean rate of land loss is to the tune of 120 meters per km per year and annual soil loss is about 2500 tonnes per sq. km. Landslides have been a major and widely spread natural disaster that often affect life and property, leading to major concern.

Post Harvest Losses

Most often, the post-harvest losses from natural disaster are neglected. It is not only the standing crops that are being destroyed by natural disasters. The already harvested crops that are stored in the silos, agriculture farmhouses, etc. are also affected much by the disasters. Farmers have very poor storage and transportation facilities which become more critical for perishable fruits and vegetables. Proportions of the produce that farmers are unable to sell in the market are 34 percent, 44.6 per cent, and about 40 per cent for fruits, vegetables, and fruits and vegetables combined (Pandey, 2018). These losses are accounted more when natural

disasters occur. As such, there should be proper and sufficient storage structures so that natural disasters do not affect them and the agro-processing facilities should preferably be located close to the points of production in rural areas. This will not only save the produces from natural disaster but will also enhance the production.

Table 12: Agro-climatic zones of India and related hazards

S.no	Agro-climatic zone	Area	Hazards identified
1	Western Himalayan Region	J&K, HP and hill region of Uttarakhand	Cloud burst, Landslides, snowfall, hailstorm, fog, flash floods, high winds, cold winds/waves, frost, GLOF, LLOF, Earthquake
2	Eastern Himalayan Region	Arunachal Pradesh, hills of Assam, Sikkim, Meghalaya, Nagaland, Manipur, Mizoram, Tripura and Darjeeling	Landslides, flood, flash flood, cloud burst, heavy rainfall events, fog and heavy winds, Frost, Cold wave
3	Lower Gangetic Plain Region	West Bengal, eastern Bihar, Brahmaputra valleys	Drought, Flood, heat & cold waves, flash floods, heavy rainfall
4	Middle Gangetic Plain region	Large part of Uttar Pradesh, Bihar	Flood, drought, heat waves, cold waves, hail storm and lightening
5	Upper Gangetic Plain Regions	Central and Western Uttar Pradesh, Haridwar and Udham Nagar in Uttarakhand	Cloud burst, landslides, flash flood, heavy rainfall events, hail storm/dust storm, heat/cold waves, fog, lightening, drought
6	Trans-Ganga Plain Region	Punjab, Haryana, Chandigarh, Delhi and the Ganganagar district of Rajasthan	Flood, drought, cold wave, frost, heatwave, environmental hazards like water logging, alkalinity, salinity, low ground water table
7	Eastern Plateau and Hills	Chhotanagpur Plateau, extending over Jharkhand, Orissa, Chhattisgarh and Dandakaranya	Flood, drought, heat waves, extreme rainfall events, cyclones (Odisha)
8	Central Plateau and Hills	Bundelkhand, Baghelkhand, Bhandar Plateau, Malwa Plateau, and Vindhyaachal Hills	Drought, Flood, heat wave, cold wave, hail storm, extreme rainfall events
9	Western Plateau and Hills	Part of Malwa plateau and Deccan plateau (Maharashtra)	Drought, Flood, hailstorms, heat & cold waves
10	Southern Plateau and Hills	Southern Maharashtra, the greater parts of Karnataka, Andhra Pradesh, and Tamil Nadu uplands from Adilabad District in the	Drought, Cyclone, floods, heavy rainfall events, tidal waves, Tsunami, hail storm

		north to Madurai District in the south	
11	Eastern Coastal Plains and hills	Coromandal and northern Circar coasts of Andhra Pradesh and Orissa	Cyclones, floods, heat waves, heavy rainfall events, heavy winds
12	Western Coastal Plains and Ghats	Malabar and Konkan coastal plains and the Sahyadris	Cyclones (rare), Floods, heavy rainfall, high humidity, UV radiation
13	Gujarat Plains and Hills	Hills and plains of Kathiawar, and the fertile valleys of Mahi and Sabarmati rivers	Drought, cyclones, flash floods (sometimes)
14	Western dry Region	Rajasthan	Drought, heat waves, dust storms, hot winds
15	Island Region	Andaman-Nicobar and Lakshadweep	Tsunami, Cyclones, heavy rainfall events

Source: Niti Aayog(2012)

Table 13: Vulnerability profile of different agro-climatic zones of India

S.no.	Agro-climatic zones	Key vulnerability attributes			
		Environmental	Social	Economic	Physical
1	Western Himalayan Region	Soil erosion, inclement weather	Vulnerable Social Groups, Lack of awareness about government programmes	Poor accessibility, inadequate market linkages	Poor storage facilities, road connectivity, poor communications
2	Eastern Himalayan Region	Shifting cultivation, red-brown soil is not productive	Small and marginal farmers	Financial support mechanism	Poor road connectivity
3	Lower Gangetic Plain Region	Water logging	Capacity to adapt to new farming practices	Financial support mechanism, Poor accessibility, inadequate market linkages	Poor storage facilities
4	Middle Gangetic Plain Region	Waste land and user land	Vulnerable Social Groups, Lack of awareness about government programmes	Diversification of agriculture practices	

S.no.	Agro-climatic zones	Key vulnerability attributes			
		Environmental	Social	Economic	Physical
6	Trans-Ganga Plain Region	Water logging, salinity, alkalinity, soil-erosion, falling water table	Farmers non-sensitised towards environmental degradation		Storage facilities
7	Eastern Plateau and Hills	Water scarcity due to plateau structure	Vulnerable Social Groups (ST and SC population) Lack of education and awareness, small and marginalised farmers, Forced migration	Diversification of agriculture practices,	Poor road connectivity, Access to technology
8	Central Plateau and Hills	Water scarcity, water table low	Lack of education and awareness,	Diversification of agriculture practices	Poor road connectivity, Access to technology
9	Western Plateau and Hills	Inefficient water management	Lack of awareness	Diversification of agriculture practices	
10	Southern Plateau and Hills	Inefficient water management	Lack of awareness	Diversification of agriculture practices	
11	Eastern Coastal Plains and Hills	Alkalinity	Lack of awareness	Development of fisheries	Infrastructure facilities inadequate
12	Western Coastal Plains and Ghats	Soil erosion		Diversification of agriculture practices	
13	Gujarat Plains and Hills	Wasteland, low water table		Aquaculture development	Infrastructure facilities for irrigation inadequate
14	Western Dry Region	Erratic rainfall, wastelands	Poor and marginalised farmers, lack of awareness	Financial support mechanism, Poor accessibility, inadequate market linkages, silvi-pastoral development	Infrastructure facilities for irrigation inadequate
15	Island Region			Financial support mechanism, Poor accessibility, inadequate market linkages	Infrastructure facilities for irrigation inadequate

2.3.5 Vulnerability Analysis of DoACFW

A practical template/framework was developed to conduct Hazards, Risks Vulnerabilities and Capacity Assessment (HRVCA) at the national level. A generic template was prepared for all the divisions of the Department of Agriculture, Cooperation and farmers welfare (DoACFW) and a different template was prepared for the institutes under DARE. Accordingly, the templates were circulated to get it filled by all the nodal officers of each division and institutes. The different components of vulnerability, namely, environmental vulnerability, social vulnerability, economic vulnerability and physical vulnerability, were analyzed separately considering indicators belonging to that component only.

2.3.5.1 Environmental Vulnerability

One of the most important components of vulnerability is the environmental vulnerability. Out of all the indicators, soil water holding capacity scores the highest followed by land degradation and agro-diversity which means that these three indicators attribute to the increased risk of environmental vulnerability. It is defined that soil water holding capacity is the amount of water that a given soil can hold for crop use; land degradation is the year-wise area of degraded land (eroded land, the area under deforestation, water-logged area, use of chemical fertilisers and pesticides) and agro-diversity is Level of agriculture diversification within species and outside species also varieties of crops. Further, it can be seen from the same figure that groundwater quality scores the lowest followed by net irrigated area which means that these two indicators play a very minor role in making a system vulnerable to environmental effects. 15 different indicators taken under environmental vulnerability can be seen in Fig.7.

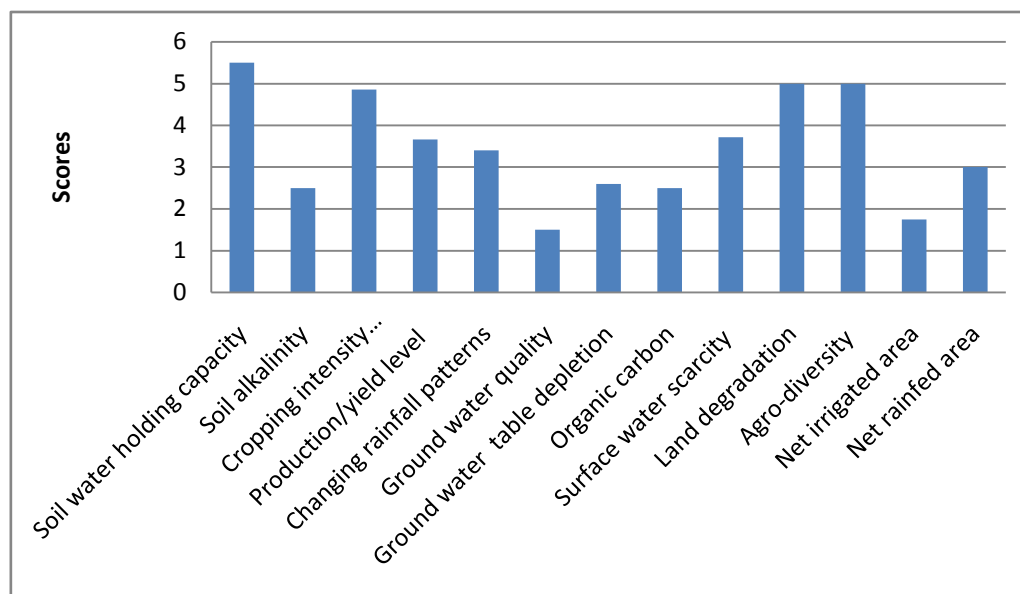


Figure 7: Environment vulnerability of DoAFW

2.3.5.2 Social Vulnerability

Social vulnerability is the inability of people living in a system to cope with adverse effects from multiple stressors. The indicators taken for social vulnerability assessment are lack of skills/ capacity, health, education, vulnerable social groups, small and marginal farmers, lack of awareness, migration and unsustainable agricultural practices. Out of these 8 indicators, vulnerable social groups scores the highest followed by lack of skills/capacity, whereas health scores the least followed by migration. The Vulnerable social group is the number of elderly, children, scheduled caste, scheduled tribe, etc.; Lack of skills/ capacity is the coverage of schemes; Health relates to the infrastructure available like a number of hospitals and Migration is the number of migrated farmers. So, vulnerable social groups and number of coverage of schemes play a major role in making a society vulnerable. Health-related infrastructures and number of migrated farmers are two indicators which have been given least score by most of the divisions.

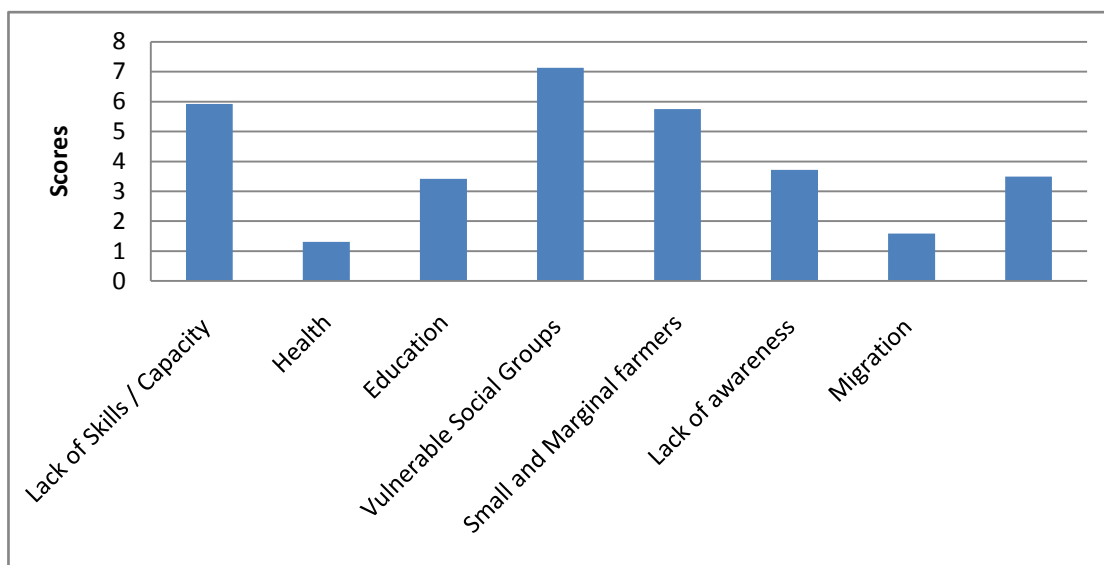


Figure 8: Social Vulnerability of DoAFW

2.3.5.3 Physical Vulnerability

The Physical vulnerability was assessed using a set of indicators viz road connectivity, poor communication, electricity, storage facility, other infrastructures, access to agriculture inputs, access to technology, farm mechanization and irrigation system/facilities. Out of these indicators, other infrastructures like buildings, offices, etc., scores highest followed by storage facilities which makes an area vulnerable to disaster. Electricity and farm mechanization score the lowest being least responsible for making a system physically vulnerable. However, the other indicators are also attributing to making a system vulnerable though lesser than other infrastructures. The indicators can be viewed as under:

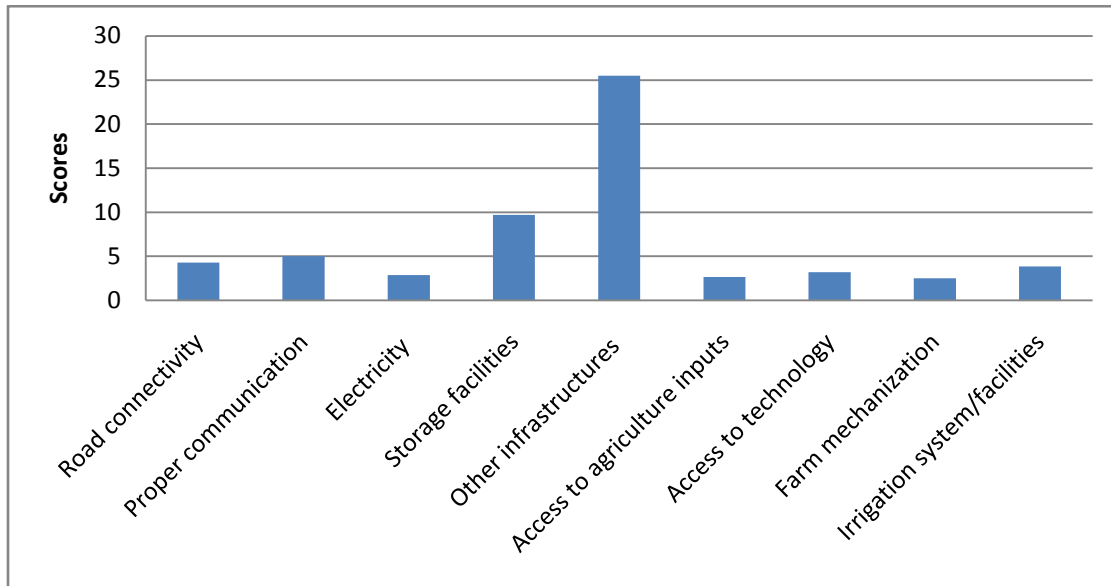


Figure 9: Physical Vulnerability of DoAFW

2.3.5.4 Economic Vulnerability

The economic vulnerability depends on the economic status of individuals, communities or the nation as a whole. The Economic vulnerability has been assessed using a set of indicators namely farm holder size, market linkages, financial support system, insurance coverage, cost of cultivation, access to agro-advisory and access to climatic services. It has been found that insurance coverage scores the highest while the cost of cultivation scores the least. The other remaining indicators are also attributing equally towards making a system susceptible to disasters. Therefore, to reduce vulnerability, it is needed to address those indicators that are making a system more vulnerable for which knowledge and understanding about the local condition must be studied in depth.

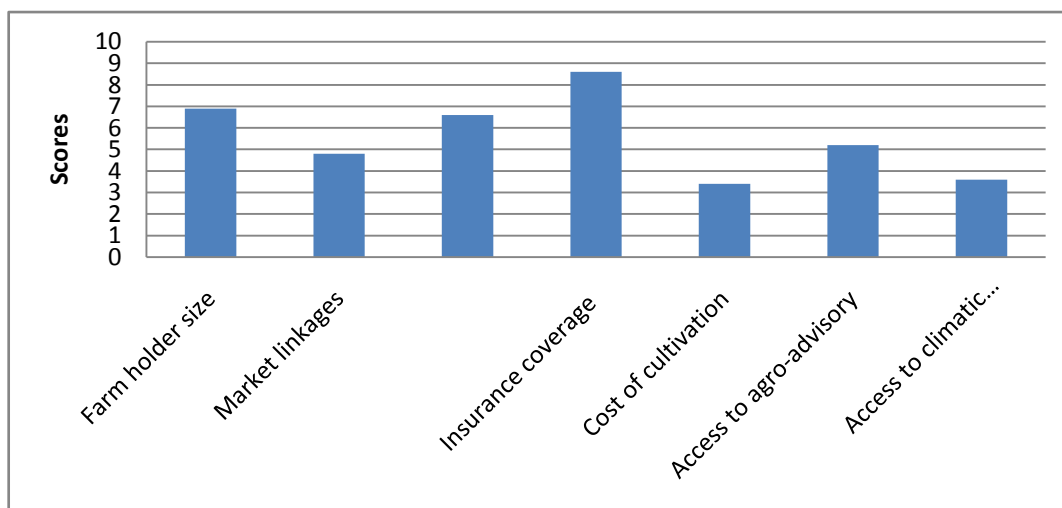


Figure 10: Economic vulnerability of DoACFW

2.3.6 Vulnerability Analysis of DARE

HRVCA exercise template was prepared separately for DARE institutes. The components of vulnerability are same namely environmental vulnerability, social vulnerability, economic vulnerability and physical vulnerability. However, the indicators under each component for DARE institutes are different from the indicators of DoAFW. The template has been filled by the nodal officers from all the three institutes namely Rajendra Prasad Central Agricultural University, Pusa, Rani Lakshmi Bai Central Agricultural University, Jhansi and Central Agricultural University, Imphal. The duly filled HRVCA templates were further analyzed and are presented in the following section.

2.3.6.1 Environmental Vulnerability

For environmental vulnerability assessment, 17 indicators have been selected. Out of these indicators, groundwater table depletion scores the highest followed by surface water scarcity which makes a system prone to environmentally vulnerable. On the other hand, chemical exposure of people working in the institute scores the lowest followed by waste management facility, contamination of drinking water, groundwater availability and net irrigated area, which plays a minor role in making a system environmentally vulnerable. So, from here it can easily be identified to which indicator to be focused on and which indicator to be given less importance. The indicators can be seen in the figure-11 below:

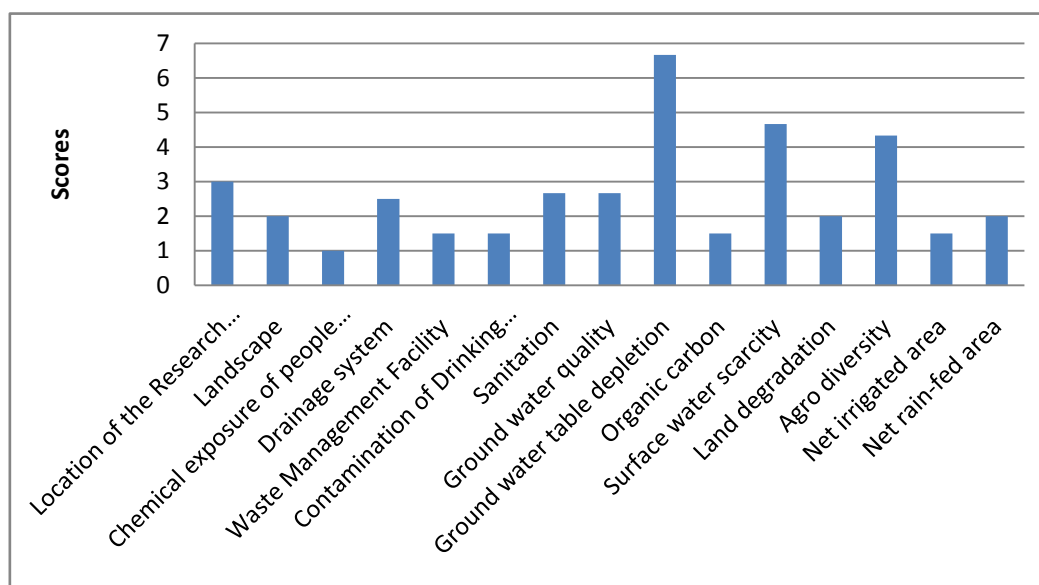


Figure 11: Environment Vulnerability of DARE

2.3.6.2 Social Vulnerability

The indicator, Education scores the highest followed by the population of staff and students while differently-abled, population requiring critical care, accessibility to drinking water and accessibility to medical facilities score the lowest sharing equal value. The different indicators under this component are shown in the figure 12 below:

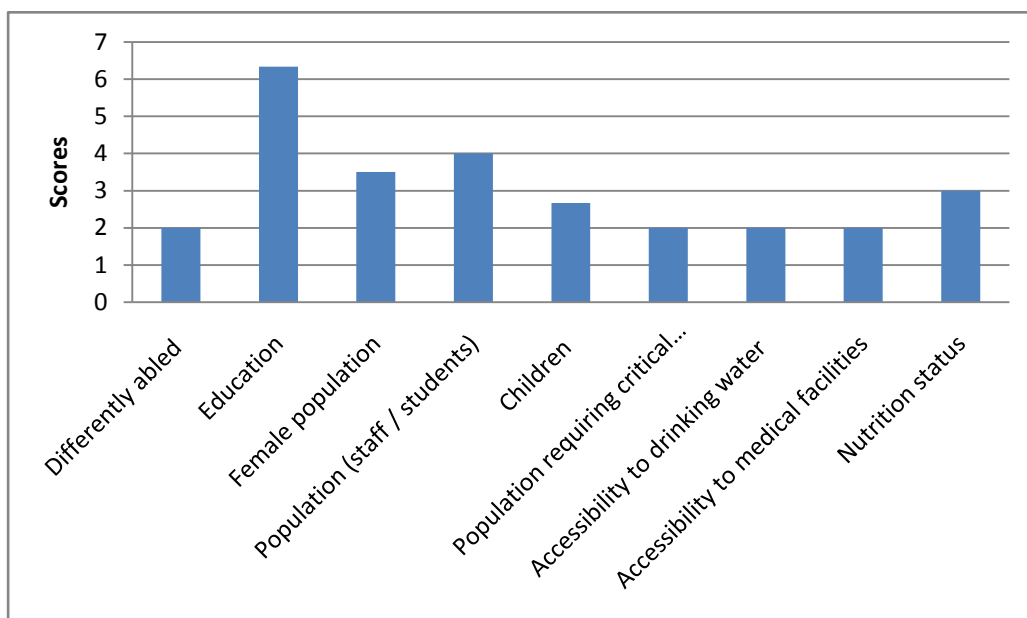


Figure 12: Social Vulnerability of DARE

2.3.6.3 Economic Vulnerability

Out of the five Economic Vulnerability indicators, Market linkage scores the highest, followed by the cost of cultivation while the loss of cultivable land and price inflation score the lowest with the same value. All the indicators should be given equal priority to make it less vulnerable with giving market linkage a little higher importance since its score is highest among the other indicators. The indicators under economic vulnerability are shown in the figure 13 below:-

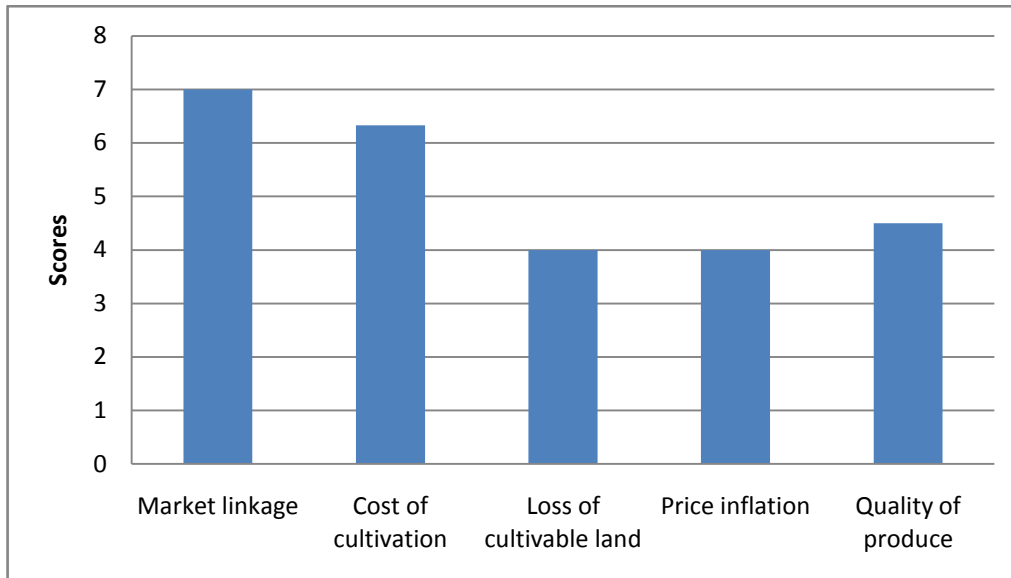


Figure 13: Economic Vulnerability of DARE

2.3.6.4 Physical Vulnerability

Under physical vulnerability component, 13 indicators have been considered. Out of which transport and communication score the highest followed by the type of construction while damage to electric wiring scores the lowest. The other indicators also contribute equally to making a system physically vulnerable. However, greater emphasis should be given to the type of construction and transport and communication since these 2 indicators score relatively higher than the other remaining indicators. The indicators under physical vulnerability are shown in the figure 14 below:

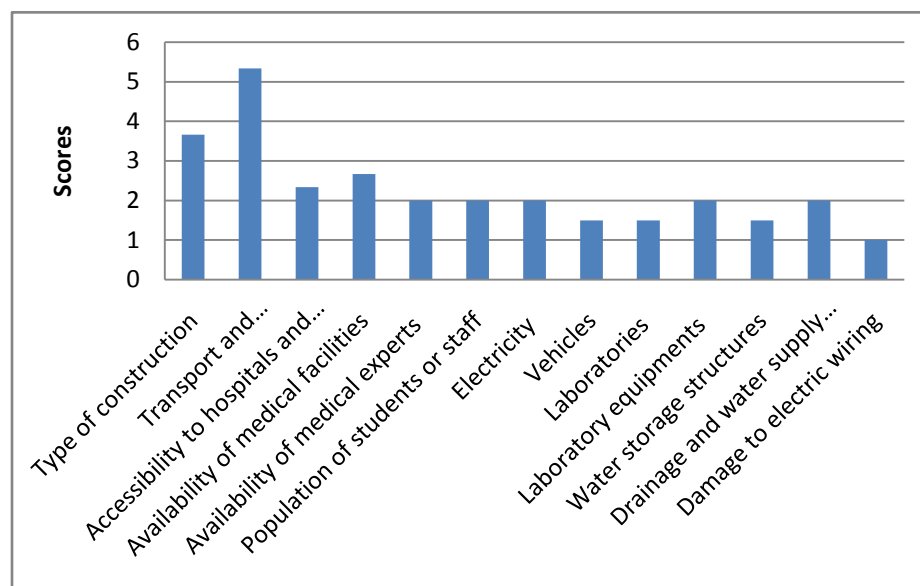


Figure 14: Physical Vulnerability of DARE

2.3.7 Capacity Analysis

The Capacity analysis includes actions (programmes, projects and/or measures) and instruments expressly aimed at reducing disaster risk in endangered regions, and mitigating the extent of disasters. Need for capacity assessment, resource mobilization, training, education and information, is, therefore, critical for sustainable agriculture development. Higher education and research/innovation capacities are the basic requirements for the evolution of discipline from theories to practical solutions, development of professional expertise, trained professionals, and soundness in decisions and actions. Organizations and reorganization of systems, framework, tools, mandate, accountability and authorities at various levels also form part in the capacity building for the sustainability of efforts (Concept note, NIDM). The components of capacity building and training have also been envisaged in policy, act and various guidelines of National Disaster Management Authority (Gupta et al., 2016).

Assessing technical & functional capacity gaps and training needs of Government officials on climate change in the context of disaster management and climate change impacts is very important – so as to ensure that they have the required knowledge and skillsets –to plan and implement the departmental activities for promoting sustainable development at the national level. This will identify the existing and desired capacity, particularly focusing on technical and functional capacities required to perform the functions based on the expected roles and responsibilities of the departments for planning, coordination implementation and monitoring of climate actions.

The Knowledge base of participants was assessed on various aspects related to disaster risk reduction and climate change and its impacts and current policies and programmes of the departments. Key gaps identified department wise is given in Table 14.

Table 14: Assessment of department's level of knowledge on CCA-DRR under MoAFW

Components	Divisions																		DARE					
	Crop	RFS	NRM	Extn	PP	Seeds	Credit	Horti	M&T	Agri	Census	DES	DM	Oilseed	Agri Trade policy	Agri Marketing	Agri. Cooperation	Farmers welfare	INM	Policy	RPCAU	CAU	RLBCAU	NBPGR
Basic Knowledge on climate change and disaster risk reduction	L	H	M	L	H	H		M	L	M		N			NA		NA			L	H	L	H	L
Relevant Policies and Plans related to DRR and CCA	M	H	M	L	H	H		M	L	L	L	N			NA		NA			M	M	L	L	L
Programmes/initiatives/ approaches related to DRR and CCA	H	H	M	L	H	H		H	L	L	L	N			NA		NA			N	H	M	L	M

Source: Based on the HRVCA exercise. Note: H=High, M=Medium, L=low

As was analysed, most of the departments had a fairly good understanding of the hazards faced by them – like floods, droughts; climate change vulnerabilities and impacts etc. However, it was clear during discussions that the participants or their parent departments only used some aspects of this cycle of thinking/information on disasters and impacts for their program planning and implementation. Further, most of the departments used only discussed data and information only related to their own department/field of work only, thereby missing the departmental convergence.

Some of the key gaps in the knowledge and capacities of the departments, for the integration of Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) into developmental planning, that needs to be addressed are listed below:

- Basic understanding of the concepts of climate change adaptation and its linkages with disaster risk reduction
- Awareness on National/State Govt. policies on DRR and CCA
- Training on HRVC analysis with respect to climate change adaptation and Disaster Risk Reduction issues
- Using information like future climate scenario, analysis of past disasters for future risks, etc.
- Analysis of schemes from Central and State governments with DRR linkages and possible actions under each scheme to reduce vulnerability and risks
- Vulnerability assessments of critical infrastructures to be included in planning processes
- Relevant training on topics like gender mainstreaming, communication approaches, ecosystem- based approaches, and community involvement etc.

CHAPTER 3

Chapter 3: Hazard Specific Prevention and Mitigation Measures

This chapter presents the disaster prevention and mitigation measures for each hazard such as drought, flood, cyclone etc, highlighting the roles and responsibilities of agencies at national and state level. For each hazard, the roles and responsibility of agencies at the national and state level is presented under understanding vulnerabilities & risk, inter-agency coordination, structural & non-structural measures, capacity development and climate change risk management

3.1 Background

Prevention and mitigation strategies should work towards reducing the financial and social costs to communities over time, improving the built environment, and reducing the impact on, and damage to, the environment. Therefore, every investment should go through risk audit to check if new programmes, activities or projects have the potential to create new risks of disasters. If such investments cannot be avoided these must be protected by safeguards through adequate structural and non-structural prevention measures so that the benefits of investments are fully protected from risks of disasters. For example, assets of the agriculture department like offices, equipments and others should be located at places which have lesser chances of getting affected by a disaster. The main idea here is what the department can do within its mandate to increase the idea of risk prevention.

The disaster prevention and mitigation plan integrate the global targets into the national efforts and seeks to strengthen the Ministry of Agriculture and Farmers Welfare reliance to both natural and human-induced disasters. As per the DM Act, 2005, “Mitigation” has been defined as “measures to reduce the risk, impact, or efforts of a disaster or threatening disaster situation”. The goal is to minimize the risks from multiple hazards and threats from individual hazards need not always occur in isolation.

The guiding principles of the Sendai Framework state that mitigation of disaster risk requires responsibilities to be shared by different divisions of governments and various agencies. For each hazard (as identified in chapter 2 i.e. HRVCA), the approach used in this NADMP incorporates the four priorities enunciated in the Sendai Framework into the planning framework under the six thematic areas of action as below:

1. Understanding vulnerabilities and risks
2. Inter-agency coordination
3. Structural measures
4. Non-structural measures
5. Capacity development
6. Climate Change Risk Management

3.2 Drought

This section relies on the guidelines published by NDMA on drought management listed in Annexure-I and the manual prepared by the DoAFW (2016).

3.2.1 Understanding Vulnerabilities and risk

Drought				Understanding Risk
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre [#]	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State [#]	
1 Vulnerability Maps	MINFC, MoAFW, 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 monsoon 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 Analysis of satellite imageries, use of appropriate indicators (vegetation, NDVI, NDWI, soil moisture, MAI, etc.) 	DMDs, SDMA, RD, SDMC, DDMA, ICAR Institutes(CRIDA) SAUs in collaboration with central agencies	<p><u>Responsibility – State</u> <u>Recurring/ Regular (RR)</u></p> <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

Drought					Understanding Risk	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				Responsibility – State	
	Centre #	Responsibility – Centre	State #			
Assessment, Monitoring, Forecasting, Early Warning	MoAFW, MOES, DOS, MOJS, MOST	<p><u>Short Term(T1)</u></p> <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 areasPrepare 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 deficitMonitoring key drought indices at National and State levels as per latest national manual for drought managementDeveloping composite index of various drought indicators relevant to each agro-climatic zoneDevelop a multi-criteria method based on various indices (vegetation, soil, water availability, etc.) as standardized framework for drought forecasting considering agro-climatic zones	<p><u>Recurring/ Regular (RR)</u></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 dataEnsure functioning of DMC with requisite facilities and staff to continuously monitor water availability in the drought-prone blocks or a likelihood of drought.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 factorsSeparately, at the end of SW and NE monsoon, prepare crop advisory for blocks that are likely to face water deficitSeparately, at the end of SW and NE monsoons, prepare comprehensive water			

Drought					Understanding Risk
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				Responsibility – State
	Centre [#]	Responsibility – Centre	State [#]		
					conservation, re-distribution, and management plan for the areas in
3	Drought Declaration	MoAFW, 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 31 October; Rabi by 31 March• Early season drought: In August as per recommended criteria
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MoAFW, MOIS, 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	DMD\$, SDMA, DSJE, SAU, AGD, PRIs, ULBs, DDMA	<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 rain fall uncertainties <p>Short Term (T1)</p> <ul style="list-style-type: none">• Constitute/ strengthen the

Drought		Understanding Risk			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
			HRVCA		<ul style="list-style-type: none"> mechanisms for consultation with experts and stakeholders
5	Research	MoAFW, 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 focused 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 ICAR-CRIDA, NRAA	<p>Recurring/ Regular (RR)</p> <p>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</p>
6	Disaster Data Collection and Management	MHA * , MOSPI, all ministries/depts.	<p>Recurring/ Regular (RR)</p> <p>Systematic 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>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Systematic management of data on disaster damage and loss assessments <p>Short Term (T1)</p> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline

3.2.2 Inter-Agency Coordination

Drought					Inter-Agency Coordination	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				Responsibility – State	
	Centre [#]	Responsibility – Centre	State [#]	<u>Recurring/ Regular (RR)</u>		
1 Overall disaster governance	MoAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Providing coordination, technical inputs, and support	DMD\$, SDMA, RD, AGD, DRD, PRD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Preparation and implementation of DM plans and ensure the functioning of agencies with DMtasksAll aspects of disaster risk management and mainstreaming DRREnsuring coherence and mutual reinforcement of DRR, CCA and development		
2 Response	MoAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Organizing and coordinating central assistance	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Organizing and coordinating the immediate responseCoordinate with central agencies		
3 Warnings, Information, Data	MoAFW, MOES, MOIS, DOS, MOST, MEITY, NDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	SDMC, DMD\$, SDMA, RD, AGD, IRD, WRD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <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		

Drought					Inter-Agency Coordination	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State#	Responsibility – State <u>Recurring/ Regular (RR)</u>	
4	Non-structural measures	MoAFW, MOJS, MOES, MHA, BIS, NDMA	<ul style="list-style-type: none"> Coordination among central and state agencies for <ul style="list-style-type: none"> 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	

3.2.3 Structural Measures

Drought					Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State#	Responsibility – State <u>Recurring/ Regular (RR)</u>	
1	Storage Facilities	MoAFW, MOJS, MORD	<ul style="list-style-type: none"> Technical support for water conservation structures, integrated water resources management infrastructure needs (surface and ground water) 	DMD\$, SDMA, RD, DDMA, Forest Dept., Water Supply Dept., PRIs, ULBs, WRD, DRD, PRD, RD	<ul style="list-style-type: none"> Drinking water storage and distribution facilities Fodder storage facilities to maintain fodder banks Rainwater harvesting systems – individual and community 	

Drought					Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre	State#	Responsibility – State	
2	Water Conservation Structures	MoAFW, MOJS, MORD	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Technical support • Guidelines • Projects/Grants 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs, WRD, DRD, PRD, AHD, RD, IRD	<u>Recurring/ Regular (RR)</u> <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	<u>Recurring/ Regular (RR)</u> <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	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Ensure rainwater harvesting and storage in the social housing schemes especially in drought-prone areas 	

3.2.4 Non-Structural Measures

Drought				
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
		Centre [#]	Responsibility – Centre	Responsibility – State
1	Mitigation Measures	MoAFW, MOES, MOJS	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Conduct pilot studies in drought prone areas for suggesting long term mitigation measures Promote watershed development projects <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Convergence of lessons learnt from studies carried out by various research institutions. Technical inputs on better natural resource and crop management (especially for dryland/ rainfed farming) Public Private Partnerships 	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Coordinate the efforts of the central agencies in implementing mitigation measures <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Promote private participation in disaster management facilities Improve the implementation of watershed development programmes <p><u>Medium Term (T2)</u></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

Drought					Non-Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre [#]	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State [#]	Responsibility – State <u>Recurring/ Regular (RR)</u>	
2	Promote soil and water conservation, water harvesting and efficient utilization, , efficient irrigation, afforestation	MoAFW, ICAR, Agricultural Research Institutions, DOS, NIDM	<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	<ul style="list-style-type: none">• Promote water efficient irrigation systems (sprinklers, drip, etc.)• Promote protective irrigation through micro irrigation systems• Provide advice to farmers to cope with drought, crop management under drought conditions, and efficient water management• Training in water and soil moisture conservation• Promote village-level information systems for natural resource management, afforestation and other options using economically useful vegetation	
3	Agricultural credit, agricultural inputs, finance, marketing, and crop insurance	MoAFW, IRDA, NABARD, Banks, ICAR	<ul style="list-style-type: none">• Provide credit and financing products relevant to the drought-proneareas• Promote agricultural insurance programmes, and ensure that farmers are informed about the availability of insurance products	DMC, AGD, State Rural Coop. Banks, Rural Banks, NABARD, SLBC, DDMA	<ul style="list-style-type: none">• Need-based credit• Promote financial inclusion• Monitor the availability of credit and other financial support from banks and other financial institutions to farmers in drought-prone area	

Drought		Non-Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			<ul style="list-style-type: none"> Ensure risk cover for dryland / rainfed farmers who face very high rainfall uncertainty and dependent agricultural workers 		<ul style="list-style-type: none"> Ensure the insurance programmes reach the target audiences (especially dryland/ rainfed farmers) and dependent agricultural labor Marketing support Ensuring availability of quality agricultural inputs
4	Risk Transfer	MFIN [*] , NDMA, MHA, MoAFW	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Policy Framework 	DFIN [*] , DMD\$, SDMA, DAG	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Policy Framework
5	Reducing climate change impact	MoAFW, MOEFCC,	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Guidelines on various forms of coping arrangements 	SDMAs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Initiate measures for reducing the impact of climate change on drought Implement various water and soil conservation programmes taking into account climate change impacts

3.2.5 Capacity Development

Drought					Capacity Development	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			State#	Responsibility – State	
	Centre#	Responsibility – Centre	Short Term (T1)			
1 Training and Capacity Building	MoAFW, MHRD, NIDM, NDRF, MANAGE, NIRD, DMC, MYAS, NDRF, DOPT	• 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 • Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques • Support training of SDRF, CDEF, community, and volunteers	ICAR Institutes (CRIDA),SAUs, SDMA, ATI, SIDM, SIRD, SLRTI, SDMC, SDRF, DDMA, PRIs, ULBs	Short Term (T1) • 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 Medium Term (T2) • Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques (crop, animal care, integrated water resources – surface and groundwater) • Professionals for veterinary care and support to drought-affected animals		

Drought						Capacity Development
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
2	Curriculum Development	MoAFW, Agri. Univ., MHRD, MHRD, NIDM, NCERT, CBSE	<p><u>Recurring/ Regular (RR)</u></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\$, SAUs, EDD, SBSE	<p><u>Recurring/ Regular (RR)</u></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	MoAFW, NDMA, NDRF, NIDM	<p><u>Recurring/ Regular (RR)</u></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 behavior change in the awareness campaigns/ IEC• Promote use of insurance/risk transfer• Promote Community Radio	DMD\$, SDMA, IPRD, RD, DDMA, PRIs, ULBs, SAU	<p><u>Recurring/ Regular (RR)</u></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 groundwater)• Promote attitude and behavior 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	

Drought					
Central/ State Agencies and their Responsibilities					
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
4 Empowering women, marginalized communities, and differently abled persons	MWCD, MSJE, NDMA, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management 	DMID ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD, SAU, EFD, DSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels 	
5 Drought Management Plans	MoAFW	<u>Short Term (T1)</u> <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 	DMID ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD, SAU, EFD	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Ensure development of state, district, block, taluka and village drought management plans 	
6 Mainstreaming drought management in developmental plans	Relevant Central Ministries in collaboration with State Governments	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> All ministries/ departments will mainstream disaster management efforts in their developmental plans 	DMID ^{\$} , SDMA, RD, DDMA, PRIs, ULBs, AGD, AHD, WRD, DRD, PRD, IRD	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> All state govt. departments/ agencies will mainstream disaster management efforts in their developmental plans 	

3.2.6 Climate Change Risk Management

Climate Change Risk Management				
Drought				
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities	State [#]	Responsibility – State
1 Research, Forecasting, Data Management, Zoning, Mapping	MoAFW*, MOEFCC, MOES, MoST, NIDM, DOS, MOJS, NLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Improving the assessment and monitoring of intensity, frequency of weather events and rainfall/water deficit in rainfed, arid/semiarid areas factoring-in GACC impacts <p>Short Term (T1)</p> <ul style="list-style-type: none"> Assessing GACC effects on drought-prone areas <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Assess enhanced economic and social risks under GACC scenarios Prepare GACC scenario maps for all drought-prone areas Assess enhanced drought risks from GACC and on adaptations to enhance 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 condition 	DMD\$, IRD, AGD, WRD, ICAR Institutes (CRIDA), SAUS, SDMA, DDMA, PRIs, ULBs, SLRTI, EFD	<p>Recurring/ Regular (RR)</p> <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 <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 impacts scenarios Promote research studies with State specific contexts on GACC and consequent changes in hazards.

Climate Change Risk Management				
Drought	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
		Centre#	Responsibility – Centre	State#
			<ul style="list-style-type: none"> Expansion of weather insurance mechanisms and agricultural practices. Research on climate resilient crops for drought proofing. 	Responsibility – State
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	MoAFW*, NDMMA, NIDM, MOJS, MOST, MSJE, NLRTI	<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. Creation of data bank and hazard risk & vulnerability mapping. Impact assessment, periodic review and evaluation Assess GACC risks of vulnerable and marginalized sections Provide technical support and guidance for comprehensive HRVCA considering GACC impact <p>Long Term (T3)</p> <ul style="list-style-type: none"> Undertake detailed studies on vulnerability and risk due to land 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans <p>Short Term (T1)</p> <ul style="list-style-type: none"> Impact assessment, economic and social risks under GACC and reporting Assess GACC risks of vulnerable and marginalized sections <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Creation of databank and hazard, risk & vulnerability mapping at local level. <p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Sensitization and Public Awareness Capacity building and utilizing traditional knowledge to build eco-system.

Drought						Climate Change Risk Management	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities					
		Centre#	Responsibility – Centre	State#	Responsibility – State		
			degradation / desertification. <u>Recurring/ Regular(RR)</u> <ul style="list-style-type: none">• Promote climate resilient crops• Capacity Building and Regular Monitoring & Evaluation				
3	Climate Change Adaptation (CCA)	MoAFW*, MOES*, MOST, DOS, MOJS, MOEFCC, NIDM	<u>Short Term (T1)</u> <ul style="list-style-type: none">• Understanding adaptation needs• Study coping mechanisms• Develop adaptation mechanisms <u>Medium & Long Term (T2, T3)</u> <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• Promote adaptive measures in social protection programmes for the vulnerable groups• Promoting traditional crop that have the potential to mitigate the adverse effects of climate change with spatial and sequential diversity• Promoting traditional agricultural practices	DMD\$, SDMA, DDMA, PRIs, ULBs, AGD,SAUs	<u>Short Term (T1)</u> <ul style="list-style-type: none">• Develop Local for Adaptation Strategies <u>Medium Term (T2)</u> <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.• Promoting traditional crop that have the potential to mitigate the adverse effects of climate change with spatial and sequential diversity• Promoting traditional agricultural practices <u>Long Term (T3)</u> <ul style="list-style-type: none">• Sponsor state-specific efforts; support local efforts• Develop climate resilient infrastructure.• Implement efficient water management and monitoring		

					<p>systems as part of CCA in the drought prone areas.</p> <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
--	--	--	--	--	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

3.3 High Intensity Rainfall/Flood risk management

3.3.1 Understanding Risk

High Intensity Rainfall/Flood			Central/ State Agencies and their Responsibilities		Understanding Disaster Risk
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre		State#	Responsibility – State
<p>1</p> <p>Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning</p>	<p>MOES*, MOJS/CWC*, MoAFW, DOS, MEITY, NLRTI</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Assessment, Monitoring, and Scientific studies <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Preparation of close contour and flood vulnerability maps Modernization 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 		<p>ICAR Institutes, SAUs,DMD\$, IRD., WRD, SDMA, DDMA, SLRTI, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <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><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Implementing and monitoring of flood preparedness, river

High Intensity Rainfall/ Flood		Understanding Disaster Risk		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
	Centre [#]	Responsibility – Centre		
		<ul style="list-style-type: none"> • Preparedness, river basin and reservoir management plans <p><u>Medium Term (T2)</u></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 		<p>basin and reservoir management plans including updating rule curves, improve system of water release from reservoirs</p> <ul style="list-style-type: none"> • Identification of priority flood protection and drainage improvement <p><u>Medium Term (T2)</u></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
		<p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Developing/ improving/ updating forecasting methods and models for quantification of inflows and storage of dams 		<p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Execution of flood protection and drainage improvement schemes
2 Zoning, Mapping, and Classification Flood Prone Areas	MOJS*, DOS, NLRTI, NIH	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> • Preparation of large-scale hazard maps of flood prone areas identifying areas of high vulnerability • Studies on support systems for 	DMD\$, IRD, SLRTI, WRD, SDMA, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Support and cooperate with central agencies • Sponsor state-specific efforts; support local

High Intensity Rainfall/ Flood		Central/ State Agencies and their Responsibilities			Understanding Disaster Risk
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
			<p>people living in flood prone areas</p> <ul style="list-style-type: none"> • Evolving designs of shelters in flood prone areas • Socio-economic impacts of flood 		efforts
3	Research and Development	<p>MOJS, MoEFCC, DOS, MOST, NLRTI, NIDM, Brahmaputra Board, Ganga Flood Control Commission</p>	<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 prevention measure • Developing/ updating forecasting methods and models for quantification of inflows and storage of dams 	<p>ICAR Institutes, SAUs, DMD^{\$}, IRD, WRD, SDMA, DDMA, SLRTI</p>	<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

High Intensity Rainfall/ Flood		Central/ State Agencies and their Responsibilities			Understanding Disaster Risk
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre		State#	Responsibility – State
4 Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NDMA, NIDM, MOJS, MOST, MSJE, NLRTI	<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 HRVCA 		DMD\$, SDMA, DDMA, RD, IRD, DSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans <u>Short Term (T1)</u> <ul style="list-style-type: none"> Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
5 Dissemination of Warnings, Data and Information	MOES, MOJS MEITY, MCOM, MOIB, MEA NDMA, DOS	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Quick, clear, effective dissemination among central and state agencies <u>Short Term (T1)</u> <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 neighboring countries Promoting reliable networking systems for data and information sharing among central and state agencies Monitoring of landslides and blockages in rivers 		DMD\$, SDMA, RD, IRD, WRD, IPRD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <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

High Intensity Rainfall/ Flood		Understanding Disaster Risk		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
	Centre [#]	Responsibility – Centre		
		<ul style="list-style-type: none"> Warning systems Providing information in all possible ways and using all types of media Interface with mobile network service providers for warnings 		<ul style="list-style-type: none"> Monitoring compliance by various network operators and service providers
6	MHA [*] , MOSPI, NIDM, NIC, 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 	DMD ^{\$} , SDMA, DES, all depts.	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments

3.3.2 Inter-Agency Coordination

High Intensity Rainfall/ Flood		Inter-Agency Coordination		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State
	Centre [#]	Responsibility – Centre		
1	MOIS	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support 	DMD ^{\$} , SDMA, RD, IRD, 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 Ensuring

High Intensity Rainfall / Flood		Inter-Agency Coordination		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
	Centre#	Responsibility – Centre	State#	
				Coherence and mutual reinforcement of DRR, CCA and development
2	Response	MHA	DMD\$, SDMA, RD, IRD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organizing and coordinating the immediate response Coordinate with central agencies
3	Warnings, Information, Data	MOJS, IMD, DOS, METY, NDMA	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <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

High Intensity Rainfall / Flood		Inter-Agency Coordination		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
		Centre#	Responsibility – Centre	State# Responsibility – State
4	Non-structural measures	MHA, BIS, NDMA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

3.3.3 Investing in DRR– Structural Measures

High Intensity Rainfall / Flood		Structural Measures		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
		Centre#	Responsibility – Centre	State# Responsibility – State
1	Establishment/ Strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources 	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood
2	Flood control measures such as construction of embankments and levees	MOIS, NWDA, CWPRS, CBRI, SERC, IE(I)	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Technical support and studies 	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Identification suitable sites for temporary shelters for people and livestock evacuated from localities at risk

High Intensity Rainfall / Flood		Structural Measures		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State#	Responsibility – State
	Centre#	Responsibility – Centre		
				<ul style="list-style-type: none"> • Construction of multi-purpose shelters in villages/ habitations prone to flood • Proper monitoring and maintenance of river embankments
3	Relevant Central Government Ministries, MORD, MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Ensure that flood-resistant features are incorporated in planning and execution of social housing schemes 	DMD\$, SDMA, RD, DRD, UDD, PRD, DDMA, PRIs, ULBs	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> • Ensure that flood - resistant features are incorporated in the planning and execution of social housing schemes in flood prone areas
4	NDMA, MOJS, NBCC, BMTPC, CBRI, SERC, IE(I)	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Advisory • Construction of temporary structures to store the plant, animal and insect genes 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> • Ensure availability of shelters, undertake proper maintenance, and make arrangements to support the people shifted to temporary shelters
5	MORTH, MOD, NHAI, BRO	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Proper alignment and design 	DMD\$, SDMA, RD, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Coordination and cooperation with the central agencies and ensure proper alignment and design in all state projects

High Intensity Rainfall / Flood				Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			Responsibility – State
		Centre#	Responsibility – Centre	State#	
6	Enhancing the safety of dams and reservoirs	MOJS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Advisories and guidance 	<p>DMD\$, SDMA, DDMA, RD, IRD, WRD</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Carry out measures to increase safety, reduce risks from flood Undertake pre- and post-monsoon inspections of dams and reservoirs Monitor the implementation of safety enhancements in accordance with norms
7	Desilting/ dredging of rivers to improve flow; drainage improvement; flood water diversion through existing or new channels	MOJS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Advisories and guidance 	<p>IRD, WRD, SDMA, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Implementation as per norms
8	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all relevant Ministries/ Departments	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Guidance and implementation 	<p>DMD\$, SDMA, RD, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Collaboration with technical agencies and implementation

3.3.4 Investing in DRR–Non-Structural Measures

High Intensity Rainfall / Flood					Non-Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			State#	Responsibility – State
		Centre#	Responsibility – Centre			
1	Regulation and enforcement of laws, norms, regulations, guidelines including Regulation for reservoir management Integrated WaterResources Management(IWRM)	IMD, DOS, MOJS, NWDA, DOS, MFIN	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none">Guidance and SupportOversight and monitoring of compliance with coastal zone lawsPromote institutional mechanisms for sharing forecasts, warnings, data, and information <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none">Adoption of revised reservoir operation manualsRegulatory framework for flood plain zoning and flood inundation management <p><u>Medium Term (T2)</u></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 regulationsNorms/ regulations applicable to buildings in flood-prone areas <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none">Facilitate the implementation of IWRM in major river basins and their sub- basins	DMD\$, IRD, WRD, SDMA, DDMA, RD, DFIN	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none">Implementing land-use regulation for low lying areas as per flood control normsRegulation of inhabitation of low- lying areas along the rivers, nallas and drainsImplementing flood management action plan Support and cooperate with central agencies; Sponsor state- specific efforts; support local efforts <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none">Enforcing building codes and regulationsReview and modification of operation manuals for all major dams/ reservoirsPrevention and removal of encroachment into the waterways and natural drainage systems <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none">Implementing regulatory	

High Intensity Rainfall / Flood		Non-Structural Measures		
Sub-Thematic Area for DRR	Centre#	Central/ State Agencies and their Responsibilities		Responsibility – State
		Responsibility – Centre	State#	
				<p>framework for flood plain zoning and flood inundation management</p> <ul style="list-style-type: none"> Implementing flood plain zoning regulations <p>Long Term (T3)</p> <p>Implementation of IWRM in major river basins and their sub-basins</p> <ul style="list-style-type: none"> Cooperate with central within each state/UT efforts
2	NDMA, MOJS, MHUA, BIS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Guidance and Support 	<p>DMD\$, SDMA, DDMA, RD, Local bodies</p>	<p><u>Medium Term (T2)</u></p> <p>Revise and implement the relevant rules in flood prone areas</p>
3	MOEFCC	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Guidance and Support 	<p>SDMA, DDMA, DMD\$, RD, EFD, Local bodies</p>	<p><u>Short Term (T1)</u></p> <p>Discourage reclamation of wetlands, natural depressions</p> <p><u>Medium Term (T2)</u></p> <p>Action plan managing wetlands and natural drainage systems for flood moderation</p> <p><u>Long Term T3)</u></p> <p>Implementation of watershed management including catchment area</p>

High Intensity Rainfall / Flood		Non-Structural Measures		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
	Centre#	Responsibility – Centre	State#	
				treatment and afforestation programmes
4	Public Private Partnerships	NDMA, MOJS, MCA [*] , MCF, MOCI, MPFI, MHIPE, MFIN	<p>Guidance</p> <p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Promote private participation in disaster management facilities 	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Promote private participation in disaster management facilities
5	Risk Transfer	MFIN [*] , NDMA, MHA, MAFW	<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><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> • Policy Framework

3.3.5 Capacity Development

High Intensity Rainfall / Flood		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Training	NIDM, LBSNAA, NIRM, NDMA, NDRF, NISA, and other training institutions for Indian Civil Services	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Training and orientation programs for central govt. staff, SDRF, CDEF, community, and volunteers 	ICAR Institutes, SAUs, DMD\$, SDMA, DDMA, SDRF, ATIs, Engineering Training Institutes, SIRD, Police Training Academies	<p><u>Recurring/ Regular (RR)</u></p> <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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides, NSS, SDRF, CDEF, Community and Volunteers 	DMD\$, SDMA, SIDM, ATI DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <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

High Intensity Rainfall / Flood		Capacity Development		
Sub-Thematic Area for DRR	Centre#	Central/ State Agencies and their Responsibilities		
		Responsibility – Centre	State#	Responsibility – State
2	MHRD, AICTE, IITs, IIMs, UGC, NIDM, Professional Bodies/ Councils	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Strengthen coverage of flood damage mitigation, flood tolerant designs/ crops, and construction Techniques 	Professional Bodies/ Councils Boards of Education	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Update curriculum for undergraduate engineering courses to include topics relevant for flood Risk Management <p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Improving curriculum periodically using new technologies
				<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Promote use of insurance/ risk transfer Promote Community Radio
4	NDMA, NIDM, MOIS, Ministries, Govt. Agencies, NDRF, Armed Forces, CAPF	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills by all ministries and in all States/UTs 	DMDS, SDMA, RD, WRD, IRD, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Joint planning and execution of emergency drills

High Intensity Rainfall / Flood		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
5	Vocational Training/ Skill Development	NDMA, NIDM, MSDE, NSDA, NSDC, IIE, NIESBUD, MMSME, NLSDA, IIMs/ IITs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Promoting skill development for multi-hazard resistant construction in flood-prone areas for different types of housing and infrastructure 	DMD\$, SDMA, DDMA, RD, SLSDA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Conduct training programmes Develop a 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Promotion, Guidance, and Support 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></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, local community organizations

3.3.6 Climate Change Risk Management

High Intensity Rainfall / Flood				Change Risk Management	
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
		Centre#	Responsibility – Centre	State#	
1	Research, Forecasting / Early Warning, Data Management, Zoning, Mapping	MOES, MOJS*, MAFW, MOEFCC, DOS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Assessment, Monitoring, and Scientific studies <p><u>Short Term (T1)</u></p> <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><u>Medium Term (T2)</u></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 flood Prepare GACC scenario maps for all river systems Enhanced risks from GACC and on adaptations to change 	<p>ICAR Institutes(CRID A), SAUs,</p> <p>DMD\$, EFD, IRD, WSD*, SDMA, AGD, FIHD, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <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 <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Document state-specific GACC impacts and coping mechanisms <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

High Intensity Rainfall / Flood					Climate Change Risk Management	
Sub Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State [#]	Responsibility – State		
	Centre [#]	Responsibility – Centre				
		<p><u>Long Term (T3)</u></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 neighboring countries to understand and monitor GACC impacts on major rivers associated with or flowing from neighboring countries 				
2 Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	NIDM, MOJS*, MOST, MoES, CSIR, DOS DST	<p><u>Medium Term (T2)</u></p> <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 marginalized sections • Provide technical support and guidance for comprehensive HRVCA considering GACC impacts <p><u>Long Term(T3)</u></p> <ul style="list-style-type: none"> • Undertake detailed studies on vulnerability and risk under GACC scenarios along the coast 	ICAR Institutes, SAUs, State / UT, SDMA, DMD\$, RD, Irrigation Dept. / WRD	<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 • Develop strategies for structural and non-structural measures based on HRVCA <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Assess GACC risks of vulnerable and marginalized sections 		

High Intensity Rainfall / Flood					Climate Change Risk Management	
Sub-Thematic Area for DRR	Centre#	Central/ State Agencies and their Responsibilities			Responsibility – State	
		Responsibility – Centre			State#	Responsibility – State
Climate Change Adaptation (CCA)		<p><u>Short-Term (T1)</u></p> <ul style="list-style-type: none"> Understanding adaptation needs Study coping mechanisms Develop GACC adaptation mechanisms <p><u>Medium & Long Term (T2, T3)</u></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 Promoting flood tolerant, both improved and traditional agricultural practice, particularly varieties. Promotion of resilient practices for adaptation of horticultural and animal based production systems 			SDMA, IRD/WRD*, EFD, DRD, DSJE, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Sensitization and awareness creation Support national CCA efforts Coordination with central agencies Sponsor and promote state-specific efforts and local efforts for GACC mitigation <p><u>Term (T2)</u></p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects Promoting climate resilient natural resource management and crop management technologies, crop diversification, Promoting both improved and traditional agricultural, horticultural and animal management practices <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Implementation of GACC adaptation programs Promote appropriate combinations of Green and Blue infrastructure approach

3.4 Cyclone and Wind Risk Mitigation

3.4.1 Understanding Risk

Cyclone and Wind			Understanding Risk	
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		Responsibility – State
		Responsibility – Centre	State [#]	
1 Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	MOES*, DOS, MOST, MOJS, MEITY, NLRTI, MOEFCC	<p>Recurring/Regular (RR)</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 Studies on ecosystem and shoreline changes Promote availability in public domain cyclone database and forecasts <p>Short Term (T1)</p> <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 <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Modernization of observation network, equipment, systems, technology 	<p>DMD\$, SDMA, RD, SLRTI, DDMA, PRIs, ULBs</p>	<p>Recurring/ Regular (RR)</p> <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 <p>Short Term (T1)</p> <ul style="list-style-type: none"> Constitute State Level Coastal Advisory Committees as per need <p>Medium Term (T2)</p> <ul style="list-style-type: none"> Studies on socio-economic on coping capabilities and impacts

Cyclone and Wind		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"> Establishment of at least one High Wind Speed Recorder and one surge recorder for each coastal district, vulnerable to cyclones Aircrag 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 aircrag-based profiler observations 			
2 Zoning/ Mapping	MOES*, DOS, MOEFCC, MOST, NLRTI	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Support the preparation of detailed maps to delineate coastal wetlands, mangroves and shelter belts and tracts for coastal bio-shields using best tools, field studies, and satellite data 	SDMA, SLRTI, DDMA	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Carry out the mapping and related studies 	

Cyclone and Wind				Central/ State Agencies and their Responsibilities		Understanding Risk	
Sub-Thematic Area for DRR		Centre#	Responsibility – Centre		State#	Responsibility – State	
3	Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	MOES*, MOST, MOEFCC, MSJE, NLRTI, NDMA, NIDM	<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 HRVCA 		SDMA, DDMA, DMD\$, SLRTI, RD, DSJE, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans, and for development planning <u>Short Term (T1)</u> <ul style="list-style-type: none"> Constitute/ strengthen the mechanisms for consultation with experts and stakeholders 	
4	Dissemination of warnings, data, and information	MOES*, MOIB, MEITY MOST, MCOM	<u>Recurring/ Regular (RR)</u> <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 Facilitating last-mile connectivity and access to disaster risk information 		DMD\$, SDMA, DDMA, RD, DDMA, PRIs, ULBs, IPRD	<u>Recurring/ Regular (RR)</u> <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 <u>Short Term (T1)</u> <ul style="list-style-type: none"> Establishing seamless interface between national and state networks <u>Medium Term (T2)</u> <ul style="list-style-type: none"> Ensure facilities and infrastructure for the implementation of adequate access of information to communities at risk 	

Cyclone and Wind				Understanding Risk	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
5	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/depts.	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline 	<p>DMD\$, SDMA, all depts.</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline

3.4.2 Inter-Agency Coordination

Cyclone and Wind				Inter-Agency Coordination	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Overall disaster governance	MOES*	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support 	<p>DMD\$, SDMA, RD, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></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

Cyclone and Wind		Inter-Agency Coordination			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
2	Response	MHA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organizing and coordinating central assistance 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organizing and coordinating the immediate response Coordinate with central agencies
3	Warnings, Information, Data	MOES*, MEITY, NDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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	<u>Recurring/ Regular (RR)</u> <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	MHA, NDMA, BIS	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Coordination among central and state agencies for a revised/ updated rules, norms, standards, enact / amend laws, regulations, and adopt/ review policies 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

3.4.3 Investing in DRR – Structural Measures

Cyclone and Wind		Structural Measures			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Establishment/ strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources 	DMD\$, SDMA, ULBs, PRIs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood
2	Multi-Purpose Cyclone Shelters	NDMA, MHUA, MOST	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Technical support 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk <u>Medium Term (T2)</u> <ul style="list-style-type: none"> Construction of multi-purpose shelters in coastal villages/habitations prone to frequent cyclones <u>Long Term (T3)</u> <ul style="list-style-type: none"> Ensure compliance with relevant building codes

Cyclone and Wind		Structural Measures		
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
		Centre#	Responsibility – Centre	State# Responsibility – State
3	Social Housing Schemes	MORD, MHUA	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Review all housing schemes to ensure that appropriate multi-hazard safety norms, including cyclone-resistant features are incorporated in all social housing schemes <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Ensure that cyclone-resistant features are incorporated in planning and execution of social housing schemes <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Carry out retrofitting of all social housing without multi-hazard, especially cyclone-resistant features 	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Review all housing schemes to ensure that appropriate multi-hazard safety norms, including cyclone-resistant features are incorporated in all social housing schemes <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Ensure that multi-hazard, especially cyclone-resistant features are incorporated in planning and execution of social housing schemes <ul style="list-style-type: none"> Ensure compliance with relevant building codes <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Carry out retrofitting of 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Guidance and implementation 	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Collaboration with technical agencies and implementation

3.4.4 Investing in DRR–Non-Structural Measures

Cyclone and Wind			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"> Laws Regulations Enforcement mechanisms Techno-Legal regimes Institutional Arrangements Codes for disaster risk reduction Compliance monitoring 	MOES, MOEFCC, DOS, BIS, MFIN	<ul style="list-style-type: none"> Guidance and Support Oversight and monitoring of compliance with coastal zone laws <p>Short Term (T1)</p> <ul style="list-style-type: none"> Review and update relevant codes 	DMD\$, SDMA, RD, Environment / Forest Dept., DFIN	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Ecologically sound land-use zonation Regulating aquaculture, and groundwater extraction Strengthen land-use planning 	
			DMD\$, CADA, CZMA, DDMA, PRIs, ULBs	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> 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	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Notification of coastal zones for different purposes as per CRZ guidelines and techno-legal framework of town and country planning rules; enforcement and monitoring 	
	MOES, MORD, MOEFCC	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> Promote coastal shelter belts as a mandatory component under national afforestation programme 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs, Environment /Forest Dept.	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> All coastal states and UTs will undertake the spread, preservation and restoration/regeneration of bio-shields 	

Cyclone and Wind		Non-Structural Measures			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
		CWC, All ministries and departments	<u>Recurring/ Regular (RR)</u> <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	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote risk insurance <u>Short Term (T1)</u> <ul style="list-style-type: none"> Constitute task teams jointly with central agencies for implementing land-use regulation as per zoning guidelines
2	Public Private Partnerships	MOES, NDMIA, MCA*, MCF, MOCI, MPFI, MHPE, MFIN	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance 	DMD\$, SDMA, RD, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote private participation
3	Risk Transfer	MFIN*, NDMIA, MHA, MAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property Policy Framework 	DFIN*, DMD\$, SDMA, DAG	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> <ul style="list-style-type: none"> Policy Framework

3.4.5 Capacity Development

Cyclone and Wind		Capacity Development			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Training	NIDM, NDMA, NLRTI, NDRF	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Training and orientation programs for central govt. staff, SDRF, CDEF, Community, Volunteers, and other direct stakeholders 	<p>DMD\$, SDMA, DDMA, RD, SIDM, ATI, Technical Training Institutes, SIRD, Police Training Academies, AHD</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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
2	Curriculum Development	NDMA, NIDM, NDRF, MYAS, MOD	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Incorporating disaster response, search and rescue in the training programs of youth such as NCC, NYKS, Scouts and Guides and NSS 	<p>DMD\$, SDMA, DDMA, RD, SIDM, ATI</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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, IIMs/ IITs	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management 	<p>EDD, Professional Bodies and Councils in States</p>	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management
		MHFW, NLRTI	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Introduction of Crisis Management, emergency medical 	<p>HFWD, EDD</p>	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Introduction of Crisis Management, emergency medical

Cyclone and Wind		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals		response/recovery and 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
3	Awareness Generation	NDMA, NDRF, CAPF, NIDM, MOES	<ul style="list-style-type: none"> • Carry out mass media campaigns • Promote attitude and behaviour change in the awareness campaigns/IEC Long Term (T3) <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	Recurring/ Regular (RR) <ul style="list-style-type: none"> • Carry out mass media campaigns • Promote attitude and behavior change in the awareness campaigns/IEC Long Term (T3) <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
4	Mock Drills/ Exercises	NDMA, NDRF, MOD, CAPFI	Recurring/ Regular (RR) <ul style="list-style-type: none"> • Promote planning and execution of emergency drills by all ministries and in all States/UTs 		Recurring/ Regular (RR) <ul style="list-style-type: none"> • Joint planning and execution of emergency drills

Cyclone and Wind		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
5	Vocational Training/ Skill Development	NDMA, NIDM, MSDE, NSDA, NSDC, IIE, NIE SBUD, IIMs/ ITs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promoting skill development for multi-hazard resistant construction in cyclone-prone areas 	DMD\$, SDMA, DDMA, RD, SLSDA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Conduct training programmes Creating ToT teams for different trades relevant to cyclone-resistant construction
6	Empowering women, marginalised communities, and persons with disabilities	MSJE, MWCD, NDMA, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management 	DMD\$, SDMA, DSJE, RD, SIDM, ATI, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7	Community-Based Disaster Management	NDMA, NIDM, NDRF, MOD, CAPF, MORD, MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promotion, Guidance, and Support 	DMD\$, SDMA, RD, DDMA, SIDM, ATI, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Training for PRI, SHG, NCC, NSS, youth, local community organizations <u>Short Term (T1)</u> <ul style="list-style-type: none"> Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach

3.4.6 Climate Change Risk Management

Cyclone and Wind		Climate Change Risk Management		
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
		Centre [#]	Responsibility – Centre	State [#] Responsibility – State
1	Research, Forecasting, Data Management, Zoning, Mapping	MOES [*] , DOS, MOST, MOEFCC, MAFW, NDMA, NLRTI	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Promote studies and research on climate change-relate risks and adaptation options <p><u>Short Term (T1)</u></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><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Develop Data base management system for GACC impacts 	<p><u>Recurring/ Regular (RR)</u></p> <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 <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Document state-specific GACC impacts and coping mechanisms <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

Cyclone and Wind		Climate Change Risk Management			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
2	Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	MOES*, NIDM, MOEFCC, NLRTI	<p><u>Long Term (T3)</u></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 marginalized sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	DMD\$, SDMA, RD, EFD, AGD, FIHD, WRD, DDMA, PRIs, ULBs, SLRTI	<p><u>Long Term (T3)</u></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 marginalized sections
3	Climate Change Adaptation (CCA)	MOES*, MOST, DOS, MOJS, MAFW, MOEFCC	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Understanding CCA needs Study GACC coping mechanisms Develop CCA mechanisms Promoting of adaptation measures with appropriate natural resource management, crop/horticultural/ animal management practices including improved varieties and breeds <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Promote appropriate combinations of Green and Blue infrastructure approach Support the implementation GACC adaptation programs Promote adaptive measures in social protection programmes for the vulnerable groups 	DMD\$, SDMA, EFD*, RD, Agriculture Dept., WRD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Sensitization 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><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects Promoting of adaptation measures with appropriate natural resource management, crop/horticultural/ animal management practices

Cyclone and Wind		Climate Change Risk Management			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
					<u>Long Term (T3)</u> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts Promote appropriate combinations of Green and Blue infrastructure approach

3.5 Tsunami

3.5.1 Understanding Risk

Tsunami		Understanding Disaster Risk			
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			<u>Medium Term (T2)</u> <ul style="list-style-type: none"> Encourage development of standardized 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 		<u>Medium Term (T2)</u> <ul style="list-style-type: none"> Develop detailed computerized maps and databases of vulnerable areas along the coast for planning and coordination of DM activities
1	Research and Development Efforts	MOES*, MOST, NLRTI, NIDM, MOEFCC		DMD\$, SDMA, RD, DDMA	
2	Zoning/ Mapping	MOES*, MOST, NLRTI	<u>Long Term (T3)</u> <ul style="list-style-type: none"> Database of Tsunami Risk and Vulnerability in the coastal areas with information on trends of storm surge, high tides, local 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Ensure support to the Central Government agencies in zoning/mapping and carry out at their level

Tsunami		Central/ State Agencies and their Responsibilities					Understanding Disaster Risk
Sub-Thematic Area for DRR		Centre [#]	Responsibility – Centre		State [#]	Responsibility – State	
			bathymetry, etc.				
3	Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	MOES [*] , NLRTI	<u>Medium Term (T2)</u> <ul style="list-style-type: none">Assess the status of existing important installations in coastal areas to withstand tsunami		DMD\$, SDMA, RD, DDMA, SLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Support, cooperation for data collection and updates	
		DOS, IAF, Indian Navy, ICG	<u>Medium Term (T2)</u> <ul style="list-style-type: none">Securing critical instrumentation to ensure fail- safe functioning of these critical instruments and their protection				
4	Dissemination of warnings, data, and information	MOES [*] , MHA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Monitoring seismic activity, provide warnings based on seismic models and issue periodic bulletins		DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	
5	Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	MOES [*] , NDMA, NIDM, MOST, MSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Promote studies, documentation and researchStudies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspectsProvide technical support and guidance for comprehensive HRVCA		DMD\$, SDMA, RD, DSJE, PRIs, ULBs, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Undertake HRVCA as part of preparing and periodic revision of DM plans <u>Short Term (T1)</u> <ul style="list-style-type: none">Constitute/ strengthen the mechanisms for consultation with experts and stakeholders	

Tsunami		Understanding Disaster Risk			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
6	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/depts.	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline 	<p>DMD\$, SDMA, all depts.</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline

3.5.2 Inter-Agency Coordination

Tsunami		Inter-Agency Coordination			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	Overall disaster governance	MOES*	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support 	<p>DMD\$, SDMA, RD, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></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 in the coastal areas

Tsunami					
Inter-Agency Coordination					
Central/ State Agencies and their Responsibilities					
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State	
2 Response	MHA *	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organizing and coordinating central assistance 	DMD\$, SDMA, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organizing and coordinating the immediate response Coordinate with central agencies 	
3 Warnings, Information, Data	MOES *, NDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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	<u>Recurring/ Regular (RR)</u> <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	MOES *, MHA, BIS, NDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring 	

3.5.3 Investing in DRR–Structural Measures

Tsunami		Central/ State Agencies and their Responsibilities				Structural Measures
Sub-Thematic Area for DRR		Centre#	Responsibility – Centre	State#	Responsibility – State	
1	Strengthening of lifeline structures and high priority buildings	Relevant Central Government Ministries	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation as per recommendations of safety audit where applicable 	DMD\$, SDMA, RD, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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> <ul style="list-style-type: none"> Guidance to implementing agencies 	DMD\$, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation in compliance with relevant building codes/ standards/ technical guidance 	
3	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	BIS, NDMA, NLRTI**	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance and implementation 	DMD\$, SDMA, RD, SPWD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Collaboration with technical agencies and implementation 	

3.5.4 Investing in DRR–Non-Structural Measures

Tsunami		Central/ State Agencies and their Responsibilities			Non-Structural Measures
Sub-Thematic Area for DRR		Centre #	Responsibility – Centre	State #	Responsibility – State
1	Mainstreaming DM into Development Planning	MFIN, NDMA, NITI Ayog	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Include DM concerns in plan schemes and non-plan proposals by various ministries as per norms 	<p>DMD\$, SDMA, RD, Finance Dept., DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Include DM concerns in all schemes and proposals by various ministries as per norms
2	Regulation and enforcement of relevant laws	MOES; DOS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Guidance and Support • Oversight and monitoring of compliance with CRZ laws 	<p>DMD\$, SDMA, RD, EFD, DDMA, PRIs, ULBs</p>	<p><u>Short Term (T1)</u></p> <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><u>Medium Term(T2)</u></p> <ul style="list-style-type: none"> • Ecologically sound land-use zonation • Discourage inappropriate/ risky use of coastal areas

Tsunami		Non-Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre #	Responsibility – Centre	State #	Responsibility – State
3	Techno-Legal Regime	BIS, NDMA	<p><u>Recurring/ Regular (RR)</u></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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Ensure implementation of standards through all departments/institutions <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Develop suitable byelaws for rural areas (for both engineers and non-engineered buildings) considering local conditions
4	Non-structural shore stabilization measures and bio-shields	NDMA, MOEFCC, MOES	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Guidance and Support 	DMD\$, SDMA, RD, EFD, DDMA	<p><u>Medium Term (T2)</u></p> <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 • Raising the ground level (above the design water level) with natural beach sand <p><u>Long Term (T3)</u></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 <p>Establishment of bio-shields (e.g., mangrove plantations, as a natural defence) for communities residing along the estuaries</p>

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

3.5.5 Capacity Development

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

Tsunami		Central/ State Agencies and their Responsibilities				Capacity Development
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State#	Responsibility – State <u>Recurring/ Regular (RR)</u>		
3 Awareness Generation	NDMA, NDRF, CAPF, NIDM	<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 behavior 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 		
4 Mock Drills/ Exercises	NDMA, All Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	<ul style="list-style-type: none"> Joint planning and execution of emergency drills (Central and State) 	DMD\$, SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police	<ul style="list-style-type: none"> Joint planning and execution of emergency drills (Central, State, Local and Community) 		
5 Documentation	NIDM, MOES, through its nodal institutions	<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Prepare and distribute manuals and tsunami hazard zonation maps to the public through SDMA's/ 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 		
6 Empowering women, marginalized, and persons with disabilities	MSJE*, MWCD, NDMA, NIDM	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of 	DMD\$, SDMA, RD, SIDM, ATI, SLRTI, DDMA,	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of 		

Tsunami					Climate Change Risk Management	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre	State#	Responsibility – State	
7	Community-Based Disaster Management		Disaster Management	PRI, ULBs	<ul style="list-style-type: none"> disaster management at the state, district, and local levels 	
		NDMA, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promotion, Guidance, and Support to CDEF and community, volunteers 	DMD\$, SDMA, RD, DDMA, PRI, ULBs	<u>Recurring/ Regular (RR)</u> <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 	

3.5.6 Climate Change Risk Management

Tsunami					Climate Change Risk Management	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre	State#	Responsibility – State	
1	Research, Forecasting, Early Warning, Information Systems,	MOES*, DOS, MOST, MOEFCC, MAFW, NDMA, NLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote studies and research on climate change-related risks and adaptation options <u>Medium Term (T2)</u> <ul style="list-style-type: none"> Studies on GACC driven ecosystem and shoreline changes 	DMD\$, SDMA, RD, AGD., AHD, FIHD, WRD,	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Support national risk reduction efforts related to GACC Coordination with central agencies 	

Tsunami		Climate Change Risk Management		
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities		
	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 <u>Long Term (T3)</u> Develop database management system for GAC Cimpacts 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 <u>Medium (T2)</u> 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 Risks Vulnerabilities and Capacity Assessment (HRVCA)	<ul style="list-style-type: none"> Assess the changes in risk, vulnerability and capacities under GACC impact scenarios Assess GACC risks of vulnerable and marginalized sections Provide technical support and guidance for comprehensive HRVCA considering GACC impacts 	DMD\$, SDMA, RD, EFD, Ag-D, FIHD, WRD DDMA, PRIs, ULBs, SLRTI	<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 marginalized sections

Tsunami					Climate Change Risk Management	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			Responsibility – State	
		Centre#	Responsibility – Centre	State#	Responsibility – State	
3	Climate Change Adaptation (CCA)	MOES*, MOST, DOS, MOJS, MAFW, MOEFCC	<u>Short Term (T1)</u> <ul style="list-style-type: none"> • Understanding CCA needs • Study GACC coping mechanisms • Develop CCA mechanisms <u>Medium & Long Term (T2, T3)</u> <ul style="list-style-type: none"> • Support the implementation GACC adaptation programs 	DMD*, SDMA, EFD*, FIHD, RD, AGD, WRD, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Sensitization 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 	
			<ul style="list-style-type: none"> • Promote adaptive measures in social protection programmes for the vulnerable groups 	PRIs, ULBs	<u>Short Term (T1)</u> Develop local adaptation strategies and pilot projects <u>Medium & Long Term (T2, T3)</u> <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 	

3.6 Heat Wave

3.6.1 Understanding Risk

Heat Wave		Central/ State Agencies and their Responsibilities			Understanding Risk
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State	
1 Observation Networks, Information Systems, Monitoring, Research, Forecasting, Early Warning and Zoning/ Mapping	MOES*, MAFW, MOEFCC, MEITY, NDMA, MHFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Support for organizing training Extend technical support 	IMD, ICAR Institutes, SAUs? DMD ⁵ , SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRI/ULB, DDMA, SLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Maintaining preventive measures as per norms <u>Short Term (T1)</u> <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. <u>Medium Term (T2)</u> <ul style="list-style-type: none"> Establish and maintain community-based network for sharing alerts <u>Long Term (T3)</u> <ul style="list-style-type: none"> Modify or customize warnings according to thresholds suitable for the State/UT 	
2 Hazard Vulnerabilities Capacity Assessment (HRVCA) Risks and Assessment	MOES, MOEFCC, NDMA, MHFW, MSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote studies, documentation and research 	DMD ⁵ , SDMA, EFD, DSJE, PRI/ ULB, DDMA, SLRTI, SAUs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Updating HRVCA Identification and listing of Identifying the vulnerable population/communities/ settlements 	

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 physical, social, economic, ecological, gender, social inclusion and equity aspects <u>Short-Term(T1)</u> <ul style="list-style-type: none"> • Develop guidelines 		<ul style="list-style-type: none"> • Identification of groups requiring special attention <u>Short Term (T1)</u> <ul style="list-style-type: none"> • Constitute/ strengthen the mechanisms for consultation with experts and stakeholders • Conduct audit of equipment and human resource requirements 	
3 Dissemination of warnings, data, and information	IMD, MOEFCC, NDMA, MHFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Support for organizing training • Extend technical support 	DMD\$, SDMA, EFD, SLRTI, PRIs/ ULBs, DDMA	<u>Short Term (T1)</u> <ul style="list-style-type: none"> • Create awareness preventive measures • Extensive IEC campaigns to create awareness through print, electronic and social media <u>Medium Term (T2)</u> <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.	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments 	DMD\$, SDMA, all depts.	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments 	

3.6.2 Inter-Agency Coordination

Heat Wave		Central/ State Agencies and their Responsibilities			Inter-Agency Coordination
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre <u>Recurring/ Regular (RR)</u>	State#	Responsibility – State <u>Recurring/ Regular (RR)</u>	
1 Overall Disaster Governance	MHFW,NDMA, MHUA,MRD,	<ul style="list-style-type: none"> 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 	DMD\$, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRIs, ULB, DDMA	<ul style="list-style-type: none"> 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 <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Appointing a State Nodal Agency and Officer Preparing/Adapting Heat Wave Action Plan Implementation as per specific conditions in the state. <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Develop a clearly defined inter agency emergency response plan with roles and information flows clearly marked out <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Ensuring coherence and mutual reinforcement of DRR, CCA and development Partnering local institutions with national institutions /experts Adapting HAPs developed in other countries/cities, monitoring and evaluating implementation and impact on mortality 	

Heat Wave		Inter-Agency Coordination		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
	Centre#	Responsibility – Centre	State#	
2 Preparation and Response	MHUA, MORD, MOJS, MIRTH, MHRD, MOPR, MLBE, MPWR, MHFW	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Directives/ Advisory on shelters, creating awareness, managing resources, organizing medical support, strengthening hospital preparedness 	<p>DMD⁵, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRD, ULB, PRIs, DDMA</p>	<ul style="list-style-type: none"> Organizing and coordinating the immediate response Coordinate with central agencies Implementing heat action plan Establishing First Aid/ Medical Aid facilities in key locations Identify vulnerable places and provide drinking water points at those places and work sites; also, ORS Avoiding outdoor games/sports activities Livestock preparedness during hot weather - ensuring that the livestock and other animal components such as poultry has sufficient shade (shelter management) and water on hot days <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Heat treatment wings in hospitals Establishing medical assistance facilities at places of mass gathering <p><u>Medium Term(T2)</u></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 heatwave

Heat Wave		Central/ State Agencies and their Responsibilities			Inter-Agency Coordination
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
		<u>Recurring/ Regular (RR)</u>		<u>Recurring/ Regular (RR)</u>	
Warnings, Information, Data	MOES [*] , MHFW	<ul style="list-style-type: none">Issue Heat wave alerts and weather forecasts on Short / Medium / Long range durationPublic awareness and community outreach <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none">DocumentationCollecting Data from StatesMaintaining national-level database	DMD\$, SDMA, RD, DRD, UDD, DWSD, EDD, PD, EFD, AHD, HD, WCD, PRD, ULB, PRIs, DDMA	<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 riskFollow the alerts/warning“Do’s-and-Don’ts” during a heat wave should be available in local languages and disseminated through media. <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none">Collecting Data/Information necessary for review/update of the plan	

3.6.3 Structural Measures

HeatWave		Structural Measures			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
					<u>Short Term (T1)</u>
1	Heat wave shelters and other measures	MHUA, MORD, MOJS, MRTH, MOPR	<u>Short Term (T1)</u> <ul style="list-style-type: none">Directive to promote cool roofs and heat reducing integrated development	DMD\$, SDMA, Forest Dept., PRIs, ULBs, DDMA	<ul style="list-style-type: none">Strengthening/mainstreaming the network medical assistance facilitiesTemperature forecasts and heat alerts will be sent as bulk messages on mobile phones, local electronic mediaElectronic screens at busy traffic intersections and market placesEffective transportationPromote cool roofs and heat reducing integrated development

Heat Wave					Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre	State#	Responsibility – State	
2	Social Housing Schemes	MHUA, MORD, MOPR	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Guidelines and technical support for incorporation of protection from heat wave in multi-hazard resistant housing schemes 	DMD\$, SDMA, EFD, PRIs, ULBs, DRDA, DDMA	<u>Short Term (T1)</u> <ul style="list-style-type: none"> 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	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance and implementation 	DMD\$, SDMA, EFD, PRIs, ULBs, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Collaboration with technical agencies and implementation 	

3.6.4 Non-Structural Measures

Heat Wave					Non-Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre#	Responsibility – Centre	State#	Responsibility – State	
1	Techno-Legal regimes	MHUA, MORD, MOJS, MIRTH, 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 heat wave conditions 	

Heat Wave					Non-Structural Measures
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
2 Risk Transfer	MIFIN [*] , NDMA, MHA, MAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term(T1)</u> <ul style="list-style-type: none"> Policy Framework 	DFIN [*] , DMD\$, SDMA, DAG	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term(T1)</u> <ul style="list-style-type: none"> Policy Framework 	

3.6.5 Capacity Development

Heat Wave					Capacity Development
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1 Training	MHUA, MORD, NDRF, MHFW, NIDM, MYAS	<u>Recurring/ Regular (RR)</u> <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 	DMD\$, SDMA, SDRF, RD, DRD, UDD, DWSD, EDD, PD, EFD, SIRD, SLRTI, AHD, HD, WCD, PRI/ ULB, DDMA	<u>Recurring/ Regular (RR)</u> <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	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Inclusion of heat wave and similar issues in various curriculum 	DMD\$, SDMA, SDMI, EDD, SLRTI, DDMA	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Inclusion of heat wave and similar issues in various curriculum 	

Heat Wave		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
3	Awareness Generation	NDMA, MOIB	<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 heatwave 	DMD\$, SDMA, UDD, RD, HD, DDMA	<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
4	Mock Drills/ Exercises	MHUA, MOPR	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills 	DMD\$, SDMA, UDD, RD, SDRF, F&ES, CDEF, Police, DDMA	<u>Recurring/ Regular (RR)</u> <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
5	Vocational Training/ Skill development	MHUA, MOPR, NDMA, NLSDA, MSDE, NIDM	<u>Short Term (T1)</u> <ul style="list-style-type: none"> 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	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Conduct training programmes <u>Short Term (T1)</u> <ul style="list-style-type: none"> Creating ToT teams for different trades relevant to heat-wave protection in the construction of different types of housing and infrastructure

Heat Wave		Capacity Development			
Sub-Thematic Area for DRR	Centre#	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
		MSJE	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance to addressing heatwave emergencies in relevant areas Promote gender sensitive and equitable approaches for awareness raising 	DMD\$, SDMA, SIDM, DSJE, PRIs, ULBs, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development for coping with heat wave emergencies

3.6.6 Climate Change Risk Management

Heat Wave		Climate Change Risk Management			
Sub-Thematic Area for DRR	Centre#	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
		MOES*, MOEFCC, NDMA, MHFW, NLRTI	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Develop GACC impact scenarios relevant for occurrence of heatwave 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 <u>Medium Term (T2)</u> <ul style="list-style-type: none"> Develop Database management system relating to Heat Wave & climate change 	DMD\$, SDMA, UDD, DRD, HD, SLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Support and coordination Research on local threshold and climate change adaptation Improving the dissemination of information on GACC and adaptation

Heat Wave		Capacity Development		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			Responsibility – State
	Centre#	Responsibility – Centre	State#	
2 Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	MOES*, MOEFCC, NDMA, MHFW, MSJE, NLRTI	<p><u>Recurring/ Continuous (RR)</u></p> <ul style="list-style-type: none"> Impact Assessment, Periodic review and evaluation Creation of data bank and hazards risk & vulnerable mapping <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Assess the trends of heat wave risk under GACC scenarios <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Assess GACC risks of vulnerable and marginalized sections Provide technical support and guidance for comprehensive HRVCA considering GACCimpacts 	DMD\$, SDMA, UDD, DRD, HD, DSJE, SLRTI	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Incorporate updated info on GACC in HRVCA while preparing or periodic revision of DM plans <p><u>Short Term (T1)</u></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 <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Assess GACC risks of vulnerable and marginalized sections
3 Climate Change Adaptation (CCA)	MOES*, MOST, DOS, MOJS, MOEFCC	<p><u>Short-Term (T1)</u></p> <ul style="list-style-type: none"> Understanding CCA needs Study GACC coping mechanisms Develop CCA mechanisms <p><u>Medium & Long Term (T2,T3)</u></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 and Blue infrastructure 	DMD\$, SDMA, HFWD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></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><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Develop local adaptation strategies and pilot projects

Heat Wave		Capacity Development			
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities				
	Centre #	Responsibility – Centre	State #	Responsibility – State	
		<p>approach</p> <ul style="list-style-type: none">• Promote adaptive measures in social protection programmes for the vulnerable groups• Promotion of heat tolerant varieties of field crops and horticultural crops, animal breeds• Nutrition and Shelter management for large and small ruminants and poultry• Animal health care		<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none">• Sponsor and promote state-specific efforts and local efforts• Promotion of heat tolerant varieties of field crops and horticultural crops, animal breeds• Nutrition and Shelter management for large and small ruminants and poultry• Animal health care <p><u>Long Term (T3)</u></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	

3.7 Earthquake

3.7.1 Understanding Risk

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

Earthquake		Understanding Disaster Risk			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
					prioritize important urban areas for micro-zonation, do professional review before adoption
4	Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	NDMA, NIDM, MOST, MSJE, NLRTI	<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 HRVCA 	DMD ^{\$} , SDMA, RD, DSJE, PRIs, ULBs, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans <u>Short Term (T1)</u> <ul style="list-style-type: none"> Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
5	Disaster Data Collection and Management	MHA [*] , MOSPI, all ministries/ depts.	<u>Recurring/ Regular (RR)</u> <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, DES and all depts.	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Systematic data management of data on disaster damage and loss assessments <u>Short Term (T1)</u> <ul style="list-style-type: none"> Disaster Damage and Losses 2005-2015 baseline

3.7.2 Inter-Agency Coordination

Earthquake					Inter-Agency Coordination	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1	Overall Disaster Governance	MOES	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Providing coordination, technical inputs, and support 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></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 	
2	Response	MHA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Organising and coordinating central assistance 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Organising and coordinating immediate response • Coordinate with central agencies 	
3	Non-structural measures	MOES*, BIS, MHA, NDMA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring 	

3.7.3 Structural Measures

Earthquake		Central/ State Agencies and their Responsibilities				Structural Measures
Sub-Thematic Area for DRR	Centre #	Responsibility – Centre	State #	Responsibility – State		
1 Social Housing Schemes	Relevant Central Government Ministries, MORD, MHUA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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	<p><u>Recurring/ Regular (RR)</u></p> <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 		
2 Strengthening and seismic retrofitting of prioritized lifeline structures and buildings	Relevant Central Government Ministries	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Implementation strengthening and seismic retrofitting as per recommendations of safety audits 	DMD\$, SDMA, SPWD, RD, DDMA, PRIs, ULBs	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Implementation strengthening and seismic retrofitting as per recommendations of safety audits in all govt. departments, agencies, public utilities, schools, colleges, community halls, etc. 		
3 Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I), all relevant Ministries/ Departments	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Guidance implementation and 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs, SPWD	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Collaboration with technical agencies and implementation 		

3.7.4 Non-structural measures

Earthquake		Central/ State Agencies and their Responsibilities			Non-Structural Measures
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1	IRC, MRTD, RDSO, MOR, AERB, DAE, BIS, MORD, MHUA	<p><u>Recurring/ Regular (RR)</u></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><u>Medium Term (T2)</u></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><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> Ensure strict compliance with code implementation through relevant Departments and agencies 	
2	MOES [*] , NDMA, IE(I), CIDC, CFI, NAC, relevant Ministries/ Departments	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Periodically provide clarifications in line with the relevant national standards Formulate standard procedures and guidelines <p><u>Medium Term (T2)</u></p>	DMD ^{\$} , SDMA, RD, UDD, SPWD, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Carry out safety audit of lifeline buildings and critical infrastructure <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals 	
3	MHRD, NDMA, relevant Central Ministries /Departments, professional bodies of architects and engineers	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Establish a professional Civil Engineers Council established by an Act for certification of engineers and evolve a procedure for certification of engineers 	Relevant Departments	<p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Implement licensing of engineers through appropriate legal framework and institutional Mechanism 	

Earthquake					Non-Structural Measures	
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities				
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
4	Public Private Partnerships	NDMA, MOES, MCA [*] , MCF, MOCI, MIPFI, MHIPE, MFIN	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance 	DMD ^{\$} , SDMA, RD, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote private participation in disaster management facilities 	
5	Risk Transfer	MFIN [*] , NDMA, MIHA, MAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> <ul style="list-style-type: none"> Policy Framework 	DFIN [*] , DMD ^{\$} , SDMA, DAG	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> <ul style="list-style-type: none"> Policy Framework 	

3.7.5 Capacity Development

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

Earthquake		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
2	Curriculum Development	MOES, MOCI, MHRD, UGC, AICTE, IITs, NIDM and other related agencies	<p><u>Medium Term(T2)</u></p> <ul style="list-style-type: none"> Facilitate the introduction of subjects related to DM, in the undergraduate and professional courses 	DMD\$, SDMA, RD, HD, EDD, DDMA	<p><u>Medium Term(T2)</u></p> <ul style="list-style-type: none"> DM related aspects to be included in undergraduate and professional courses
3	Awareness Generation	NDMA, NDRF, CAPF, NIDM	<p><u>Recurring/ Regular (RR)</u></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 <p><u>Medium Term(T2)</u></p> <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 	DMD\$, SDMA, IPRD, RD, SIDM, ATIs, SDRF, F&ES, CDEF, Police, DDMA, PRIs, ULBs	<p><u>Recurring/ Regular (RR)</u></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 <p><u>Medium Term(T2)</u></p> <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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Monitoring Emergency Preparedness of Ministries/ Departments 		<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Monitoring Emergency Preparedness of Departments

Earthquake		Central/ State Agencies and their Responsibilities				Capacity Development
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State		
		<u>Short Term (T1)</u>		<u>Short Term (T1)</u>		
		<ul style="list-style-type: none"> Promoting the planning and execution of emergency drills by all ministries and in all States/UTs 		<ul style="list-style-type: none"> Joint planning and execution of emergency drills, and volunteers 		
5	MOES, NIDM	<u>Medium Term(T2)</u> <ul style="list-style-type: none"> Undertake documentation of major earthquakes and ensure wider dissemination 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs, ATI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Popularization and distribution of documentation in local languages 		
6	MWCD, MSJE, NDMA, NIDM	<u>Medium Term(T2)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management 	DMD\$, SDMA, RD, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs	<u>Medium Term(T2)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels 		
7	NDMA, NIDM, MORD, MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promotion, Guidance, and Support 	DMD\$, SDMA, RD, DDMA, PRIs, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Training for PRI, SHG, NCC, NSS, Youth, local community organizations <u>Short Term (T1)</u> <ul style="list-style-type: none"> Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach 		

3.8 Landslides

3.8.1 Understanding Risk

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

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

3.8.2 Inter-Agency Coordination

Landslides				Inter-Agency Coordination		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities					
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
1 Overall disaster governance	MOM, MOD	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support 	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs	<p><u>Recurring/ Regular (RR)</u></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 		
2 Response	MHA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Organising and coordinating central assistance 	DMD ^{\$} , SDMA, RD, DDMA, ULBs, PRIs	<p><u>Recurring/ Regular (RR)</u></p> <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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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	<p><u>Recurring/ Regular (RR)</u></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 		
4 Non-structural measures	GSI, MHA, BIS, MOD, BRO, NDMA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> 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	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring 		

3.8.3 Structural Measures

Landslides			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> <ul style="list-style-type: none"> Technical inputs and guidance 	DMD\$, State DGM, SPWD	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Improving infrastructure, roads, and land stabilization work 		
2 Protection of Heritage Structures	ASI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> 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> <ul style="list-style-type: none"> Support and collaboration 		
3 Multi-Hazard Shelters	NDMA, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Technical support 	DMD\$, SDMA, DDMA, PRIs, ULBs	<u>Short Term (T1)</u> <ul style="list-style-type: none"> Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk <u>Medium Term (T2)</u> <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 		

3.8.4 Non-Structural Measures

Landslides		Central/ State Agencies and their Responsibilities			Non-Structural Measures
Sub-Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State	
1 Site selection for Human Settlements in Landslide Prone Areas	MOM, MOD	<p>Short Term (T1)</p> <ul style="list-style-type: none"> Guidelines for proper site selection for human settlements, amenities, and other infrastructure 	DMD, SDMA, State DGM, DDMA, Local Authorities	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> Detailed land-use zoning incorporating landslide risks as applicable Adopt suitable byelaws for rural and urban areas Enforce/ promote model codes (e.g., NBC 2016 and updated standards) into practice Ensure proper compliance 	
2 Regulations and building codes	MOM, MOD, BIS, NIDM	<p>Medium Term (T2)</p> <ul style="list-style-type: none"> 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 	DMD, SDMA, UDD, DDMA, Local Authorities	<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 safety issues Adopt land use zoning, building byelaws and model code (e.g., NBC 2016) legislation with suitable modification for reducing risk 	

Landslides		Central/ State Agencies and their Responsibilities			Non-Structural Measures
Sub-Thematic Area for DRR		Centre#	Responsibility – Centre <u>Short Term (T1)</u>	State#	Responsibility – State
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	<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 evolve a procedure for certification of engineers 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 	DMD ^{\$} and all relevant Departments	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implement licensing of engineers through legal framework and institutional mechanism
4	Public Private Partnerships	MOM, MOD, NDMA, MCA [*] , MCF, MOCI, MPFI, MHPE, MFIN	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Guidance 	DMD ^{\$} , SDMA, DDMA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promote private participation in disaster management facilities
5	Risk Transfer	MFIN [*] , NDMA, MHA, MAFW	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> Policy Framework 	DFIN [*] , DMD ^{\$} , SDMA, DAG	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <u>Short Term (T1)</u> Policy Framework

3.8.5 Capacity Development

Landslides		Capacity Development		
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		State#	Responsibility – State
	Centre#	Responsibility – Centre		
1 Training	NIDM, MOM, MOD, CDMM, COA, MYAS, NDRF	<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	<u>Recurring/ Regular (RR)</u> <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 including those for care and protection of disaster affected animals
2 Curriculum Development	MOM, GSI, MHRD, UGC, AICTE, COA, NIDM	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> • Review and revise curriculum 	DMD ^{\$} , SDMA, EDD	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> • Include information on landslides in the curriculum
3 Awareness Generation	GSI, NIDM, NDMA, NDRF, CAPF, MOIB	<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 behavior 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	<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 behavior change in the awareness campaigns/IEC

Capacity Development				
Landslides	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
		Centre#	Responsibility – Centre	State#
				Responsibility – State <ul style="list-style-type: none"> Promote use of insurance/ risk transfer Promote Community Radio Inform people about care and protection of disaster-affected animals
4	Mock Drills/ Exercises	Government Ministries/ Agencies, NDRF, Armed Forces, CAPF	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills by all ministries and in all States/UTs 	DDMA, PRIs, ULBs <u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills by all ministries and in all States/UTs
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> <ul style="list-style-type: none"> Documenting the history of landslide studies and other related activities in India 	DMD ^{\$} , SDMA, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs <u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Constitute multi-institutional and multi-disciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate
6	Empowering women, marginalised, and persons with disabilities	MSJE*, MWCD, NDMA, NIDM	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels 	DMD ^{\$} , SDMA, SIDM, ATI, SLRTI, DDMA, PRIs, ULBs <u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels

Landslides					Capacity Development	
Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities					
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State		
	Community- Based Disaster Management	NDMA, NIDM, MORD, MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Promotion, Guidance, and Support	DMD\$, SDMA, DDMA, PRI's, ULBs	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none">Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approachTraining for PRI, SHG, NCC, NSS, Youth, local community organizations	

3.8.6 Climate Change Risk Management

Landslides		Climate Change Risk Management			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	Research, Forecasting/Early Warning, Data Management, Zoning, Mapping	MOM*, MOD*, MOES*, MOJS, MAFW,DOS	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Assessment, Monitoring, and Scientific studies on GACC impacts on LSA <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> LSA vulnerability maps under GACC scenarios <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Study GACC-related changes on LSA 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>Long Term (T3)</u></p> <ul style="list-style-type: none"> Improve the LSA forecasting capabilities consistent with the anticipated GACC impacts on flood-prone areas 	<p>DMD^{\$}, IRD, WRD, SDMA, DDMA, PRIs, ULBs</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Support national risk reduction efforts related to GACC Coordination with central agencies <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> 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

Landslides		Climate Change Risk Management			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
2	Hazard Risks Vulnerabilities and Capacity Assessment (HRVCA)	MOM*, MOD*, NDMIA, NIDM, MOJS, MOST, MSJE, NLRTI	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> Improve the understanding of the enhanced vulnerabilities of LSA-prone communities 	DMID\$, SDMA, RD, IRD, DSJE, SLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Undertake HRVCA as part of preparing and periodic revision of DM plans <u>Short Term (T1)</u> <ul style="list-style-type: none"> Data collection related to landslides Integrate adaptive measures in social protection programmes for the vulnerable groups

3.9 FIRE

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

Fire Hazard			
Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
	Centre [#]	Responsibility – Centre	Responsibility – State
Understanding Risk	MHA [*] , MHUA, MOEFCC, Other Relevant Ministries/ Departments	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Technical support • Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> • Disaster Damage and Losses 2005-2015 baseline 	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments <p><u>Short Term (T1)</u></p> <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 • Disaster Damage and Losses 2005-2015 baseline <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Mapping of hazardous sites that pose fire and explosion risks • Assess and fix the requirement of equipment and manpower • Identifying areas prone to forest fires and take preventive measures

Fire Hazard				
Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
Inter-Agency Coordination	MHA, MHUA, NDRF	<u>Recurring/Regular (RR)</u> <ul style="list-style-type: none"> Provide guidance, technical inputs, and support 	DMD ^{\$} , SDMA, F&ES, SDRF, INDD, SPCB, DISH, ULBs, PRIs, DDMA, Other Depts.	<u>Recurring/ Regular (RR)</u> <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
Structural Measures	MHA, MHUA, NLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Technical support 	DMD ^{\$} , SDMA, F&ES, SDRF, INDD, SPCB, DISH, ULBs, PRIs, DDMA, SLRTI, Other Depts.	<u>Medium Term (T2)</u> <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 <u>Long Term (T3)</u> <ul style="list-style-type: none"> Procurement of equipment for fire fighting, urban search and rescue as per the requirement Establish fire stations/ posts upto the sub-divisional level to the block level Enhance the multi hazard response capabilities considering local hazards and vulnerabilities

Fire Hazard				
Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
Non-Structural Measures	MHA, MHUA, Other relevant Ministries/ Depts.	<u>Recurring/ Regular (RR)</u> <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 	DMD ^{\$} , SDMA, F&ES, SDRF, INDD, SPCB, DISH, ULBs, PRIs, DDMA, SLRTI, Other Depts.	<u>Recurring/ Regular (RR)</u> <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
		<u>Short Term (T1)</u> <ul style="list-style-type: none"> Risk Transfer Policy Framework 		<u>Short Term (T1)</u> <ul style="list-style-type: none"> 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 setup Legal regime for mandatory fire clearance from F&ES for different types of buildings, colonies, industries and other installations Risk Transfer Policy Framework

Fire Hazard				
Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
Capacity Development	MHA, NDMA, NIDM, NDRF, Other relevant Ministries/ Departments	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Provide guidance and support to SDRF, CDEF, community, and volunteers • TOT programs on various aspects such as fire fighting, managing collapsed structure, and search and rescue 	<p>DMD^{\$}, SDMA, SDRF, SIDM, ATI, F&ES, SDRF, CDEF, ULBs, PRIs, DDMA, SIRD, SLRTI</p>	<p><u>Recurring/ Regular(RR)</u></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 fire fighting, managing collapsed structure, and search and rescue <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Address the capability gaps – human and institutional • Strengthening and standardizing response mechanisms

3.10 Pest Attack

3.10.1 Understanding Vulnerabilities and Risk

Pest Attack		Central/ State Agencies and their Responsibilities			Understanding Risk
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre	State [#]	Responsibility – State	
1 Monitoring	ICAR, NIPHM, NRSA	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Regular scouting /monitoring at block levels for pest incidence in major crops Identification of invasive pests/epidemics/ flare-up of new minor pests Pest surveillance at regular intervals Weather forecasts and agro met advisories 	SDA SAUs ICAR Institutes	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Regular scouting /monitoring at block levels for pest incidence in major crops Identification of invasive pests/epidemics/ flare-up of new minor pest Pest surveillance at regular interval Weather forecasts and agro met advisories 	

3.10.2 Inter-Agency Coordination

Pest Attack		Central/ State Agencies and their Responsibilities			Inter-Agency Coordination
Sub-Thematic Area for DRR	Centre [#]	Responsibility – Centre <u>Recurring/Regular</u>	State [#]	Responsibility – State <u>Recurring/Regular</u>	
1 Status Report	ICAR, NIPHM, IMD	<ul style="list-style-type: none"> Over all compilation and preparation of pest reports to have preparedness for next season Development for pest forewarning systems and integration with weather forecasts / agro met advisories Dissemination of pest alerts and Pest control measures 	SAUS ICAR Institutes SDA	<ul style="list-style-type: none"> Over all compilation and preparation of pest reports to have preparedness for next season Development for pest forewarning systems and integration with weather forecasts / agro met advisories Dissemination of pest alerts and Pest control measures 	

3.10.3 Structural Measures

Pest Attack					Structural measures
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	IPM inputs	CIBRC, ICAR Institutes (NCIPM etc., and other NBAll), NIPHM, NRSA IMD	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Ensure the availability of bio control inputs/agents Avoidance of expired /banned pesticides Technical support/guidelines Convergence with various pesticide industries and crop & pest specific insecticides Promotion of PPP 	ICAR institutes, SAUs, SDA	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Ensure the availability of bio control inputs/agents Avoidance of expired /banned pesticides Technical support/guidelines Convergence with various pesticide industries and crop & pest specific insecticides Promotion of PPP

3.10.4 Non-Structural Measures

Pest Attack					Non- Structural measures
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre	State [#]	Responsibility – State
1	DSS	ICAR	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Development of decision support systems (DSS) against major pests 		
2	LEISA	ICAR(CRIDA, NCIPM), NIPHM	<u>Recurring/Regular</u> <ul style="list-style-type: none"> Promotion of Low external input(LEI) /non pesticide measures for cost effective pest control/sustainable agriculture(SA) 	SDA	<ul style="list-style-type: none"> Promotion of Low external input(LEI) /non pesticide measures for cost effective pest control/sustainable agriculture(SA)

3.10.5 Capacity Development

Pest Attack		Capacity Development			
Sub-Thematic Area for DRR		Central/ State Agencies and their Responsibilities			
		Centre [#]	Responsibility – Centre <u>Recurring/Regular</u>	State [#]	Responsibility – State
1	Training and Capacity Development	ICAR, NIPHM, NRSA	<ul style="list-style-type: none"> Formulate and implement training programmes for pest control to different stake holders including research /extension personnel and farmers Training of Control staff trained to use such toxic chemicals effectively and to avoid adverse effects on human health and the environment Information of local populations about planned control operations Use of new dissemination techniques /modes including ICT and other digital tools Promotion of crop insurance 	SAUs, SDA	<ul style="list-style-type: none"> Formulate and implement training programmes for pest control to different stake holders including research /extension personnel and farmers Use of new dissemination techniques /modes including ICT and other digital tools Promotion of crop insurance

3. 10.6 Climate Change Risk Management

Pest Attack		Climate Change Risk Management		
Sub-Thematic Area for DRR	Centre [#]	Central/ State Agencies and their Responsibilities		Responsibility – State
		Responsibility – Centre	State [#]	
1 Impact of climate change and reducing their impacts	ICAR(CRIDA, NCIPM), NIPHM	Recurring/Regular <ul style="list-style-type: none"> • Identification of climate driven pest incidence and initiate measures for reducing their impacts/levels • Promotion of crop diversification and conservation of bio diversity • Promoting of pest and disease tolerant crop varieties, animal breeds and other adaptation practices 	SAUs SDA	<ul style="list-style-type: none"> • Identification of climate driven pest incidence and initiate measures for reducing their impacts/levels • Promotion of crop diversification and conservation of bio diversity • Promoting of pest and disease tolerant crop varieties, animal breeds and other adaptation practices

3.11 Cold wave and Frost

Cold wave and Frost			
Thematic Area for DRR		Central/ State Agencies and their Responsibilities	
Understanding Risk	Centre [#]	Responsibility – Centre	Responsibility – State
		Recurring/ Regular (RR) <ul style="list-style-type: none"> • Technical support for HRVCA and risk assessment • Data Collection Short Term (T1) <ul style="list-style-type: none"> • Compiling the baseline data of 2005-2015 	Recurring/ Regular (RR) <ul style="list-style-type: none"> • Compile and maintain data on events like cold wave and frost – location, event information, impacts, etc. Short Term(T1) <ul style="list-style-type: none"> • Prepare list of settlements and households facing very high risk • Mapping Cold wave-prone areas and identify • Compiling the baseline data of 2005-2015

Cold wave and Frost				
Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre #	Responsibility – Centre	State #	Responsibility – State
		<u>Medium Term (T2)</u> <ul style="list-style-type: none"> Installing Automatic Weather Stations(AWS) Deploying Doppler Weather Radar (DWR) 		<u>Medium Term (T2)</u> <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 cold wave-prone areas and technical expertise to prevent and mitigate landslides Inventory of areas that experienced cold wave episodes and related losses, especially crop losses
Inter-Agency Coordination	MOES, MoAFW, MOEFCC	<u>Recurring/ Regular (RR)</u> <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/ 	SAUs, DMID ^{\$} , SDMA, DDMA	<u>Recurring/ Regular (RR)</u> <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

Cold wave and Frost				
Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre#	Responsibility – Centre	State#	Responsibility – State
		updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies		<ul style="list-style-type: none"> Coordination among state agencies for ensuring updated norms/codes and their implementation, enforcement and monitoring
Non-Structural Measures	MHA, MOES, MOEFCC, MOST	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Provide Support Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Frame model rules, laws, guidelines Risk Transfer Policy Framework 	All departments, ULBs, PRIs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Review of existing regulations and amending them in accordance with safer building Risk Transfer Policy Framework
Capacity Development	MoAFW, MOES, MOEFCC, DOS, MSJE, MWCD, NIDM, NDRF, MFAHD	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Awareness raising Technical support for post- cold wave and frost management for livestock and 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 	DMD\$, SDMA, SDRF, EFD, AGD, AHD, DRD, UDD SLRTI, PRI, ULB, SPWD, DDMA, SIRD, and SAUs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Enhancing capabilities of ULB/PRIs to prepare and cope with events like cold wave and frost Basic training on coping up with cold wave and frost for CDEF, community, and volunteers Training on various aspects of coping with cold wave and frost Training on post-cold wave management in agriculture and live stocks Basic training on coping with

Cold wave and Frost				
Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State
		<ul style="list-style-type: none"> Training support for SDRF, CDEF, community, and volunteers 		<p>cold wave and frost</p> <ul style="list-style-type: none"> Promoting culture of awareness, alertness and preparedness Awareness generation programs for public, utilities, ULBs, PRLs, 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
Climate Change Risk Management	MOES*, MoAFW*, MOEFCC, NLRTI	<p><u>Medium Term(T2)</u></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 and Cold wave and frost Promote cold tolerant field crop and horticultural crops, animal breeds Shelter management , health cares and quality nutrition for animals Promotion of polyhouses, 	SAUs, DMD\$, SDMA,DDMA, DRD,UDD, AGD,PRLs, ULBs, SLRTI	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Support and cooperate with central agencies Sponsor state-specific efforts; support local efforts Promote cold tolerant field crop and horticultural crops, animal breeds Shelter management , health cares and quality nutrition for animals Promotion of polyhouses, protected agriculture/horticulture Promotion of resilient natural

Cold wave and Frost				
Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre#	Responsibility – Centre	State#	Responsibility – State
	MOEFCC*, MORD, MoHUA, NDMA, MSJE	<p>protected horticulture/ agriculture/ Promotion of resilient natural resource management practices</p> <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> • Understanding adaptation needs • Study coping mechanisms <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Develop Adaptation Mechanism <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Implement adaptation programs • Promote adaptive measures in social protection programmes for the vulnerable groups 	<p>SAUs</p> <p>DMD\$, SDMA, DRD, UDD, DDMA, PRIs, ULBs, DSJE</p>	<p>resource management practices</p> <p><u>Recurring/ Regular (RR)</u></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><u>Short Term (T1)</u></p> <p>Develop local adaptation strategies and pilot projects</p> <p><u>Medium Term (T2)</u></p> <p>Sponsor and promote state-specific efforts and local efforts</p> <p><u>Long Term (T3)</u></p> <ul style="list-style-type: none"> • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

3.12 Hailstorm and Cloudburst

Cloudbursts and Hailstorms				
Central/ State Agencies and their Responsibilities				
Thematic Area for DRR	Centre #	Responsibility – Centre	State #	Responsibility – State
Understanding Risk	MOES, MoAFW, MOEFCC, MOST, DOS, NLRTI**	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Technical support for HRVCA and risk assessment • Data Collection <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> • Compiling the baseline data of 2005-2015 <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> • Installing Automatic Weather Stations(AWS) • Deploying Doppler Weather Radar (DWR) 	DMD ⁵ , SDMA, EFD, AGD, AHD, DRD, UDD, SLRTI, PRI, ULB, SPWD, DDMA	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Compile and maintain data on events like cloud bursts and hailstorms – location, event information, impacts, etc. <p><u>Short Term(T1)</u></p> <ul style="list-style-type: none"> • Identify settlements located on sites prone to hailstorms/ Cloudburst • 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><u>Medium Term (T2)</u></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	Central/ State Agencies and their Responsibilities			
	Centre #	Responsibility – Centre	State [#]	Responsibility – State
				<p>and technical expertise to prevent and mitigate landslides</p> <ul style="list-style-type: none"> Inventory of areas that experienced hailstorm episodes and related losses, especially crop losses
Inter-Agency Coordination	MOES, MoAFW, MOEFCC	<p><u>Recurring/ Regular (RR)</u></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 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>DMD^{\$}, SDMA, DDMA</p>	<p><u>Recurring/ Regular (RR)</u></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
Structural Measures	MHUA, MORD	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Technical support for slope stabilization and geo-engineering 	<p>DMD^{\$}, SDMA, DRD, UDD, SLRTI, PRI, ULB, SPWD, DDMA</p>	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Undertake slope stabilization measures on a regular basis

Cloudbursts and Hailstorms				
Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre #	Responsibility – Centre	State #	Responsibility – State
				<p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Integrated approach to slope stabilization combining bioengineering (plants, trees) and mechanical structures for slope stabilisation <p><u>Medium Term (T2)</u></p> <ul style="list-style-type: none"> Develop additional drainage for quick and safe flow of stormwater Repair and maintain natural drainage systems, rivulets, etc. to ensure unhindered flow of stormwater
Non-Structural Measures	MHA, MOES, MOEFCC, MOST	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Provide Support Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></p> <ul style="list-style-type: none"> Frame model rules, laws, guidelines Risk Transfer Policy Framework 	All departments, ULBs, PRIs	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property <p><u>Short Term (T1)</u></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 Risk Transfer Policy Framework <p><u>Medium Term (T2)</u></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

Cloudbursts and Hailstorms			
Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
	Centre #	Responsibility – Centre	Responsibility – State
Capacity Development	MoAFW, MOES, MOEFCC, DOS, MSJE, MWCD, NIDM, NDRF	<p><u>Recurring/ Regular (RR)</u></p> <ul style="list-style-type: none"> • Awareness raising • 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 	<ul style="list-style-type: none"> • Enhancing capabilities of ULB/PRI to prepare and cope with events like clodbursts and hailstorms • Basic training on coping up with hailstorm for CDEF, community, and volunteers • Training on various aspects of coping with clodburst, hailstorms, search and rescue • Training on post-hailstorm management in agriculture • Basic training on coping with clodburst and hailstorm • Training on various aspects of coping with clodburst, 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 dissemination to general public through all medium • Information on safety, care and protection of disaster-affected animals • Promote use of insurance/ risk Transfer

Cloudbursts and Hailstorms			
Thematic Area for DRR	Central/ State Agencies and their Responsibilities		
	Centre #	Responsibility – Centre	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 	<p>Recurring/ Regular (RR)</p> <ul style="list-style-type: none"> • Enhancing capabilities of ULB/PRI to prepare and cope with events like clodbursts and hailstorms • Basic training on coping up with hailstorm for CDEF, community, and volunteers • Training on various aspects of coping with clodburst, hailstorms, search and rescue • Training on post-hailstorm management in agriculture • Basic training on coping with clodburst and hailstorm • Training on various aspects of coping with clodburst, 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

Cloudbursts and Hailstorms				
Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
	Centre #	Responsibility – Centre	State #	Responsibility – State
Climate Change Risk Management	MOES*, MAFW*, MOEFCC, NLRTI	<p>Short-Term (T1)</p> <ul style="list-style-type: none"> • Understanding GACC adaptation needs • Study GACC coping mechanisms • Develop GACC adaptation mechanisms 	DMD, SDMA, DDMA, EFD, AGD, AHD, DRD, UDD, SLRTI, PRI, ULB, SPWD, 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 • Sensitization 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> <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, Cloud burst & Climate Change 		<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
		<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 		

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, NIASM, ICAR, CSMRS, WIHG, DTRL, Roorkee Univ., 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/UT.

CHAPTER 4

Chapter 4: Mainstreaming Disaster Risk Reduction (DRR)

This chapter presents an overview of integrating disaster risk reduction and climate change into existing development policies, plans and projects. It details out the international and national perspective of integrating DRR and CCA into programmes and policies of the Ministry of Agriculture and Farmers Welfare.

4.1 Introduction

Development policies, plans, schemes and projects currently do not take disaster risk reduction and climate change concerns into account due to lack of awareness and clarity on how to effectively develop and integrate the DRR and adaptation options. Integrating adaptation into development cooperation provides an essential opportunity to make more climate and disaster-resilient development investments. The process of mainstreaming DRR into development planning needs to have appropriate tools and methodologies along with political commitment, public understanding, scientific knowledge and expertise.

Knowledge of climate vulnerabilities, risk and disaster risk reduction will ensure that development gains will not be undermined by climate risk. It also offers the opportunity to build adaptive capacity and resilience in the face of climate change, so that the risk of future adverse impacts is minimized. It is important to have first-hand knowledge on climate and DRR issues and the two-way relationship between climate risk and development plans: i.e. climate risk may affect development plans, and development plans may impact climate systems.

4.1.1 International perspective for CCA and DRR integration

The year 2015 was a landmark year for the United Nations and Global Development Agenda. The convergence of interests and global concerns for sustainable development, disaster risk reduction and climate change led to the formation of a new roadmap for a sustainable and safe world together: The Sendai framework for disaster risk reduction, The Sustainable Development Goals and The Paris Climate Agreement. These agreements of global significance provide opportunities to build coherence across different but overlapping policy areas. A brief about the goals of three frameworks have been mentioned below:

Global Framework/Goals/Agreement	Thrust Point	India's Stand
Sendai Framework for Disaster Risk Reduction, 2015-2030	It is a non-binding voluntary agreement for 15 years which recognizes the responsibility of States for DRR and the shared responsibility with local government, private sector and other stakeholders. SFDRR improves on HFA by identifying the gaps, good lessons learned and future challenges.	India is a signatory to SFDRR and is attempting to comply with it on a voluntary basis. Recently released National Disaster Management Plan of India (NDMP), 2016 , incorporates the approach articulated in Sendai Framework to achieve a substantial reduction in 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.
Sustainable Development Goals	It includes 17 global sustainable development goals with 169 targets. Twenty-five targets of the new SDG Framework are directly or indirectly related to DRR in 10 of the 17 SDGs. The agenda identifies and asserts the immediate needs to reduce climate and disaster risk & emphasizes resilience building of communities and nations to achieve the SDGs.	Explicit references for DRR, CCA and resilience can be observed in goals and targets especially related to poverty, hunger, healthy lives, building resilient infrastructure, education, sustainable management of water, climate change, resilient and smart cities.
Paris Climate Agreement	Paris Agreement was called historic, primarily because, for the very first time, countries had unanimously agreed that while holding temperature rise to under 2-degrees, countries to pursue 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.	India ratified the agreement on 2 nd October, 2016. In future approaches to climate adaptation, the loss and damage caused by disasters will be better incorporated to accomplish the goal of climate resilience. The preamble of agreement mentions the adoption of Sendai Framework for Disaster Risk Reduction.
United Nations Convention for Combating Desertification (UNCCD)	UNCCD, established in 1994, is the sole legally binding international agreement that links environment and development to sustainable land management. It addresses specifically arid, semi-arid and dry sub-humid areas, known as	India is a signatory to the United Nations Convention for Combating Desertification (UNCCD). The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal Ministry of Government of India (GoI) that oversees the implementation of the Convention in the country. India's population is

Global Framework/Goals/Agreement	Thrust Point	India's Stand
	drylands, home to some of the most vulnerable ecosystems and peoples.	projected to reach 1.7 billion by 2050. About 2 billion hectares of land – an area over three times the size of India – are degraded, but can be restored back to health. India was one of the first countries to commit to the 2030 Sustainable Development Goal target of achieving land degradation neutrality (LDN)

4.1.2 National Perspective for Integrating CCA and DRR

In our country disaster management comes under revenue and relief department whereas climate and the related subject come under the jurisdiction of Ministry of Environment, Forest and climate change and concern State Department of Environment. Although the Disaster Management Act, 2005 and Disaster Management policy 2009, envisage disaster risk reduction instead of conventional relief centric approach which has been followed by state departments for years, it is mandated that every department has to prepare a departmental level DM plan and allocate a specific budget for DM (preparedness and mitigation as well). The component of CCA in short/medium/long term has not been incorporated in these plans. 13th Finance commission is having specific allocation for DM capacity building, training and non-structural components.

CCA and DRR approaches are integrated to some extent at the national level through India's commitment to Hyogo Framework for Action, 2005-15; Sendai Framework 2015-2030, the National Action Plan on Climate Change (NAPCC, 2008), State Action Plans of climate change (SAPCC) and other ministerial-level programs. Furthermore, an array of sectoral departments such as Water Supply, Health, Agriculture, Rural Development and Urban Development undertake activities that influence climate and disaster resilience. However, when the overall implementation of such projects and schemes is observed low horizontal & vertical coordination exists between departments, especially on integrating DRR and CCA concerns into their sectoral programs. These gaps undermine the ability to translate concepts and DRR or CCA policies into action on the ground.

4.2 Programs and Policies of the Ministry/Department Contributing to DRR

4.2.1 Department of Agriculture, Cooperation and Farmers Welfare

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
Administration, Economic Administration and General Coordination	Entrusted primarily to collect, compile and disseminate economic and statistical data relating to agriculture and provide analytical inputs to DAC&FW for the formulation of better agricultural and economic development policies. The relevant data is available on the department's website i.e. https://eands.dacnet.nic.in/ . This Directorate does not handle the formulation and finalization of five-year plans and annual plans	Not applicable keeping in view the work handled by the Directorate.	Not applicable to keeping in view the work handled by the Directorate
Agriculture Census	Agriculture Census Scheme (1970-71)	<p>Main source of information on basic characteristics of operational holdings such as number and area of operational holdings, land-use, cropping pattern, irrigation status, tenancy and input use pattern by operational holdings.</p> <p>Information to be used as an input for development planning, socio-economic policy formulation and establishment of national priorities</p> <p>Statistics can be used for sustainable recovery processes for identified hazards</p>	This exercise is to avoid thin spreading of resources, and make effective implementation and monitoring of schemes when controlled by a few implementing and monitoring agencies, and expedite approval mechanism, which may not prove true when Umbrella Schemes grow too huge themselves.

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
Agricultural Marketing	New Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017	Provisions include inter alia private markets, direct marketing, farmer-consumer markets and special commodity market yards Training and research on disaster management aspects	Declaring warehouses/silos/cold storages or such structures as market sub yards to reduce the number of intermediaries between producer and buyer and increase the share of the farmer in consumer's rupee.
	National Agriculture Market (e-NAM)	To enhance transparency in transactions, price discovery and farmers' reach to larger number of markets to sell their produce to buyers of their choice at their convenience	The Model Agricultural Produce Marketing Act (APMC Act), 2003, and recent improvements to it through Model Agricultural Produce and Livestock Marketing (Promotion and Facilitating) Act (APLM), 2017, provide increasing efficiency in agricultural markets in India.
Cooperation	Price Support Scheme (PSS) and Market Intervention Scheme (MIS)	The Price Support Scheme (PSS) and Market Intervention Scheme (MIS) ensure remunerative prices to the growers and in case market prices fall below the MSP/MIP, central/state agencies start the purchase operation by paying the MSP/MIP to the farmers	This scheme provides a pre-determined quantity at a fixed Market Intervention Price (MIP) procured by NAFED as the Central agency and the agencies designated by the state government for a fixed period or till the prices are stabilized above the MIP, whichever is earlier. MIS ensures remunerative price for procurement of crops at MIP which are perishable and for which MSP is not notified by Gol.
	Assistance to National Level Cooperative Federations	Promotion of Technical & Consultancy Services, intensification of field studies, research and statistical activities, assistance to NCDC programmes for development of co-operatives under the central sector integrated scheme on agricultural Co-operation during 12 th five year plan.	Improvement of infrastructural facilities/office buildings/premises etc.

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
	Integrated Scheme on Agricultural Cooperation	Supporting Agency: National Cooperative Development Cooperation (NCDC)	Assistance in storage facilities of market produce
	Assistance for Cooperative Education and Training	Intensification of Cooperative Education and improving managerial capabilities of professionals working at various levels of management in the Cooperative Sector. Supporting Agency: National Council for Cooperative Training (NCCT) and National Cooperative Union of India	Improving operational performance has been among key targets by various organizations globally including cooperatives. Among the major strategies to improve performance of various kinds in organizations.
Credit	<p>Agricultural Credit</p> <p>Agriculture Insurance: i. Pradhan Mantri Fasal Bima Yojna</p> <p>ii. Restructured Weather Based Crop Insurance Scheme</p> <p>iii. Coconut Palm Scheme</p>	<p>Availability and access to adequate, timely and low cost credit from institutional sources especially to small and marginal farmers.</p> <p>Making availability of credit schemes to small and marginal farmers will help in speedy recovery after disasters like flood, drought, fire, high intensity rainfall etc</p> <p>The scheme provides comprehensive risks insurance against crop yield losses due to adverse climate conditions such as drought, hailstorm, floods and pests disease etc.</p> <p>Provide insurance protection to the farmers against likely crop yield losses due to adverse weather incidence, such as deficit and excess rainfall, high or low temperature, humidity etc.</p>	<p>There is an ever increasing need to invest in agriculture due to a drastic rise in global population and changing dietary preferences of the growing middle class in emerging markets towards higher value agricultural products. Besides, climate risks increase the need for investments to make agriculture more resilient to such risks.</p> <p>To minimize the area discrepancy in coverage, the scheme also promotes the digitization of land records.</p>

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
	iv. Unified Package Insurance Scheme	<p>which are deemed to impact adversely the crop production</p> <p>Scheme is implemented in coconut growing states to provide financial support in case of damage of palm tree and their productivity due to adverse climatic conditions, pest and diseases etc.</p> <p>Financial protection & comprehensive risk coverage of crops, assets, life, and safety of school going children of farmers.</p>	<p>Pradhan Mantri Fasal Bima Yojana (PMFBY) aims at covering the losses suffered by farmers due to reduction in crop yield as estimated by the local appropriate government authorities.</p> <p>The scheme also covers pre sowing losses, post-harvest losses due to cyclonic rains and losses due to unseasonal rainfall in India.</p> <p>There is a provision to cover losses due to localized calamities such as inundation also in addition to the previously covered hailstorm and landslide risks.</p>
Crops	National Food Security Mission (NFSM)		<p>Training related to disaster management, awareness generation</p> <p>Research support for integrated pest management system</p> <p>Reclamation of soil, establishment of soil testing laboratories</p> <p>Technical back stopping by ICAR crop institutes and SAUs for major crops for seed production and supply system:</p> <ol style="list-style-type: none"> 1. Rice- NRRI, Cuttack, 2. IIRR, Hyderabad 3. Wheat- IIWBR, Karnal 4. Pulses- IIPR, Kanpur 5. Oilseeds-IIOR, Hyderabad, 6. Rapeseed & Mustard -- DRM, Bharatpur 7. Cotton-CICR, Nagpur 8. Jute- CRIJAF, Kolkata 9. Sugarcane-IISR, Lucknow 10. Maize- DMR, Ludhiana 11. Soybean-DSR, Indore 12. Sorghum and millets-IIMR, Hyderabad 13. Groundnut-ICAR-DGR, Junagadh 14. IGFR, Jhansi

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
	Crop Diversification Programme Bringing Green Revolution in Eastern India (BGREI)	ICAR-IIWM, Bhubaneswar	ICAR-RC-ER, Patna
Drought Management	To coordinate relief measures upon receipt of request from the states for additional central assistance from National Disaster Response Fund in the wake of drought, hailstorm, pest attack and cold wave/frost	Monitoring of ongoing drought situation and coordinate with concerned Ministries/Departments/State Governments	Technical backstopping by ICAR-CRIDA, Hyderabad , Network centres of AICRPDA and AICRPAM SAUs , KVKs
Extension	Programs for Capacity Building	Designing model training courses on DRR Organizing awareness and training session on Disaster Risk Reduction related to early warning systems Develop information sharing strategy and extension materials on tolerant/resilient crops and crop zoning to relevant stakeholders	Linking DRR with Agriculture Knowledge Information System (AKIS) and Information Technology Built capacity of field functionary related to DRR information and information for better communication. Technical backstopping by ICAR-Agriculture Extension Division
	Kisan Call Centre	Develop App to communicate information to farmers on early warning related to pest attack and other related disasters	Develop a system for regular updates through a system of SMS or voice messages
	Programs for Skill Development	Promote an action-based research and field-based studies for the identification, validation and location specific adaptation of agricultural practices enhancing resilience to droughts, floods, hailstorms, extreme weather events, and pests & diseases	Promote use of farmer field schools (FFSs) and demonstration farms/plots to disseminate knowledge on good practices for DRR. The potential of KVKs at district level harness for skill development programme for climate smart agriculture.

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
Horticulture	Mission for Integrated Development of Horticulture	<p>Awareness and capacity building to protect horticulture crops from uncertainties of extreme weather events</p> <p>Training Programs for disease forecasting units for PSU and MIDH</p>	<p>Developing facilities for early warning systems for horticulture crops.</p> <p>Adverse climatic condition protected structure</p> <p>Plant health clinic centre sponsored property monitored by eco-friendly live trap to catch harmful insects</p> <p>Responsible State Agency: State Horticulture Department, Director Horticulture, Mission Director Horticulture, Directorate of Arecanut and Species Development (DASD) and Directorate of Cashew and Cocoa Development, Cochin, Central Institute of Horticulture, Nagaland and National Seeds Cooperation</p> <p>Technical backstopping by ICAR Institutes viz Bangalore, CIAH, Bikaner</p> <p>IIIVR, Varanasi, CITH, Srinagar, CPCRI, Kasargod, CTCRI, Trivendrum, IISR, Calicut</p>
Information Technology	National e-Governance Plan in Agriculture (NeGP-A)	Improving awareness and knowledge efficiency of farmers to deal with disaster management in particular heat waves, cold waves, frost management	<p>Develop/print/disseminate agromet bulletins</p> <p>Develop stand posters and information bill boards on DRR</p>
	Strengthening of IT Apparatus in Agriculture and Cooperation in the States and Union Territories (AGRISNET)	DAC has developed around 80 portals, applications and websites. The important portals are Farmers' Portal SEEDNET, DACNET, AGMARKNET (prices and arrivals in Mandis), RKVY (Rashtriya Krishi Vikas Yojana), ATMA, NHM	The rapid development of agriculture in India through ICT enabled multiple delivery channels such as Internet, Government Offices, Touch Screen Kiosks, Krishi Vigyan Kendras, Kisan Call Centres, Agri-Clinics, Common Service Centers,

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
		<p>(National Horticulture Mission), INTRADAC, NFSM (National Food Security Mission) and APY (Acreage, Productivity and Yield).</p> <p>The Kisan Call Centre (KCC) initiative aims to provide information to the farming community through toll-free telephone lines.</p>	<p>Mobile Phones (Broadcast, IVRS, interactive messaging using unstructured Supplementary Service Data and Voice Recognition for ensuring timely access to agriculture related information for the farmers of the country.</p>
Integrated Nutrient Management	<p>Soil and Land Use Survey of India (SLUSI)</p> <p>Soil Health Management (SHM), under national mission on sustainable agriculture</p> <p>Soil health card scheme</p> <p>Strengthening of soil testing laboratories</p> <p>National project on organic farming</p> <p>National Project on Organic Farming (NPOF)</p>	<p>Human resource development</p> <p>Capacity building and awareness generation</p> <p>Support for organic input production units under Capacity investment back ended subsidy scheme.</p> <p>Awareness creation</p> <p>Restrict on quality control of chemical fertilizers</p> <p>Organic farming methods can produce even higher yields than conventional methods. It also improve the soil health which leads to reduce pest, insect and disease incidences.</p> <p>Practice of organic farming not only saves energy for both animal and machine, but also reduces risk of crop failures</p>	<p>Statutory quality analysis of bio-fertilizers and organic fertilizers under FCO and testing of other organic input</p> <p>Nutrient Management enables the adaptation of plant nutrition and soil fertility management in farming systems to site characteristics, taking advantage of the combined and harmonious use of organic and inorganic nutrient resources to serve the concurrent needs of food production and economic, environmental and social viability.</p> <p>Provisions can be added for disaster safe structures/labs. Technical backstopping by ICAR-IISS, Bhopal & SAUs</p>

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
		Promote organic farming showing its importance towards DRR	
International Cooperation	Promotes the growth of mutually beneficial partnerships with other countries of the world in multilateral as well as bilateral format	<p>Making best technology available to Indian farmers to deal with disaster management</p> <p>Promoting research on early warning systems for pest management</p>	
Mechanization and Technology	<p>Promotion and Strengthening of Agricultural Mechanization through Training, Testing and Demonstration</p> <p>Establish Farm Machinery Banks for Custom Hiring</p> <p>Establish Hi-Tech, High Productive Equipment Hub for Custom Hiring</p>	<p>Making plans to safeguard farm equipments on the onset of disaster</p> <p>Trainings and capacity building for management of assets at the time of disaster</p>	Building warehouses for safeguarding farm equipments. The use of technology has reduced the risk factors in agriculture, particularly those unleashed by nature. Not only that quick processing has been made possible, technology has reduced farmer's dependency on, and vulnerability to, the nature.
Natural Resources Management	<p>Reclamation and Development of Alkali and Acid Soils (RADAS)</p> <p>National Mission for Sustainable Agriculture (NMSA)</p>	<p>Promote on-farm conservation and management practices for supporting vulnerable community (water harvesting schemes, multi-use water system and technology)</p> <p>National Mission on Bamboo</p> <p>Sub-mission on agro-forestry</p>	<p>Increase irrigation coverage where water resources are available without negative impacts on ground water</p> <p>Enhance water use efficiency through micro irrigation systems</p> <p>Promote excavation of ponds, and small scale irrigation system is suggested to be covered under MGNREGA</p> <p>Enhance water management through laser land leveling and levee improvement</p> <p>In NRM sectors vulnerable to climate change, particularly agriculture, water resources, the</p>

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
			Himalayan region, coastal regions, the integrated management of natural resources can be proposed through NMSA .
Oilseeds	Assistance for oilseed cropping through three missions namely Mini mission I (Oilseeds), Mini mission II (Oil Palm) and Mini Mission III (TBOs) NFS (Oilseeds and Oil palm)	Plan for developing and growing oil seeds based on agro-climatic conditions	Developing hilly areas for growing oil seeds. Planning stage for waste land and desert For hilly regions, funds allocated to NE States.
Plant Protection	Strengthening and Modernization of Plant Quarantine Facilities in India (SMPQF) Plant Quarantine Information System Monitoring of Pesticide Residues at National Level (MPRNL)	Coordinating with agencies to develop early warning system for pest management Coordination with Information Technology department for right and timely dissemination of information related to pest attack Training regarding efficacy and safety to human beings and animals specify the dosage, manner of use, application technique, precautions against poisoning, label and leaflet. Promoting research on exotic species and potential threat to plants	35 CIPMCs, 67 Plant Quarantine Stations, 12 Locust Control Offices and Head Quarter, Hyderabad
Policy	Formulation of overall policy and strategy for agricultural development in a long term perspective; development of vision for agriculture over the next 20 years or so; preparation of Action Plan for achieving the same;	Update sustainable agriculture policy. Farmers' distress, National Agriculture Policy 2007 and Doubling Farmers' Income and its empowered Committee	

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
Rainfed Farming System	<p>Rainfed Area Development (RAD) under National Mission for Sustainable Agriculture (NMSA).</p> <p>Pradhan Mantri Krishi Sinchai Yojana (PMKSY)(per drop more crop)</p> <p>Agriculture contingency plan</p>	<p>Develop tolerant/resilient varieties of rainfed crops and efficient crop zoning/crop alignment</p> <p>Develop resilient natural resource management practices, cropping systems and integrate farming systems</p> <p>Develop capacity building programme for rainwater management(in situ and ex situ), artificial groundwater recharge models for higher water productivity</p> <p>Packaging farm technology with suitable designs, lining, lifting and micro irrigation systems</p>	<p>Promote revival of traditional water management systems.</p> <p>Use of efficient technology for enhancing water productivity.</p> <p>Important structures under the division are silage making, green houses, rainwater harvesting structures, tube wells, restoration small tanks, water lifting device, vermi-compost units, post harvest storage, processing units, soil and water conservation structures and micro irrigation systems.</p>
Rashtriya Krishi Vikash Yojna	<p>Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR)-</p> <p>An umbrella scheme for ensuring holistic development of agriculture and allied sectors</p>	<p>Monitoring of RKVY RAFTAAR scheme for strengthening the farmer's effort, risk mitigation and promoting agri-business entrepreneurship.</p> <p>Promote an action-based research and field-based studies for the identification, validation and location specific adaptation or agricultural practices.</p>	<ol style="list-style-type: none"> 1. Regular RKVY-RAFTAAR -70% of annual outlay. <ol style="list-style-type: none"> a. <u>Infrastructure and assets</u>- 50% (of 70%) of regular RKVY-RAFTAAR outlay- pre-harvest infrastructure- 20%, post-harvest infrastructure- 30% b. <u>Value addition</u> linked production projects (agribusiness models) for additional income to farmers - 30% (of 70%) of regular RKVY outlay. c. <u>Flexi funds</u>- 20% (of 70%) of regular RKVY-RAFTAAR outlay. 2. RKVY-RAFTAAR special sub-schemes – 20% of total annual outlay. 3. Innovation and agri-entrepreneur development - 10% of annual outlay.

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
Seeds	<ul style="list-style-type: none"> • Sub-Mission for Seeds and Planting Materials (SMSP): • Sub-Mission for Seed and Planting Materials (SMSP) under National Mission on Agricultural Extension and Technology (NMAET) • Central Sector Scheme known as 'Development and Strengthening of Infrastructure Facilities for Production and Distribution of Quality Seeds' since 2005-06 on an all India basis. • Implementation of the Protection Of Plant Varieties And Farmers' Right Act, 2001 	<ul style="list-style-type: none"> • SMSP will cover the entire gamut of seed production chain, from production of Breeder seed to supply of certified seeds to the farmers, upgrade Farm Saved seeds, to provide support for creation of infrastructure conducive for development of the seed sector, support to the public seed producing organizations for improving their capacity and quality of seed production, create dedicated seed bank to meet unforeseen circumstances and natural calamities, etc. 	<ul style="list-style-type: none"> • Infrastructure development for seed supply chain systems/seed hubs infrastructure like seed production farms, seed processing, storage, seed testing and certification for production and distribution of quality seeds to farmers. • Promotion of seed production systems at village level. • Production and promotion of short and medium duration and tolerant varieties for abiotic and biotic stresses such as drought, cold wave, heat wave, floods, submergence, cyclones, frost, hailstorm, pest & diseases • Distribution of seeds of short and medium duration varieties during natural calamities and unforeseen circumstances. • Creation of awareness for adoption of drought resilient seed variety protection.
Agriculture Trade Policy, Promotion and Logistics Development Divisions	<ul style="list-style-type: none"> • Coordinating/ formulating responses on World Trade Organization's (WTO) Agreement on Agriculture with the Ministry of Commerce, with DIPP on FDI in agriculture, with Ministry of Finance in matters relating to the modification in the Custom duty and Goods and Services Tax 	<p>Entrusted with the responsibility of making policy recommendations on export and import of agricultural commodities.</p> <p>An assessment of the State's potential in key agricultural sectors and drawing up an action plan to support the infrastructure creation to promote exports.</p>	<p>The major focus on Clusters promoting value added exports with Marketing and promotion of "Brand India".</p> <p>Establishment of Strong Quality Research & Development center.</p> <p>Inclusion of agricultural exports in State Export Policy</p> <p>Infrastructure and logistics to facilitate agricultural exports</p>

Division	Prog/Policies/Schemes or Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
	(GST) on agricultural commodities and with Ministry of Commerce in matters relating to Preferential Trade Agreements (PTAs)/Free Trade Agreements (FTAs) with different countries.		
Farmers Welfare	<ul style="list-style-type: none"> Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) 	<ul style="list-style-type: none"> Linking with the disaster management aspects like failure of crops due to drought, flood, frost, hail storms, pest attack, high intensity rainfall 	<ul style="list-style-type: none"> The landholder farmer family eligible for benefit under the scheme. The States' database of eligible beneficiary landholder farmer families in the villages will be used for building capacity for DRR.

4.2.2 Department of Agriculture Research and Education (DARE)

DARE provides the necessary government linkages for the Indian Council of Agricultural Research (ICAR), the premier research organization for coordinating, guiding and managing research and education in agriculture including natural resource management, field crops, horticulture, fisheries, animal sciences and farm mechanization in the entire country. With over 97 ICAR institutes, 53 agricultural universities, 6 bureaus, 18 National Research Centers, 25 Project Directorates, and 89 All India Coordinated Research/All India Coordinated Network Projects spread across the country. ICAR along with SAUs is one of the largest national agricultural research systems in the world. The mandate of DARE/ICAR is to plan, undertake, coordinate and promote Research and Technology Development for Sustainable Agriculture; aid, Impart and Coordinate Agricultural Education to enable Quality Human Resource Development; Frontline Extension for technology application, adoption, knowledge management and capacity development for agri-based rural development; Policy, Cooperation and Consultancy in Agricultural Research, Education & Extension. The role of DARE in Disaster Risk Reduction will be to take research, capacity building and knowledge management aspects and help in risk mitigation strategies.

Institute/ Centre	Programmes/Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
ICAR-Central Research Institute for Dryland Agriculture	<p>Basic and applied research for sustainable and climate resilient agriculture in rainfed areas</p> <p>Co-ordinate network research for generating agro-ecology specific technologies in rainfed areas</p> <p>Centre for capacity enhancement in natural resource management in rainfed areas</p> <p>Lead institute for ICAR Flagship programme on National Innovations in Climate Resilient Agriculture</p>	<p>To develop agroecology specific rainfed technologies through its network centres of AICRPDA</p> <p>Contribution to R&D policy at national, state and district level for sustainable and climate resilient rainfed agriculture</p> <p>Enhancing resilience of Indian agriculture to disasters through strategic research, technology demonstration and capacity building</p>	<p>Preparation/updation of District agriculture contingency plans and their operationalization through state line departments</p> <p>Risk and vulnerability assessment of Indian Agriculture to Climate change</p> <p>Scaling out climate resilient villages including village level institutions</p> <p>Capacity development programmes for DRR and CCA can be included</p>
ICAR-Indian Institute of Millets Research	<p>The mandate is basic and strategic research on sorghum and other millets</p> <p>Mitigating adverse effects of climate change, these crops are drought tolerant, low and high temperature tolerant and less water intensive compared to other crops</p> <p>Increasing the productivity of millets and their diversified utilization for enhancement of profitability</p>	<p>Linking with disaster management like increasing the production to ensure food security during or after any disaster.</p>	<p>Improved storage structures for harvested and processed millets and sorghums to withstand impacts of any natural disasters</p>
ICAR-National Research Centre for Integrated Pest Management	<p>The mandate is information and Communications Technology (ICT) based surveillance, monitoring of pest population, research and promotion of pest smart IPM technologies for</p>	<p>NCIPM envisages larger role in making IPM practices more effective across the country through higher levels of integration of multi disciplinary technologies and of stakeholders by means</p>	<p>Popularization of IPM technologies</p>

Institute/ Centre	Programmes/Functions	Mainstreaming with DRR	
		Non-structural measures	Structural measures
	major crops. On farm validation of IPM technologies, forging linkages with commodity based crop research Institutes, AICRP/ AINP and capacity building.	of improved research, education, training and extension for an enhanced crop and ecological health, and sustainable agricultural growth.	

4.3 Mainstreaming Organic Farming, traditional knowledge and low input technology:

Organic farming is promoted through Paramparagat Krishi Vikas Yojna (PKVY) under Integrated Nutrient Management (INM) division of Ministry of Agriculture and Farmers Welfare. National Centre of Organic Farming (NCOF) Ghaziabad runs National Project on Organic Farming (NPOF), a central sector scheme since 10th Five Year Plan. The scheme is continuing in the 12th Plan as well. The objective of the plan is to promote organic farming in the country through technical capacity building of all the stakeholders, transfer of technology, promotion and production of quality organic products. Also promotion of Organic Farming through low-cost certification system known as “Participatory Guarantee System”.

Mainstreaming traditional knowledge and promoting traditional crop have the potential to mitigate the adverse effects of climate change with spatial and sequential diversity. Traditional agricultural practices have a significant role in achieving the sustainability of agriculture by improving nutrition quality and food production. Encouraging local crops like Millets and sorghum which contribute to nutritional security. At the same time they are comparatively climate resilient crops. Indian Institute of Millets Research (IIMR) Hyderabad under Indian Council of Agricultural Research (ICAR) is engaged in research on sorghum and other millets. They are working towards increasing the productivity of millets and their diversified utilization for enhancement of profitability. Mitigating adverse effects of climate change, these crops are drought tolerant, low and high temperature tolerant and require less water compared to other crops.

Another conventional practice is **Zero Budget Natural Farming (ZBNF)**. It is a method of chemical-free agriculture drawing from traditional Indian practices. At COP-14, Indian Prime Minister conveyed that India is focusing on Zero-Budget Natural Farming (ZBNF). States like Andhra Pradesh is pioneering and implementing Andhra Pradesh ‘Zero-Budget’ Natural Farming (APZBNF) Programme, through Non Profit organization. In June 2018 they had launched a scale-out plan to transition 6 million farms/farmers to 100% chemical-free agriculture by 2024.

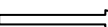

4.4 Strategic actions for sustainable management of Agriculture System

Five strategic actions have been prioritized and recommended to Ministry of Agriculture and Farmers Welfare for sustainable management of agriculture system.

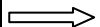
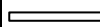
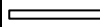

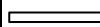

Priority 1. Strengthen governance system (institutional and technical capacities) for disaster risk reduction and climate change adaptation in agriculture and enhance coordination mechanisms

1.1 Strengthen Institutional Capacity and Mechanisms for Effective Coordination

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
1. Establish a focal point in Ministry to coordinate and guide throughout for the DRR/CCA matters and to deliver related technical tasks	Establish Secretariat to guide throughout the disaster cycle	⇒			Drought Division
	Provide logistic support to the secretariat coordination mechanism for DRR and CCA	⇒			Administration, General Coordination and Budget & Finance
2. Strengthen capacity of technical units in various departments (including decentralized levels) and in selected agricultural research, partner institutions to address and include DRR and CCA issues	Establish national trainer team on DRR and CCA and capacitate them with adequate resources	⇒	⇒		DARE with respective divisions
	Update TORs of selected staff to include DRR and CCA related responsibilities	⇒	⇒		Respective Divisions
	Develop training curriculum for DRR and CCA tailored to the situation and need of agriculture; and design cost efficient training strategy	⇒	⇒		DARE with respective divisions
	Develop specific planning policy/guideline/tools for integration of DRR and CCA into Ministry's relevant department and selected disaster prone communes	⇒	⇒		DARE and Drought Division
	Provide training to technical departments, decentralized offices, research institutes, agriculture research stations	⇒	⇒	⇒	NIDM with DARE and respective divisions
	Conduct field study/exchange program on DRR and CCA for trainees and trainers (both inside and outside countries)	⇒	⇒		Respective divisions
Establish/ strengthen inter-institutional collaboration, coordination and information exchange, with other key stakeholders in DRR and CCA across sectors	Enhance coordination with other general directorates and administrations within the ministries and other stakeholders to deliver integrated DRR measures	⇒	⇒		Plan Coordination and General Coordination

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
	Establish bilateral networking with Ministry of Jal Shakti to strengthen collaboration with regard to water use management for DRR and CCA planning				Policy, Plan Coordination and General Coordination
	Ensure active membership of agriculture officers with the task to enhance coordination and complementary between DM-committees and agricultural planning at all levels				Policy, Plan Coordination and General Coordination

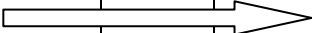

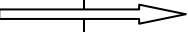
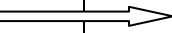
1.2 Mainstream Disaster Risk Reduction into Agriculture Policies, Strategies and Plans

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Update sustainable agriculture land management policy and agriculture land use plans in view of DRR and CCA and enforce for the endorsement	Include DRR aspects into agricultural and sustainable agricultural land use strategy				Rainfed farming System (RFS); DARE, ICAR-CRIDA
	Integrate DRR priorities into current and future sectoral and action plans of each technical unit				All divisions
Provide strategic and technical guidance for the development, and implementation there after, of DRR Policies and Plans for agriculture at decentralized levels	Develop rules and regulations for implementing DRR as part of agriculture related law and policies				Policy
	Update soil, water use, pest control and fertilizer application manuals and other communication materials for agriculture in view of DRR issues to be included				INM, NRM,; Integrated farming system (IFS)
Promote inclusion of DRR and CCA issues into the curriculum of agriculture academic universities and institutes	Host/support researches/studies for agriculture academic university students on DRR in agriculture				DARE with NIDM
	Conduct seminars/workshops to university students on DRR				All divisions


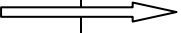
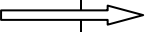
Priority 2: Promote and enhance early warning systems for pro-active disaster risk reduction and climate change adaptation

2.1 Establish and Improve Agriculture Specific Early Warning Systems

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Enhance climate and weather information products and services tailored to the needs of Indian farmers	Set up one agro met micro station located in agricultural research stations of each of 127 agroclimatic zones and District level (KVK)				Drought with Information technology
	Develop a robust networking system with sub-agro climatic zones				
	Establish bilateral networking with Ministry of Agriculture, ICAR-CRIDA(AICRPAM centres) and IMD for regular transmission and interpretation of weather and climate information matching the technical parameters needed for the purpose of agricultural applications				Drought NMSA/RFS
	Develop, build and update capacity of technical Agro-met team within Ministry and equip them with facilities and resources to translate climate and weather data into operational agromet advisory for agriculture and allied sectors				Extension, Information technology, DARE, NIDM
	Regularly develop agriculture specific weather and climate information and warning bulletins and timely disseminate to farming communities as decision support tool for crop selection and operational planning in line with cropping cycle				Information technology
Enhance agriculture related market and price information system and regular dissemination of information	Develop and build capacity of technical team and equip them with facilities and resources to provide accurate market price information for agriculture products				Credit, Cooperation

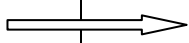

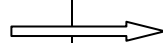
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
	Regularly disseminate product information through extension, radio, mass media and posting of relevant information at public places in hazard prone areas				Information Technology
	Establish farmer network for sharing information on market and price and other relevant DRR issues				Plan coordination, IT
Enhance Trans boundary crop pest and disease monitoring and Early Warning system	Link to regional networks on the surveillance capacities and equipment for trans-boundary disasters (flood and pests and diseases)				INM, IPM
	Strengthen national capacities and mechanisms for early pests and disease detection and early warning				INM, IPM

2.2 Improve in Coordination with Other Relevant Stakeholders, Existing Risks and Vulnerability Assessment Methodologies from Agriculture Perspectives

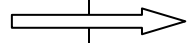
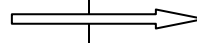
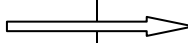
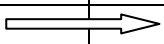
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Support to preparation of detailed hazards and disaster risks (including land degradation) and vulnerability maps for agriculture	Conduct hazard risk and vulnerability studies specific for agriculture sectors at district level and share relevant information for adaptation planning and risk mapping				NABARD MoEFCC NIDM
	Develop pilot cropping calendars to reduce hazard and disaster risk for agro-ecological regions				DARE, ICAR-CRIDA(AICRPAM) NABARD MoEFCC
	Delienate low land agriculture areas to build resilient agriculture				DARE, SAUs, Sate Line Departments

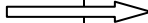
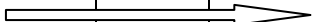
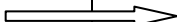

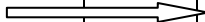
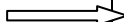

Priority 3. Enhance knowledge management and innovation in support of disaster risk reduction and climate change adaptation in agriculture

3.1 Enhance DRR Related Database to Better Inform Planning and Decision Making

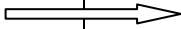
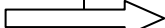
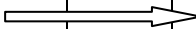
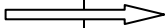
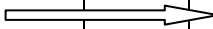
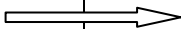
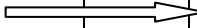
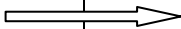
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Support to systematic collection of new data, and improved access to existing data relevant for DRR and CCA in agriculture	Conduct regular updates on agriculture sector database in view of DRR issues				DAC&FW, DARE, NIDM, MoEFCC
	Develop and maintain a knowledge portal for disaster management secretariat and link to other relevant portals. Linking to MoAFW website.				Information Technology
	Develop agricultural land data base in all agro-ecosystems including data on risk exposure				DAC&FW, Information Technology

3.2 Enhance Knowledge Base and Promote Innovation for DRR and CCA

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Promote action-based research and field-based studies for the identification, validation and location-specific adaptation of agricultural practices enhancing resilience to droughts, floods, hailstorms, extreme weather events, and pests & diseases	Promote field-based research on combined techniques for resilient agriculture				Directorate of Extension
	Promote climate change research to develop climate resilient technologies in agriculture and allied sectors				DARE
Promote farmer field schools (FFSs) and front line on-farm demonstration to scale out climate resilient technologies from NICRA and other sources for DRR	Review guideline and policies on FFS in view of DRR and CCA				State Agriculture department ATMA, DARE, SAUs & KVKs
	Facilitate the formation of FFSs in hazard prone areas				ATARI, DARE, State department of agriculture, MANAGE & NIRDPR

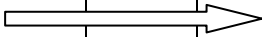
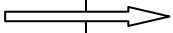
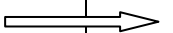
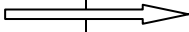
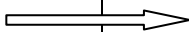
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
	Disseminate technical information to farmers on DRR & CCA				DARE , ATARIs, KVKs, MANAGE & NIRDPR
	Provide training to model farmers on resilient agriculture practices				Extension, Famers Welfare, SAUs, ATMA, NIRDPR & MANAGE
Prepare and disseminate technical textbooks (to provide guidance) for front line extension workers, NGOs and farmers on recommended crop, soil, water, land, tree, animal management practices in the context of DRR and CCA	Document good practice options for DRR in agriculture and upload them in the database				DARE, SAUs,CSO, NIRDPR & MANAGE
	Document and contextualize technical textbooks in the context of DRR and CCA for particular crops (rice, soybean, wheat etc) for small and medium farmers				DARE,SAUs, CSO, MANAGE & NIRDPR
	Publish and disseminate printed products (technical textbooks, GPs, posters...) to small farmers				DARE, SAUs, NIRDPR & MANAGE
Design and implement a capacity development strategy on DRR agriculture good practices and their application	Conduct training with extension workers and NGOs to enhance local knowledge based on DRR & good practices				DARE, SAUs, NIRDPR & MANAGE
	Promote implementation, test, and validation of DRR good practice options in agriculture				DARE & SAUs

3.3 Awareness Raising and Communication for DRR and CCA

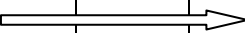

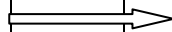
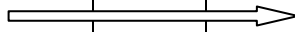
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Design and conduct local level awareness-raising campaigns and training programs on lesson learnt and good practices	Conduct a representative needs assessment study in selected districts/communes to map information deficits and needs of farmers related to DRM and economic impacts of disasters in agriculture				All divisions
	Develop field awareness program and disseminate lesson learnt and good practices of DRR and CCA, through local existing channels (Extension workers, Model Farmers) and community activities (farm demonstration, farmer field day)				Directorate of Extension
Link farmers to national and policy level to advocate on and to create awareness on DRR	Organize a national platform for farmer competition on resilient agriculture practices				Directorate of Extension
	Encourage exchange visits of farmers				Directorate of Extension
Disseminate agriculture information on DRR and CCA through mass media, mobile phones; newspapers, and printed bulletins	Share and upload information about the agriculture sector on the website				Information Technology
	Develop/print/disseminate agromet bulletins				Information Technology, Information and Broadcasting Ministry
	Develop stand posters and information billboards on DRR				Information Technology
	Collaborate with media and journalists to better inform about DRR				Information Technology

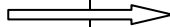
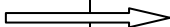
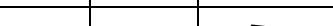
Priority 4. Reduce vulnerabilities to disasters by improving technical options and implementing Community-Based Disaster Risk Reduction and Climate Change Adaptation measures in agriculture

4.1 Promote Integrated Farming Systems and Crop Diversification to Build Resilience of Agriculture Community to Disaster Impacts

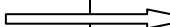



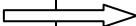
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Encourage scalable IFS modules along with natural resource management practices	Promote agroecology specific IFS modules				IPM, NRM, RFS, Mechanization and technology ICAR-IIFSR, Modipuram
	Encourage use of IPM				IPM
	Develop technical guidelines, publication, and extension material related to DRR				DARE with respective departments SAUs
Encourage crop diversification, crop rotation and cover crops to reduce soil nutrient loss	Pre/post-monsoon cropping in rice fields, Integration of soil and water conservation measures in adaptation plans across agro-ecosystems				NRM, RFS
					Directorate of Extension

4.2 Reduce Land Degradation and Erosion through Sustainable Land Management Interventions

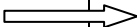

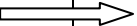
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Promote sustainable soil management (organic farming, community biodiversity management, integrated nutrient management)	Promote Community based land and soil conservation in watershed and springshed approach for scientific land use planning				RFS, RKVY,NRM, DARE
	Scale out sustainable land management practices				DARE
	Promote the use of organic fertilizers to enhance soil fertility and sustainable agriculture				INM
	Scale out amelioration measures for improvement of problematic soils/lands				RFS, RKVY,NRM


Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Encourage practices for reducing soil erosion risks and nutrient loss	Conduct non-tilling farming to reduce soil degradation for high slop areas				RFS, RKVY,NRM
	Promote cover crop systems to reduce the soil degradation				RFS, RKVY,NRM
	Organize workshops for sharing best practices related to DRR				DARE with respective divisions

4.3. Promote Sustainable Water Management and Conservation Practices

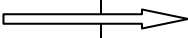
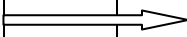
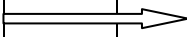
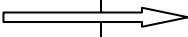
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Promote on-farm conservation and management practices for supporting vulnerable community (water harvesting schemes, multi-use water system and technology)	Promote planting techniques and watering systems				RFS, RKVY,NRM
	Increase irrigation coverage where water resources are available without negative impacts on ground - water				RFS, RKVY,NRM, Jalshakti
Improve water harvesting technique, water productivity and drought management in drought-prone areas	Promote excavation of ponds, and small scale irrigation system				Drought, RFS, RKVY
	Promote knowledge of community in keeping water during the excess period for the late wet season				RFS, RKVY
	Enhance water management through laser land levelling and levee improvement				RFS, RKVY

4.4 Promote Risk sharing and Risk Transfer Mechanism

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Assess scope and feasibility for risk transfer mechanism in the agriculture sector and develop a strategy tailored to the needs of medium and small farmers	Conduct inventory and review of available insurance mechanism for crops, saving, and credit, and subsidy schemes in agriculture				Credit, Farmers Welfare, NABARD
	Support the development of risk transfer mechanism (agro insurance, subsidy schemes) policies in view of DRR and CCA				Credit, NABARD
Promote and extend the formation of community agricultural cooperatives,	Coordinate with NGOs and other institutions to establish agriculture cooperatives, rice/seeds banks,				

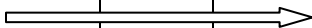
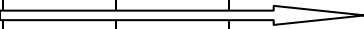
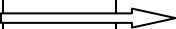
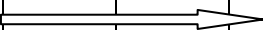

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
community seeds/rice banks, and community safety net in hazards prone areas	FFSs				Cooperation and Plan Coordination
	Promote improvement of strategic seed banks and seeds storage systems at community level				

4.5 Reduce Adverse Impacts of Chemical Fertilizers and Pesticides in Agriculture

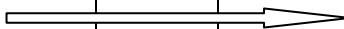
Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Enforce law application and quality controls on chemical fertilizers, herbicides, and pesticides	Enforce the application of the law, and Circulation and other regulations relating to chemical fertilizers and pesticides and their uses from national to the local level				Policy, Chemical and fertilizer ministry, commerce and trade
	Restrict on quality control of chemical fertilizers and pesticides (expired dates, quality and composition)				INM
Enhance capacities and promote awareness-raising amongst suppliers down to users about the impacts of fertilizers/ pesticides/herbicides	Enhance capacities of chemical fertilizers and pesticides distributors, sellers, and farmers on technical utilization and impacts of chemical fertilizers and pesticides				INM
	Conduct public awareness-raising on impacts of chemical fertilizers and pesticides/herbicides				INM

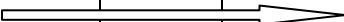
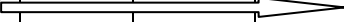
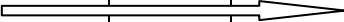
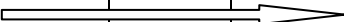

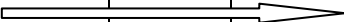
Priority 5. Strengthen effective preparedness and response capacities and the integration of disaster risk reduction and climate change adaptation into agriculture interventions

5.1 Enhance the Capacity of Departments to Conduct Regular Contingency and their Consideration in ongoing Planning and Activities

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Enhance the capacity of departments of MoAFW to be able to provide timely response to emergencies in the agriculture sector	Develop a contingency plan in line with national Emergency, Preparedness, Response Plan (EPRP)				Drought, RFS
	Conduct contingency planning exercises in hazard-prone areas and identify the practices to facilitate preparedness and response				Drought, RFS
Strengthen capacities to integrate DRR into preparedness, response and recovery project	Mainstream DRR and CCA concepts into recovery and rehabilitation projects				All divisions
	Build capacities of selected commune authorities in hazard-prone areas on resilient agriculture technique/combined agriculture techniques				All divisions
	Provide technical support to selected communes to be able to integrate at all times resilient agricultural techniques into their recovery planning				All divisions

5.2 Enhance Preparedness Measures to Improve Effectiveness of Emergency Response Actions

Strategic Actions	Specific Activities	Time frame (in yrs)			Responsibility
		0-2 yrs	2-5yrs	5-10 yrs	
Preserve seeds and fertilizers and pesticides and other agriculture inputs research institutes and stations	Stockpiling of seeds of drought/flood/heat wave/cold wave tolerant varieties of short duration alternate and contingent field, vegetable and fodder/forage crops at research stations for preparedness, real-time response and recovery				Seeds, Oilseeds, NSC NFSM, State Seed Corporations, SAUs , KVKs ICAR crop, fodder and horticultural Institutes

Strategic Actions	Specific activities	Time frame (in yrs)			Responsibility
	Stockpiling of seeds at research stations to cope with climatic extremes				Seeds, Oilseeds Mission NFSM, State Seed Corporations, SAUs KVKs ICAR crop and horticultural Institutes
	Promotion of Custom hiring centres/Farm machinery banks for various agricultural operations , irrigation, processing, value addition				Large scale farm Mechanization including tractorization. Also uberizaion of farm machinery supply Promotion of gender friendly farm mechanization Technical backstopping by ICAR-CIAE, Bhopal and CRIDA
	Stockpiling of pesticides for preparedness, real-time response and large scale application				INM
Promote and strengthen the protocols for an emergency situation in agriculture	Motivate to allocate and maintain an emergency fund for response and recovery in the agriculture sector				Budget, Credit, NIDM , DARE
	Strengthen capacities of an assessment team within departments and promote institutional cooperation, connecting to relevant stakeholders				All divisions
	Strengthen Standard Operating Procedures, protocols, and assessment formats and tools				All divisions

CHAPTER 5

Chapter 5: Inclusive Disaster Risk Reduction

This chapter emphasizes on the importance of Disaster Risk Management in context of the vulnerable groups. It highlights 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. It details out the various programmes and schemes of MoAFW for vulnerable groups and their linkages with disasters.

5.1 Introduction: Importance of Special Focus on more Vulnerable Groups

The Disaster Management Act 2005 (Chapter 11, Para 61) prohibits all forms of discrimination – based on sex, caste, community, descent or religion, etc. – 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 indicates 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 a disaster depends on the social, cultural, economic and political environment they live in. A cycle of deprivation not only increases their vulnerability but gradually alienates them from the decision-making process denying their accessibility to the basic entitlements. Inclusive Disaster Risk Management is about equality of rights and opportunities, the dignity of the individual, acknowledging diversity and assuring resilience for everyone, not leaving aside any community based on age, gender, disability or other discrimination.

5.1.1 Gender-Based Vulnerabilities

Gender refers to the social attributes and opportunities associated with being male and female and the relationships between sexes. These attributes, opportunities and relationships are socially constructed, learned, and changeable over time. Gender- related disadvantages like unequal access to resources, legal protection, decision-making power, reproductive burden and vulnerability to violence, consistently render women more vulnerable than men to the impacts of disasters. Disasters reinforce, perpetuate and increase gender inequality, making 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 constantly disregarded.

Disasters tend to hit the poorest and most marginalized demographics the hardest. Women and girls are particularly exposed to climate-related disaster risk—they are likely to suffer higher rates of mortality, morbidity and economic damage to their livelihoods. Women bring unique experiences and skill that sets to disaster risk reduction, mitigation, preparedness and in

management, although they are often not acknowledged or tapped sufficiently. Increased awareness of the drivers, pressures, stressors and opportunities associated with climate-related disasters is key to finding smart pathways to reduce and manage disasters. By recognizing and promoting the unique capacities of women, community resilience and advance gender equality can be enhanced significantly.

The agriculture sector employs 80% of all economically active women, comprising of 33% agricultural labour force and 48% of self-employed farmers, in the country. National Policy on Farmers 2007 has included “mainstreaming the human and gender dimensions in all farm policies and programmes, as one of the major policy goals.”

Men and women have different roles, responsibilities, limitations and capacities in agriculture-based work and are therefore impacted upon differently in the event of a disaster. Although women make up about 43% of the agricultural labour force in developing countries, due to gender-based discrimination, they generally have less access than men to productive resources, services and employment opportunities, creating a gap between men and women’s productivity. This gender gap in agriculture not only hinders the productivity of women, but it also places them at greater risk to hazards with the result that disasters can exacerbate or entrench existing inequalities between men and women. Moreover, barriers to women’s access to information can also impair their resilience. The work burden for women and girls increases during and after disasters, as they are typically responsible for kitchen work, household chores, securing fuel wood, water and fodder and caring for the sick and injured. Rural women and girls in developing countries are often the most affected by hazards and disasters, due to these gender inequalities.

5.1.2 Sexual and Gender Minorities

It is necessary to address the concerns of persons of various sexual orientations including transgender 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 face, deprives them of many disaster mitigation/response programmes, hampering their ability to overcome the negative effects of a disaster. The prevailing enabling environment, including social, cultural, economic and political systems, often facilitate and institutionalize root causes of inequality, especially gender inequality, challenging inclusivity. The approaches to disaster risk management, however, tend to overlook the needs and place of sexual and gender minorities and also there is no information available for transgender. There is a greater likelihood of addressing the concerns of a marginalized group like transgender in disaster situations when they are specifically accounted for during implementation.

5.1.3 Scheduled Castes and Scheduled Tribes

Scheduled castes and tribes and other socially and economically vulnerable sections of our society are especially vulnerable to the climate change because of their resource location/geographic exposure, like land ownership in riverine flood-prone areas or rainfed drought-prone areas. Their low income and greater reliance for their livelihoods on climate-sensitive sectors, like agriculture, livestock etc further aggravate this situation. Because of their limited adaptive capacity, they find it difficult to cope with the most severe climate-related hazards. The scheduled castes and tribes are recognized in the Indian Constitution as historically disadvantaged section and are listed in the two Schedules of the constitution for affirmative policies and actions. As per 2011 Census, the SC and ST population comprises about 16.6% (20.14 Cr) and 8.6% (10.43 Cr), respectively. Most of the SC and ST communities tend to be living poorly on marginal lands that 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 disaster resilient-infrastructure. It must be ensured that, in post-disaster situations and disaster mitigation planning and implementation activities, full attention shall be provided to ensure the 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. The widespread poverty among the SC/ST community demands greater social protection to them as a response to the various risks and short and long-term shocks and stresses associated with climate change.

With climate change negatively impacting rural livelihoods, a large chunk of the poor communities like SC/ST are forced to migrate to urban areas and migration becomes a favoured “adaptation strategy”. Though migration may be an accumulative strategy and some rural agricultural labourers may in the aftermath of a climate change-induced hazard to use it to shift from the agricultural to non-agricultural sector, most people especially the chronically poor people end up doing casual labour work in urban fringes often in hazardous environments.

5.1.4 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 conducive environment. UNICEF studies indicate that some times, during drought, pregnant women, adolescent and school going children are compelled to work as labourers in agriculture and other sectors for income. Children are vulnerable due to their age

and immature psychosocial understanding of the surrounding. In situations, of emergency, children often face isolation, anxiety, trauma, separation from their families, losing their parent(s), face gender violence, trafficking, etc. Some face the risk of getting recruited as child labourers. During disaster, children's physical integrity is at risk with widespread and/or systematic violence. The children often face apathy leading to severe interruption to their education and recreation, poor access to food and nutrition. In the post-disaster situations, the Anganwadis and schools must open as soon as possible. In case of damage to the structures, temporary/ emergency provisions must be established allowing children's access to 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. Primary Health Centres should also be kept opened and active so that needy/oppressed children do get timely medical/psychological assistance.

5.1.5 Persons with Disability (PWD)

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. Majority of the PWD (69%) live in rural areas, which is near as the share of the rural population. It has been observed that persons with disabilities (PWD) are often overlooked as excluded in risk reduction and disaster response measures. They are also subject to higher risks than others. Neglected throughout the DRM cycle, concerns about their inclusion relate to the 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.

5.1.6 Farm Labours

In India, more than 50% of urban migrants are from rural areas, many a times it is distress migration. Lack of alternate livelihoods and skill development in source areas, locations from where migration originates, are the primary causes of migration from rural areas. Workers migrate seasonally, temporarily, or for a longer period, either within a state or across states. More often, they are vulnerable, exploited and are compelled to work in conditions where their rights are not protected (UNI, 2020). Above this, it causes a shortage of farm labour also in rural areas and there is a large number of migrant workers in the urban areas. Risks from the COVID-19 pandemic have put new challenges in agriculture that is already under threat. The lockdown created both a shortage of labour and equipment - migrant labourers in India usually move to rural areas during harvest, and smallholder farmers often rent harvesting equipment as this is cheaper than purchasing it. This situation which is caused by COVID-19 pandemic is one good opportunity to decongest the urban areas by giving employment or alternative source of income to the migrant workers in their native place. They can be engaged in agriculture and allied activities including alternative employment such as skilled resource persons for various activities as

per local needs, as rural artisans, making of handicraft products with locally available resources etc. However, with need based skill development, capacity building and financial support, they can be engaged in FPOs (Farmers Producer Organizations) programmes, seed and fodder production, secondary agriculture activities, farm mechanization(hiring, repair, maintenance of implements) etc at grass root level. There is a need for policy reform related to agriculture, agribusiness and rural development to hold migrant workers back. There is also a need for improvising and mainstreaming programmes like Skill Development, National Handicraft Development Programmes to focus more on other rural livelihood options like handicraft, handlooms, paintings, pottery, etc.

The following response strategy for the management of shortage of farm labours may be adopted:

- PRI level strategy to availability of farm labours through District administration by involving CSOs, NGOs is recommended.
- Promoting Artificial Intelligence technology to reduce the human drudgery.
- Crop diversification and short duration crops may be considered
- Horticulture crops may be promoted
- Skill development through KVKs, NGOs, SHGs, Cooperative societies, etc. may be encouraged

5.2 Different schemes and programs of MoAFW addressing the vulnerable population

Ministry of Agriculture and Farmers Welfare has been actively engaging the vulnerable groups in their different plans and policies. National Policy on Farmers, 2007 has included “mainstreaming the human and gender dimensions in all farm policies and programmes as one of the major policy goals.” Accordingly, Gender Mainstreaming initiatives are being promoted in the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW), Ministry of Agriculture and Farmers Welfare, by way of building their capacities and improving their access to inputs, technologies and other farming resources. Focus is also being given on formation of women Self Help Groups (SHGs), capacity building interventions, linking them to microcredit, enhancing their access to information and ensuring their representation in decision making bodies at various levels. Division wise schemes and programs, addressing the vulnerable groups and their linkages with DRR have been provided in the subsequent section, as under:

Division	Policies, Schemes, Programs	Mainstreaming DRR with Vulnerable Groups
Horticulture	Mission for Integrated Development of Horticulture	<ul style="list-style-type: none"> • Imparting training for skills development to women farmers/SC/ST for growing horticulture crops and post-harvest management. • Special provisions for persons with disability for skill development • Supporting integrated horticulture development. • Promotion of water-saving technology (Drip, precision farming)
Extension	National Gender Resource Centre in Agriculture	<ul style="list-style-type: none"> • Specific interventions like training on early warning systems for bringing the farm women in the mainstream of disaster-resilient agriculture development. • Allocation of resources and flow of benefits to the woman farmers. • Setting up a gender resource centre in Agriculture • Promotion of drudgery reduction technology for farm women.
	Support to State Extension Programs for Extension Reforms through Agricultural Technology Management Agency (ATMA)-2005	<ul style="list-style-type: none"> • Farmers Training related to disaster management, Demonstrations, Exposure Visits, Kisan Mela, Mobilization of Farmers Groups and Setting up of Farm Schools (30% beneficiaries are women farmers)
	Agri-Clinics & Agri-Business Centres	<ul style="list-style-type: none"> • Supplement the efforts of public extension, support agricultural development and create gainful self-employment opportunities to unemployed youths across employment vulnerable groups with disaster management strategies along with qualification in agriculture and allied sectors. • There is a provision of credit linked back-ended upfront composite subsidy on the bank loan availed by trained candidates under the Scheme. The subsidy is 44% in respect of women, SC/ ST and all categories of candidates from North Eastern and Hill States and 36% in respect of other categories.
	Model Training Courses	<ul style="list-style-type: none"> • Training courses should also focus on different aspects of disaster management for vulnerable groups • Also include gender mainstreaming in agriculture training and planning process
	Kisan Credit Card	<ul style="list-style-type: none"> • Credit availability during different phases of disaster management

Division	Policies, Schemes, Programs	Mainstreaming DRR with Vulnerable Groups
Crops	National Food Security Mission Bringing Green Revolution to Eastern India (BGREI)	While issuing the administrative approval states are advised to allocate the funds for general, Special Component plan (SCP) for Scheduled Castes and Tribal Sub Plan (TSP) for Scheduled Tribes as per their proportion in the state population . Besides, at least 33% of funds will be earmarked for small and marginal farmers . At least 30% of funds under NFSM and 33% under BGREI will be made for women farmers.
Agricultural Marketing	Integrated Scheme for Agricultural Marketing (ISAM)	33.33% subsidy to women farmers under Agricultural Marketing Infrastructure for development of storage structures. These funds can be mobilized for safeguarding establishments of the agriculture sector from the vagaries of disasters like flood, earthquake etc. For example, raising the height of storage infrastructure in flood-affected areas.
Mechanization and Technology	Sub-Mission on Agricultural Mechanization	Increasing the reach of farm mechanization to small and marginal farmers and to the regions where availability of farm power is low. Creating awareness related to disaster management among stakeholders through demonstration and capacity building activities. Promotion of drudgery reduction tools and technique
Seeds	Sub-Mission for Seeds and Planting Material	Financial assistance/ subsidy benefits are equally available/ open to all the farmers including that of women farmers and other vulnerable groups. Flood/drought tolerant seeds can be availed through this scheme. Cooperative Education Programme for women is being implemented by the National Cooperative Union of India (NCUI). A large number of women members are engaged & involved in cooperatives dealing with activities related to Food Grain Processing, Plantation Crops, Oil Seeds Processing, Fisheries, Dairy & Livestock, Spinning Mills, Handloom and Power-loom Weaving, Integrated Cooperative Development Projects, etc.
Cooperation	Cooperative Education Programmes	These programs can be mainstreamed with the DM component
Policy	National Policy for Farmers, 2007	Better access to inputs and services, science and technology, implements, credit and support services like crèches, child care-centers, nutrition, health and training to women famers .

Division	Policies, Schemes, Programs	Mainstreaming DRR with Vulnerable Groups
Agriculture Census	Gender Based data in Agriculture Census	It is highly recommended to include data of persons with disability and transgender in the census to mobilize separate funds for these two sections of our society.
Rainfed Farming System	Rainfed Farming Development Scheme (under National Mission for Sustainable Agriculture)	Guidelines of schemes envisage that at least 50% of the allocation is to be utilized for small, marginal farmers of which at least 30% are women beneficiaries/ farmers. These funds can be mobilized for disaster management activities.
Integrated Nutrient Management	Paramparagat Krishi Vikas Yojana (PKVY), Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), Soil Health Card & Soil Health Management scheme;	30% of budget allocations for women beneficiaries/farmers. Demonstration of appropriate technology in the value- chain of agriculture and allied activity.
Plant Protection	Sub Mission on Plant Protection and Plant Quarantine (SMPPQ)	Capacity building programme of State officials and farmers including vulnerable groups.

CHAPTER 6

Chapter 6: Coherence of Disaster Risk Management Across Resilient Development and Climate Change Action

This chapter gives an overview of the policy framework for disaster management, climate change and sustainable development. It details out the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs) and Paris Agreement on Climate Change and establishes the linkages with these policies through a framework. It shows the Ministry of Agriculture and Farmers Welfare's initiatives contributing to these policy frameworks.

6.1 Introduction

2015 was a landmark year for the United Nations and Global Development Agenda. The convergence of interests and global concerns for sustainable development, disaster risk reduction and climate change led to the formation of a new roadmap for a sustainable and safe world together through the Sendai framework for disaster risk reduction, the 2030 agenda for sustainable development and the Paris Climate Agreement. These agreements of global significance provide opportunities to build coherence across different but overlapping policy areas.

6.1.1 Sendai Framework for Disaster Risk Reduction

The Sendai Framework for DRR (SFDRR) was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the successor instrument of HFA 2005-2015 and is based on elements which ensure continuity with the work done by States & other stakeholders under HFA. It is a non-binding voluntary agreement for 15 years which recognizes the responsibility of States for DRR & the shared responsibility with local government, private sector and other stakeholders. SFDRR improves upon HFA by identifying the gaps, lessons learned and future challenges. Key features of SFDRR are:

- Shifting focus from disaster management to disaster risk management by recognizing the underlying drivers of risk.
- For the first time, one global goal and outcome is defined.
- 7 global targets are defined to support the assessment of global progress in achieving the outcome and goal of the present Framework.
- The Framework emphasizes the need for strengthening the disaster risk governance by placing governments at the centre of the disaster risk reduction matrix.
- A wider scope of DRR, focussing on both natural & man-made hazards and related environmental, technological and biological hazards and risks, is covered.

- A set of guiding principles are provided for the implementation of the Framework.
- Learning from the experience gained by the implementation of HFA and to achieve the expected outcome & goal, the Framework prioritise the actions into four key areas.
- Along with social vulnerability, great emphasis is given to environmental aspects by strongly recognizing the need for implementation of integrated environmental and natural resource management techniques for disaster risk reduction.
- DRR is identified as a multi-sectoral policy which also includes health and education.

India is a signatory to SFDRR and is attempting to comply with it on a voluntary basis. The country is making efforts to achieve global targets by making advancement in the entire disaster management cycle as envisaged in the Sendai Framework and by adopting internationally accepted best practices. The National Disaster Management Plan of India (NDMP), 2016, incorporates the approach articulated in the Sendai Framework to achieve a substantial reduction in disaster risk and losses in lives, livelihoods, and health and the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NDMP is aligned with the goal and priorities of SFDRR.

6.1.2 Sustainable Development Goals

The UN Summit in September 2015 on Post-2015 Development Agenda formally adopted the 'Transforming Our World: The 2030 Agenda for Sustainable Development'. It includes 17 global sustainable development goals with 169 targets. 193 UN Member States have endorsed the SDGs at the 70th Session of UN General Assembly. The 3 focus areas of SDGs are: i) Poverty eradication, ii) Safeguard the planet from degradation while ensuring that economic, social and technological advancement occurs in harmony with nature; and (iii) Encouraging global peace and inclusive societies.

DRR, CCA & Resilience cut across different aspects and sectors of development. 25 targets of the new SDG Framework are directly or indirectly related to DRR in 10 of the 17 SDGs. The agenda identifies and asserts the immediate needs to reduce climate and disaster risk & emphasizes resilience building of communities and nations to achieve the SDGs. Explicit references for DRR, CCA and resilience can be observed in goals and targets especially related to poverty, hunger, healthy lives, building resilient infrastructure, education, sustainable management of water, climate change, resilient cities and marine & terrestrial ecosystem. These references show that the new SDG framework is a further step towards DRR and it largely rectifies the drawback of previous development framework i.e. the Millennium Development Goals (MDG) framework which overlooked the importance of CCA and DRR to reduce the impacts of disasters on societies and economies.

Table 15. DRR-CCA targets in SDGs and Sendai Framework

Sustainable Development Goals	Related DRR or CCA target	How Sendai Framework will help to achieve the goal/target-
Goal 1: End poverty in all its forms everywhere	Target 1.5	<i>"To achieve this goal and target, Sendai Framework proposes for the promotion and development of social safety nets linked with livelihood enhancement programmes to ensure the resilience of household and communities to disasters."</i>
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.4	<i>"To achieve this goal and target in the context of Sendai Framework, relevant actions including strengthening productive assets such as livestock, working animals, tools and seeds are required."</i>
Goal 3: Ensure healthy lives and promote well-being for all at all ages	Target 3.d	<i>"This target, in particular, is complemented by the outcome of Sendai Framework which has placed a strong emphasis on the resilience of health systems and integration of disaster risk reduction into health care provision at all levels."</i>
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.7 and Target 4.a	<i>"To progress these target actions, implementation needs to consider promoting disaster risk knowledge at all levels including in professional education and training as recommended by the Sendai Framework."</i>
Goal 6: Ensure availability and sustainable management of Water and Sanitation for all.	Target 6.3, 6.4, 6.5, 6.6, 6.a and 6.b	<i>"Target 6.6 indirectly provides an opportunity to mainstream ecosystem-based approaches for disaster risk reduction and further highlight their value as a 'win-win' and 'no regrets' solution to the increasing disaster and climate risks underlined in the Sendai Framework."</i>
Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.1 and Target 9.a	<i>"To progress these targets and goal, the Sendai Framework recommends strengthening disaster resilient public and private investments through structural, non-structural and functional disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and other physical infrastructure."</i>
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.1, 11.3, 11.4, 11.5, 11.b, 11.c	<i>"Measures to achieve these targets and goal, as outlined in the Sendai Framework, require mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes."</i>
Goal 13: Take urgent action to combat climate change and its impacts	Target 13.1, 13.2, 13.3, 13.a and	<i>"In order to achieve these targets and the overall goal, the Sendai Framework recommends to strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems; promote the conduct</i>

Sustainable Development Goals	Related DRR or CCA target	How Sendai Framework will help to achieve the goal/target-
	13.b	<i>of comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios; and maintain and strengthen in situ and remotely sensed earth and climate observation.”</i>
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.2	<i>“The Sendai Framework explicitly seeks to account for the environmental damages caused by disasters – in many cases damages are attributable to the removal of disaster waste and to impacts associated with recovery and reconstructions planning that have by-passed existing environmental legislation.”</i>
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.1,15.2, 15.3, 15.4 and 15.9	<i>“These targets are also in line with the Sendai Framework’s focus on building environmental resilience through the inclusion of ecosystems in risk analysis and planning. As per marine ecosystems, the Sendai Framework proposes similar priority actions for their terrestrial equivalents - mountains, rivers, coastal flood plain areas, drylands and wetlands, among others.”</i>

(Source: Compiled from Transforming Our World: the 2030 Agenda for Sustainable Development, 2015 & Disaster Risk Reduction & Resilience in the 2030 Agenda for Sustainable Development, 2015)

6.1.3 Paris Climate Agreement and Disaster Resilience

The Paris Agreement on Climate Change was adopted at the UN Climate Change Conference (COP21) held in December 2015. The agreement was adopted by 195 countries and called for a commitment to work together to safeguard the planet, promote sustainable human development and build a more resilient and equitable world for all. In Paris, the member countries agreed to:

- Hold the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C.
- The agreement is the first ever goal for global adaptation. Building on The Cancun Adaptation Framework 2010, which is based on DRR, this agreement considers enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.

- *Enhance understanding, action and support concerning loss and damage associated with the adverse effects of climate change with a focus on early warning systems and emergency preparedness, comprehensive risk assessment and management and risk insurance facilities, climate risk pooling and other insurance solutions.*¹

Paris Agreement is legally binding to all the parties unless specifically excluded. It contains all greenhouse gas emissions from all sectors and human activities, sources and sinks. The agreement will bring about a process of maintaining a balance between mitigation and adaptation. In future approaches to climate adaptation, the loss and damage caused by disasters will be better incorporated to accomplish the goal of climate resilience. The preamble of agreement mentions the adoption of Sendai Framework for Disaster Risk Reduction. There is a synergy in the language of agreement and goals of SFDRR to reduce risks and disaster losses. The role of sustainable development to reduce the loss and damage associated with climate change impacts, including extreme events and slow onset events is given great importance. National ratification by governments and implementation of national climate action plans are the steps towards implementing the Paris Agreement.

6.1.4 United Nations Convention to Combat Desertification (UNCCD)

The United Nations Convention to Combat Desertification (UNCCD) is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. There is a new UNCCD 2018-2030 Strategic Framework which is the most comprehensive global commitment which aims to achieve Land Degradation Neutrality (LDN) to restore the productivity of vast expanses of degraded land, improve the livelihoods of more than 1.3 billion people, and reduce the impacts of drought on vulnerable populations to build a future that avoids, minimizes, and reverses desertification/land degradation and mitigates the effects of drought in affected areas at all levels to achieve a land degradation-neutral world consistent with the 2030 Agenda for Sustainable Development.

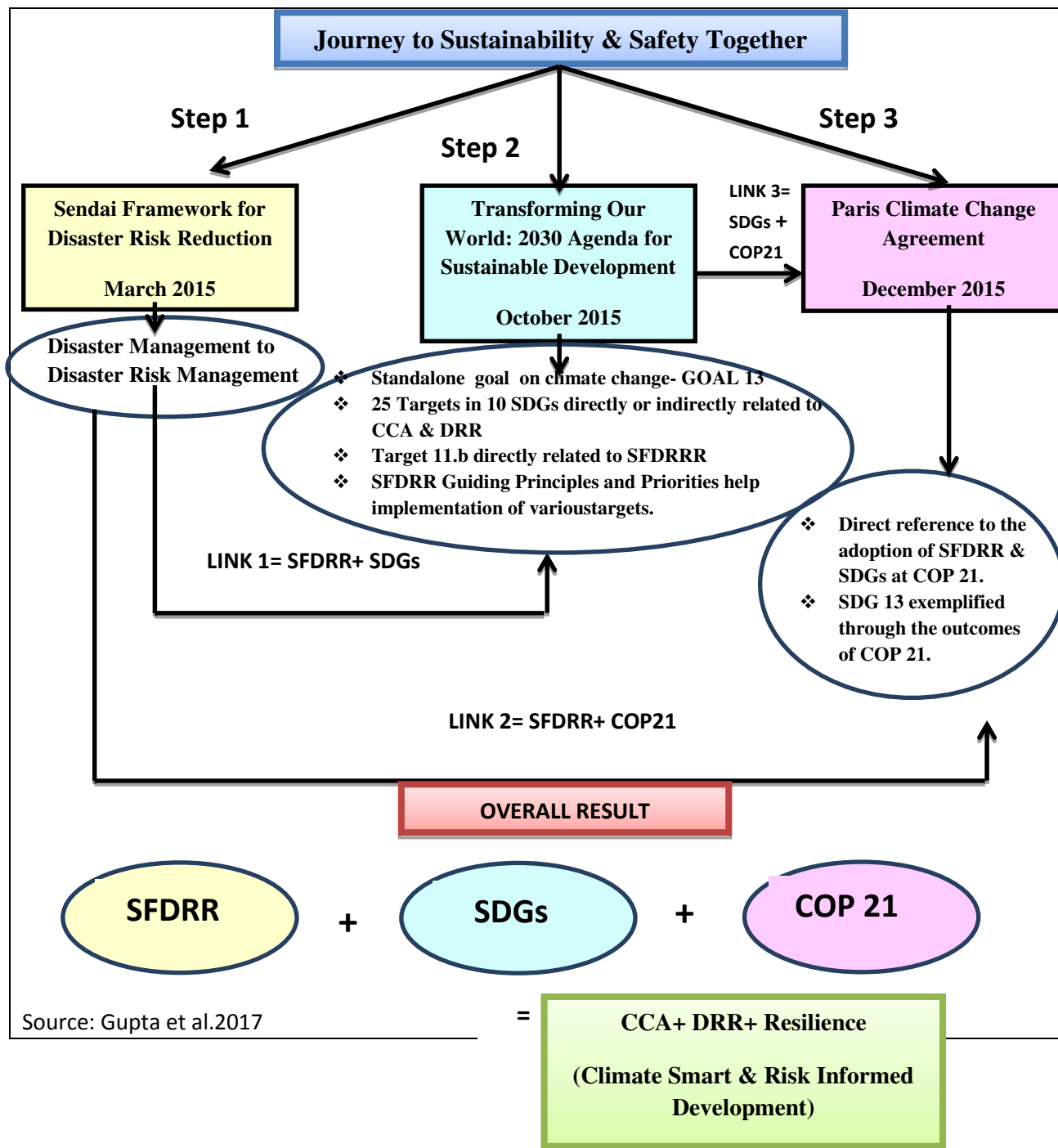
India is a signatory to the United Nations Convention for Combating Desertification (UNCCD). The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal Ministry of Government of India (GoI) that oversees the implementation of the Convention in the country. India is the current President of COP14 and will serve for 2 years. As with previous COP sessions, a high-level segment is in progress to raise political momentum for the negotiations and boost the engagement of stakeholders in the Convention's implementation.

¹ <http://www.usicomos.org/wp-content/uploads/2016/03/Sendai-Framework-and-Cultural-Heritage-UNISDR.pdf>. Accessed 17 June 2016

6.2 Synergizing SDGs, Paris Climate Agreement, Sendai Framework and UNCCD

6.2.1 The framework

There is a growing global consensus that disaster risk reduction, climate change adaptation and sustainable development are linked to each other. Many shreds of evidences of linkages between the three agendas are observed while studying the Sendai Framework for Disaster Risk Reduction 2015-2030, Sustainable Development Goals 2030, the Paris Climate Agreement 2015 and UNCCD. All of them share a common aim of making the development sustainable. Commitment to the goals and their implementation must become a global priority. To ensure the achievement of SDGs, it is very important to consider current and future challenges caused by disasters and climate change.



6.2.2 Ministry of Agriculture and Farmers Welfare Initiatives Relevant for DRR Across the Three Global Frameworks

Sendai Framework target	Sustainable Development Goals	COP 21-Paris agreement on Climate Change	Ministry's Initiatives Relevant to DRR
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 are crucial for eliminating poverty and reducing economic losses from disasters 	<p>Agri Clinics and Agri-Business Centre (ACABC) Scheme</p> <p>Sub Mission on Agriculture Mechanization (Two-component – One Central Sector and other Centrally Sponsored)</p> <p>Pradhan Mantri Krishi Sinchai Yojana</p> <p>Mission for Integrated Development of Horticulture</p>
Substantially reduce the number of disaster affected people by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 11, 13	Stresses the need for accelerated action to build resilience through risk-sensitive planning and implementation of DRR	
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>Support to States for Extension Reforms ATMA Scheme (two components – one for Farmers and other for Functionaries)</p> <p>Sub-Mission on Seeds and Planting Material</p>
Substantially reduce damage to critical infrastructure and disruption of basic services (health,	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	<p>Crop Insurance Schemes</p> <p>National Mission on Oilseeds &</p>

Sendai Framework target	Sustainable Development Goals	COP 21-Paris agreement on Climate Change	Ministry's Initiatives Relevant to DRR
education, etc.)		the global temperature goal	Oil Palm (NMOOP)
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	Integrated Scheme on Agriculture Cooperation National Food Security Mission (NFSM)
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 achieving the COP21 goals	Krishi Unnati Yojana (KUY)-MOVCDNER NMSA-Rainfed Area Development DARE/ICAR- Flagship
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	programme of National Innovations in Climate Resilient Agriculture Interest Subsidy for Short term Credit to farmers e-NAM

CHAPTER 7

Chapter 7: Capacity Development and Communication

This chapter gives an overview of capacity development activities for Disaster Risk Reduction (DRR). It entails the capacity building themes for disaster management, role of NIDM in capacity building on disaster risk reduction. The chapter identifies the capacity gaps and details out the capacity building strategy.

7.1 Capacity Development

Capacity development covers the strengthening of institutions, mechanisms, and capabilities at all levels of all stakeholders. The United Nations International Strategy for Disaster Reduction (UNISDR) defines 'Capacity Development' for DRR as “the process by which people, organizations and society systematically stimulate and develop their capability over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions – within a wider social and cultural enabling environment” (UNISDR, 2009).

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

Investing in capacity development for DRR will be a continuing process to enhance the capability of individuals, agencies, and communities to improve their performance in DM activities. 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 their ownership and commitment. The sustainability of capacity development initiatives increases in direct relation to the level of participation and ownership of the partners. For capacity development for disaster risk reduction to be effective, it must be clear in its purpose.

As capacity development entails activities on various levels, i.e. legal and institutional frameworks, systems of organizations, organization and human and material resources, it is necessary to address challenges by implementing a mix of short-term and long-term activities. Changes at one level often require changes at other levels too, as the levels are interdependent.

Thus, the focus of many capacity development efforts for DRR must go beyond only human resource development and pay enough attention to organizational and institutional issues. Public and private investment in disaster risk prevention and reduction through structural and nonstructural measures are essential to enhance the resilience to disasters. Investing in capacity development is a cost-effective way to save lives, prevent or reduce losses and ensure effective recovery and rehabilitation.

7.1.1 Capacity Development Themes

The capacity development covers all aspects of disaster management. The key aspects and broad thematic areas for capacity development, applicable to these dimensions of DM, are summarized in Table 16. The effort will be to follow the emerging best practices.

Table 16: Summary of Broad Capacity Development Themes

Capacity Development Themes	
Key Aspect	Thematic Areas
Prevention or Mitigation for Disaster risk Reduction	<ul style="list-style-type: none"> • Hazards, Risk, Vulnerability Capacity Assessment • Human resource development • Institutional strengthening • Launching demonstration projects • Safety education in educational institutions • Improve the awareness and preparedness of stakeholders at all levels • Documenting lessons from previous disasters and ensuring their wide dissemination • Preparing DM plans, regular updating, and mock drills • Institutional arrangements, policies, legal support, and regulatory framework • Developing appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions • Strengthening early warning systems • Mainstreaming of disaster risk assessment, mapping and management into development plans and program

Capacity Development Themes	
Key Aspect	Thematic Areas
	<ul style="list-style-type: none"> • Revision of building codes and standards for rehabilitation • Reconstruction practices both for urban and rural areas • Retrofitting techniques • Rapid visual surveys for safety evaluation of buildings • Training and skill development for masons and other artisans • Reinforce systems to implement, monitor, and enforce regulations for DRR • Promote a disaster-resistant built environment • Promoting community-based DM taking into account specific needs, regional diversities and multi-hazard vulnerabilities • Design and implement social safety-net mechanisms, including community-based systems • Disaster resilience of health care systems by integrating disaster risk management into primary, secondary and tertiary health care • Business resilience, and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices • Preparedness and response plans at all levels Community-based DRR and DM
Effective Preparedness and Response	<ul style="list-style-type: none"> • Emergency response capabilities – EOCs, infrastructure, equipment upgrades and adoption of best available technologies • Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization • Comprehensive revamping of Fire and Emergency Services with institutional reforms and modernization • Adoption and adaptation of emerging global good practices • Rigorous training and HRD of first responders • Early warnings, maps/ satellite data/ effective dissemination of information • Table-top exercises, simulations, and mock drills to improve the operational readiness of the plans • Rescue equipment at all levels • Systems to provide basic services in emergencies • Housing and Temporary shelters • Medical care for casualties, health care and sanitation • Power and fuel supply management • Transportation systems and network • Logistics and supply chain management • Media relations • Collection and management of data • Legal services/ support

Capacity Development Themes	
Key Aspect	Thematic Areas
Recovery and Build Back Better	<ul style="list-style-type: none"> • Post-Disaster Need Assessment systems and expertise • Credible damage assessment mechanisms and expertise • Planning capabilities to ensuring coherence of Build Back Better 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

7.1.2 Role of National Institute of Disaster Management (NIDM) and other Institutions

The NIDM, in partnership with other research institutions, has capacity development as one of its major responsibilities, along with training, research, documentation and development of a National-level information base. It networks with other knowledge-based institutions and functions within the broad policies and guidelines laid down by the NDMA. The NIDM will strive to emerge as a **‘Centre of Excellence’** in the field of Disaster Management. The NIDM will play an important role in developing and facilitating the implementation of a National training schedule for DM. It will also be the nodal institution for Regional and International cooperation for training. There are a several renowned institutes in various States, which are imparting training in DM. The capacity of existing institutes needs to be upgraded under regional and local requirements.

7.1.3 Capacity Gaps

Frequent disasters and the coping capacities have identified the gaps in the existing process and systems of various departments of the MoAFW. Increasing intensities of climate-induced disasters and related impacts of climatic variability pose additional challenges to development and overall well being of communities. Looking into the capacity gaps, a systematic approach towards long term capacity building across governance levels and stakeholder groups is required. The specific objectives for Training Need Assessment(TNA)are:-

- Identification of stakeholders of DRR & CCA with their respective roles in policy and planning, supervisory/middle and operational level;
- Identification of key issues related to disaster risks and climate change in the State, its vulnerability to such events/changes;

- Analysis of the institutional set up for DM within the State - the roles and functions of stakeholders at various levels and look at the required competencies for each (as per the Disaster Management Act 2005);
- Identification of specific areas/themes for learning identified by practitioners/ stakeholders;
- Identification of gaps in terms of knowledge, skills and aptitude, and need of key sectors for DRR and CCA (required as per the Disaster Management Act 2005) and for effective implementation of the State Action Plan on Climate Change, especially the CCA aspects;
- Mapping and review of currently available training/learning opportunities for DRM practitioners as well as those in identified sectors/Departments, within the State and outside;
- Identification and review of agencies, institutions, collaborations and networks for developing contextualized DRR/CCA learning tools/modules; and
- Provision of recommendations on how to address the capacity gaps (human, financial and others) that will inform the preparation of a Capacity Development Plan for DRR and CCA in the State.










Common training components across all Departments of MOAFW

- Awareness and sensitization program on DRR & CCA issues
- Awareness on National/International policies of Govt. of India on DRR and CCA
- Development of Departmental Plan for DRR and CCA and SOPs
- Training on HRVC analysis in respect to climate change adaptation and Disaster Risk Reduction.
- Mainstreaming development schemes/projects in the DRR and CCA Plan as well as streamlining the plans at all levels
- In ongoing/ existing training programs, 1-2 sessions should be kept specifically for DRR/ CCA
- Development of tools for Monitoring, Assessing and Evaluating implementation of DRR/ CCA Plan

7.1.4 Capacity Need

NIDM along with ICAR and allied sector institutes proposes to set up **AgrisCap (Agriculture Sector Resilience Capacity Building Programme)** under the Ministry of Agriculture and Farmers Welfare to cater to the need of agriculture and allied sectors. The proposed institute will develop sub-national level training modules including modules on diverse agriculture production systems zones, institutes, state officials etc. The programme will also conduct training and orientation programme for top-level state officials and stakeholders.

Table 17: Time frame for capacity building framework

Activity	Time-frame										Responsible Agency
Particular	0-2 years			2-5 years			5-10 years				
1. Detailing Training Programme											Drought management division of MoAFW/NIDM
2. Detailing Research Programme											Every concerned division of MoAFW (DARE/ICAR)
3. Research facility Grant (coordination)											MoAFW (DARE/ICAR) NIDM can be associated
4. Quantification/assessment of professional capacities in DRM											MoAFW
5. Training/education . policy, contents development, modules, ToT											NIDM/MoAFW
6. Strengthening Agriculture DRM component under each division of ministry											MoAFW
7. Allocation of grant / positions on Agriculture DRM											As per the need assessment
8. Allocation of grant on Agriculture DRM in ICSSR fellowship											ICSSR, NITI Aayog
9. Grant for											MoEF&CC

Activity	Time-frame											Responsible Agency
Particular	0-2 years			2-5 years			5-10 years					
Agriculture DRM under climate Research												MoAFW NABARD
10. Establish Coordination Centre for Risk Assessment, Early Warning & Communication												MoST with MoEFCC, CSIR, ICAR, IMD, NIH, etc.
11. Institutionalizing DM system and safety audit in different division of the Ministry												MoAFW
12. Establishing Chairs for specialized studies at NIDM, IIMs/IITs on Mainstreaming (MoRD), EcoDRR (MoEFCC, MoAFW), Structural Mitigation												MoAFW& NIDM

Based on the analysis of information obtained through the rapid Training Need Assessment it was found that very few departments know the climate change impacts, disaster risks and their linkages to planning and implementation of programmes in their respective sectors. The current knowledge will not be sufficient to mitigate the impacts and risks of climate change and resulting disasters. During the TNA workshop, key gaps concerning knowledge, skills and awareness were identified. The major recommended strategy for capacity development of stakeholders to deal with climate change is training and awareness generation at all levels, within various divisions /departments. The training modules, packages and strategies need to be specifically designed for different levels viz. policymakers, senior management, middle management, field-level implementation personnel, etc. Moreover, the specific focus needs to be given to cross-sectoral and inter-departmental linkages and coordination to truly and effectively mitigate the impacts and risks of climate change and resulting disasters.

Based on the gaps identified and the listing of training requirements by the participants, a suggestive listing of topics for capacity building strategy for DRR and CCA has been outlined as follows:

Table 18: List of topics for capacity building for various departments of MoAFW

Division	Capacity Building Need	Priority
M & T Division	Safeguarding the human resources/asset during the flood, earthquake, etc.	High
Crops Division	Weather alarming for flood, tsunami, cyclone and dry spell	High
Horticulture Division	Drought management	High
	Pest management	High
	Persistent Organic Pollutants (POP) for crops to control climatic effects	High
Plant Protection Division	Locust control operations	High
	New Pests Incursion	High
	Regulatory Practices	High
	Integrated Pest Management	High
NRM Division	Climate resilient agriculture	High
	10 deliverable point (Integrated farming system)	High
	Agro-forestry	High
	National Bamboo Mission	High
Extension Division	Types of disaster, hazards and their management	Medium
	Basic knowledge on climate change impacts and Disaster Risk Reduction	Medium
	Programmes/Initiatives/Approaches related to DRR and CCA	Medium
	Developing and managing a disaster risk management plan to deliver department's responsibility in these areas.	Medium
Seeds Division	Seeds logistic management under emergency situation	High
	Various aspect of climate change	High
	Cultivation of drought and flood tolerant varieties	High
	Identification of seed varieties to meet the emergency situation	High
	Disaster management plan on seed sector	High

Division	Capacity Building Need	Priority
RLBCAU (DARE Institute)	Managing the standing crops during heavy inundation by river waters with high intensity water currents and soil erosion	High
	Managing the livestock and health hazards of people during and after flood	High
	Ground water recharge and water balance	High
	Taking crops during summer seasons under water stress conditions	High
NBPGR (DARE)	Protecting the National Gene Banks	High
	National Genomic Resources Repository and GM detection Lab	High
	National Herbarium of Cultivated Plants (NHCP) has 23,000 herbarium specimens of >4200 species of plants (1500 genera and 266 families)	High
	DNA sequencing and DNA fingerprinting Labs	High
	Diseases and pests detection/testing Labs and quarantine facilities	High
CAU (DARE Institute)	Conservation Agriculture	High
	Integrated farming system	High
	Water Harvesting and soil conservation practices	High
	Biodiversity conservation	High
	Agro forestry management	High
RLBCAU (DARE Institute)	CCA and DRR	High
	Risk Management	Medium
	Programme and policies on DRM	Medium
	NADMP Functionality	High
	Capacity Development of NADMP	High

7.1.5 Capacity Development - Ministries and States

The Central Ministries, Departments and Agencies as well as the State Governments will take actions for capacity development of different stakeholders as shown in Table 19 given below on the basis of capacity development needs assessment.

Table 19: Capacity development activities - Centre and State

S.No.	Task	Central	State	Activities
1	Deploying good resources, advanced technology and equipment	Gol, MHA, All Nodal Min./ Dept.	SDMA, CoR, Revenue Dept., all Nodal Dept./ All Line Depts.	<ul style="list-style-type: none"> Identifying existing practices/mechanism Identification of gap between existing practices/mechanism and those required based on hazard risk and vulnerability and lessons learnt from recent past disasters Procurements of additional equipment with advanced technologies
2	Resource Network	MHA, NIC & NIDM	State Govt., SDMA, CoR, Revenue Dept. & DDMA	<ul style="list-style-type: none"> Maintaining the resource network Monitoring and maintaining the resource data Regular updating the resource data
3	Communication	MHA, DoT, DST & NIC	State Govt., SDMA, CoR, Revenue Dept. & DDMA	<ul style="list-style-type: none"> Developing fail-safe communications with advance technology
4	National Disaster Information System	NIDM, MHA, DoT, various Min., Dept., DST & NIC	State Govt., SDMA, CoR, Revenue Dept. & DDMA	<ul style="list-style-type: none"> Interface with the National Emergency Communication Network (NECN) and HRVCA Facilitate access to Central Ministries/ Dept./ States and other authorized users Examine integration of national HRVA database with the IDRN for effective

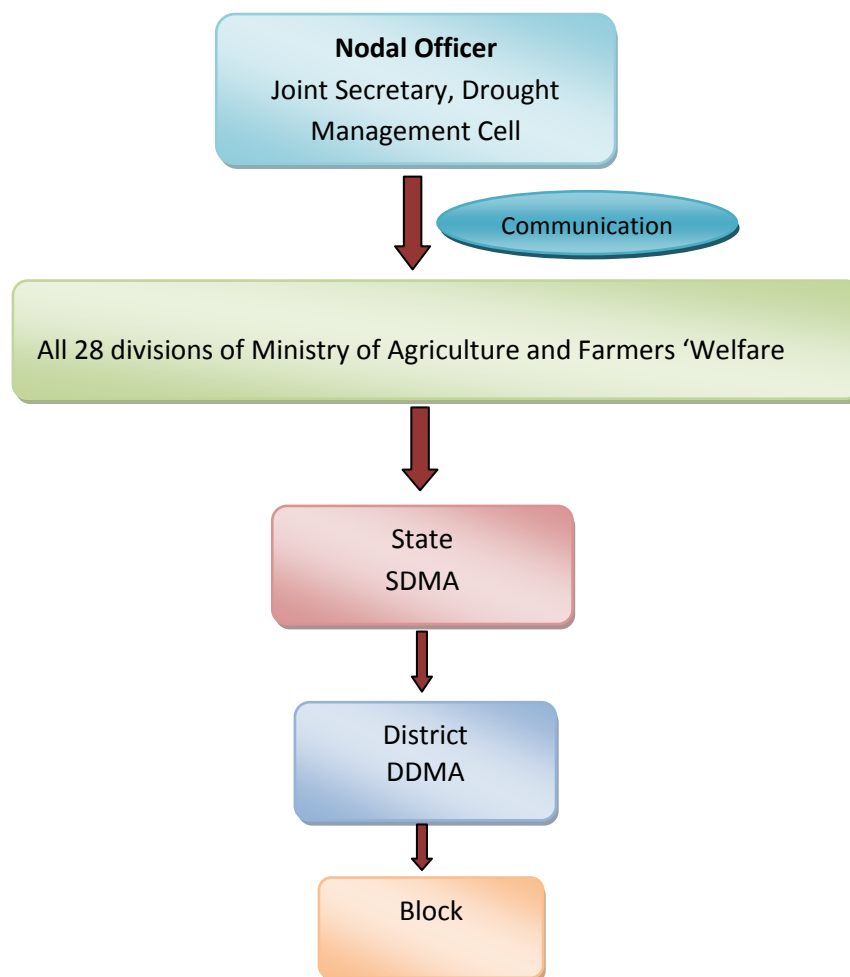
S.No.	Task	Central	State	Activities
				resource management
5	Early Warning	IMD, CWC, GSI, INCOIS, MoD, DRDO, MoAFW, IIRS, NRSC & ISRO	State/ UT and nodal Dept. of the States, Panchayats & ULBs	<ul style="list-style-type: none"> Improve the last mile Connectivity Up-grade technical infrastructure and systems
6	Strengthening training institutes for disaster management	NIDM, MoHRD, MHA & IITs/ IIMs	State/ UT & State ATIs	<ul style="list-style-type: none"> Research and extension of support grants Create/ strengthen state-level DM institutes
7	Strengthening of Emergency Operation Centres	MHA	State Govt., SDM & CoR	<ul style="list-style-type: none"> Review functioning Improve capabilities based on experience after each disaster event Deploy best of ICT Conduct capacity audits of EOCs Set up State and District level EOCs with adequate trained manpower Regular reviews and improvement of SOPs, protocols, etc. Mobile control rooms
8	Strengthening of Fire and Emergency Services	MHA & MoEFCC	State/UT, SDMA, CoR, Revenue Dept., and ULBs	<ul style="list-style-type: none"> Revamping with institutional reforms, modernization, and changes in legal framework
9	Mainstreaming of DM into local governance	MHA, Nodal Min./ Dept. & all Ministries	State Govt., SDMA, CoR, Revenue Dept., all Nodal Dept./ All Line Dept	<ul style="list-style-type: none"> Conduct training and workshops on incorporating DM plans into local Governance
10	Strengthening Community skills	MHA, NDRF & Nodal Min.	SDMA, CoR, Revenue Dept. & all Nodal Dept.	<ul style="list-style-type: none"> Training on CBDR and preparedness at local levels Address gender issues, and special needs of children, differently-abled, aged, etc. holistically in the DM context

S.No.	Task	Central	State	Activities
				<ul style="list-style-type: none"> Promote private sector and civil society involvement Promote PPPs
11	Use of media for disaster management	MHA, Min. I&B, IIMC & Nodal Min./ Dept.	SDMA, CoR, Revenue Dept., & all Nodal Dept.	<ul style="list-style-type: none"> Training and Workshops
12	Human Resource Development	MHA, MoHRD, NIDM, DoPT & Nodal Min./Dept.	SDMA, CoR, Revenue Dept. & all Nodal Dept.	<ul style="list-style-type: none"> Organize relevant training programs & refresher courses
13	To enhance DM and DRR capacities at local levels	MHA & NIDM	SDMA & SIDM	<ul style="list-style-type: none"> Conduct training in disaster management at the district level
14	Developing the technical capacities and professional disciplines	NIDM, MoST, MoEF, MoHRD & ICAR/ IITS/IIMs	SDMA & SIDM	<ul style="list-style-type: none"> Technical and professional programs relevant to various specialized aspects of DM Develop ToTs Research in key areas of DM
15	Promoting disaster management education and research	NIDM, MoHRD, MoST, MoEF, MoHFW, UGC, NCERT, CBSE, ICSE, AICTE, and other relevant agencies/ boards	SDMA & State Ed. Boards	<ul style="list-style-type: none"> Incorporate subjects of relevance to DM in the curriculum Introduce specialized programs, degrees, courses and diplomas Promote relevant research projects, programs within institutes through research grants
16	Sensitization and education for political leaders	ICAR, NIDM, NIRD, NDRF, MoUD & MoRD	SDMA, SIDM, ATI, SIRD & SDRF	<ul style="list-style-type: none"> Educate political leadership and elected representatives on risk-sensitive planning, disaster prevention, and mitigation

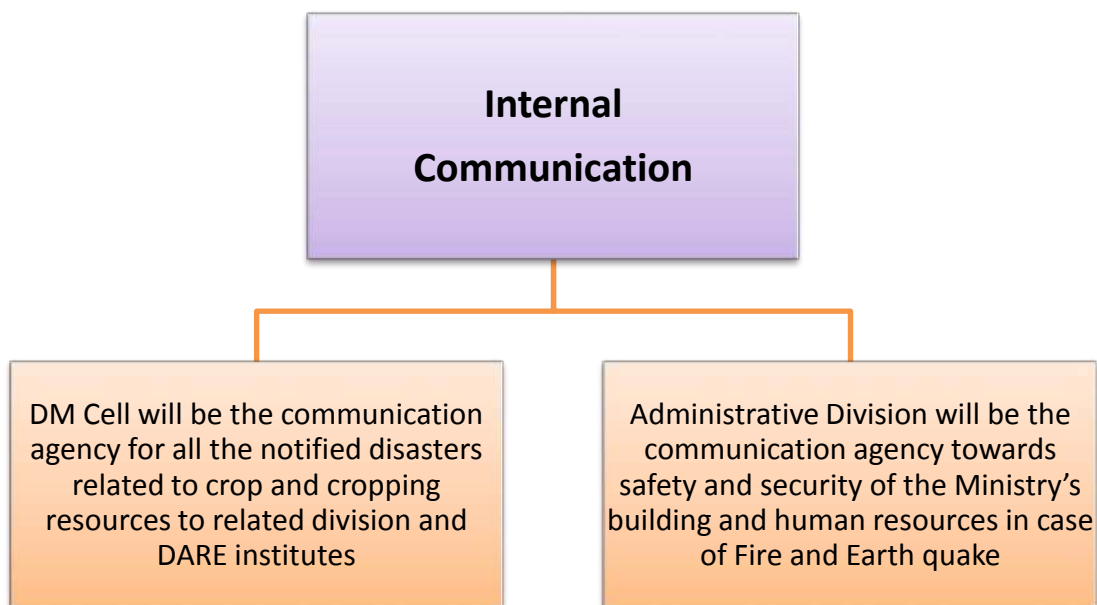
7.2 Communication Strategy

Communication strategy is an important and critical aspect of achieving the best possible response rates. A well-designed communication strategy gives a positive effect on response rate. Communication plays a very important role in plan implementation and management of disasters. During various phases of disaster, both internal and external communication with stakeholders is important to understand.

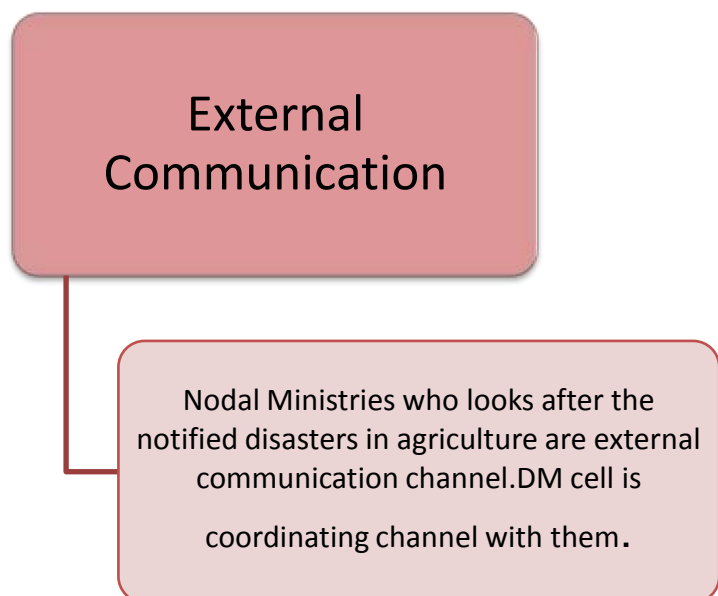
7.2.1 Communication Channel



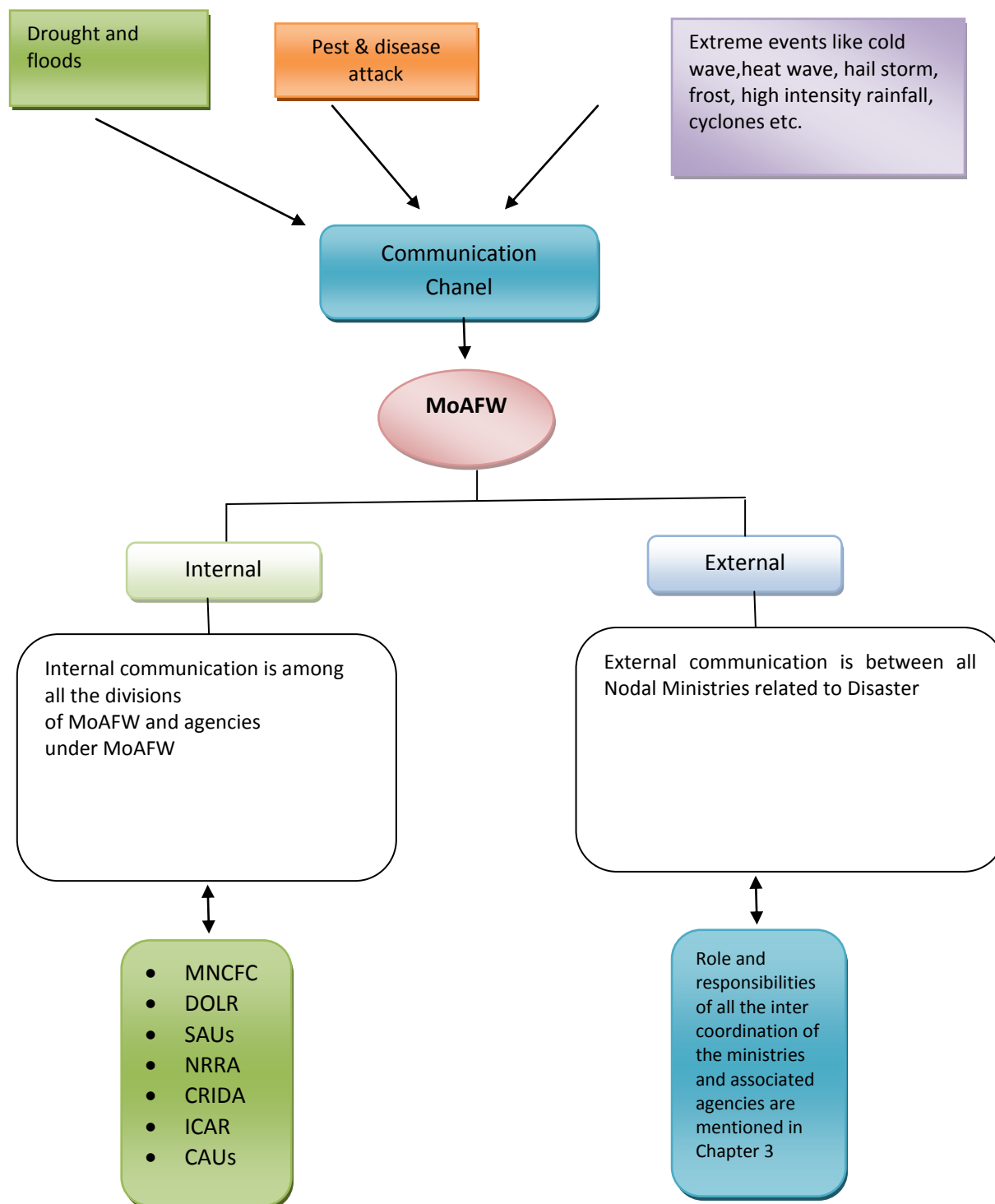
7.2.2 Internal Communication



7.2.3 External Communication



The communication strategy flowchart below shows the internal and external stakeholders for notified disasters



7.3 Scenario Based Mock Drills

Mock drills and training must be organized to test stakeholder's readiness to deploy within the shortest possible time following the activation of disaster response. They shall be conducted in a manner like that of the drills carried out by the fire-fighting department or army units. These drills must be held at the pre-designated locations of 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 NADMP and to increase their operational efficiencies. The training is 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 drills will also provide an opportunity to practice SOPs.

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 NADMP. 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.

All the concerned stakeholders may ensure their preparedness for response to safeguard buildings and infrastructure of the ministry from any disaster and must carry out regular mock drills to test their readiness. The frequency of mock drills should be repeated every 6 months and the status in this regard must be reported to the NDMA.

CHAPTER 8

Chapter 8: Coordination – Horizontal and vertical linkages

Managing disaster risk and building resilience requires the involvement of multiple agencies at different levels of governance, right from the local government, PRIs and communities to the state and central ministries, departments and agencies. This chapter presents the institutional framework along with the role and responsibilities of the concerned departments to deal with the various disasters.

8.1 Introduction

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. Managing disaster risk and building resilience requires the involvement of multiple agencies at different levels right from the local administrative bodies and communities to the top central ministries, departments and agencies. Different agencies must carry out not only their own responsibilities, but also work in a synergized manner 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 national - the relevant authorities must institutionalize programmes and activities at the ministry/department levels and increase inter-ministerial and inter-agency coordination and networking. They must also rationalize and strengthen the existing regulatory framework and infrastructure.

8.2 Inter-agency coordination

8.2.1 Cyclone

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MHA & MOES Providing coordination, technical inputs, and support	DMD, SDMA, RD & DDMA Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	NGOs, Panchayats & ULBs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Response	MHA Organising and coordinating central assistance	DMD, SDMA, RD & DDMA Organising and coordinating the immediate response Coordinating with central agencies	Panchayats, ULBs & NGOs Coordinating with central and state agencies
Warnings, Information, Data	MOES , 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 Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban;	Panchayats, ULBs & NGOs Last mile connectivity, Regular updates to people in areas at risk
Non-structural measures	MHA, NDMA & BIS 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 Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Panchayats, ULBs & NGOs Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

8.2.2 Flood risk management/high intensity rainfall

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	Ministry of Jal Shakti Providing coordination, technical inputs, and support	DMD, SDMA, RD, IRD & DDMA Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MHA Organising and coordinating central assistance	DMD, SDMA, RD, IRD & DDMA Organising and coordinating the	Panchayats, ULBs & NGOs Coordinating with central and state agencies

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
		immediate response Coordinating with central agencies	
Warnings, Information, Data	MJS, 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 Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Panchayats, ULBs & NGOs Last mile connectivity, Regular updates to people in areas at risk
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 Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Panchayats, ULBs & NGOs Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

8.2.3 Earthquake/Seismic Risk Reduction

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MOES Providing coordination, technical inputs, and support	DMD, SDMA, RD, IRD & DDMA Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MHA Organising and coordinating central assistance	DMD, SDMA, RD, IRD & DDMA Organising and coordinating the immediate response Coordinating with central agencies	Panchayats, ULBs & NGOs Coordinating with central and state agencies

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Non-structural measures	MOES, MHA, BIS, NDMAMHA, BIS & NDMA Coordination among central and state agencies for a) revised/ updated rules, norms b) adopt new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD, SDMA, RD & DDMA Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Panchayats, ULBs & NGOs Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

8.2.4 Landslides

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MoM & MoD Providing coordination, technical inputs, and support	DMD, SDMA, RD, IRD & DDMA Preparation and implementation of DM plans and ensuring the functioning of agencies with DM tasks	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MHA Organising and coordinating central assistance	DMD, SDMA, RD, IRD & DDMA Organising and coordinating the immediate response Coordinating with central agencies	Panchayats, ULBs, & NGOs Coordinating with central and state agencies
Warnings, Information, Data	GSI, SASE, MOES (IMD), MoM, BRO & 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 Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Panchayats, ULBs & NGOs Last mile connectivity, Regular updates to people in areas at risk

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Non-structural measures	<p>GSI, MHA, BIS, MoD, BRO & NDMA</p> <p>Coordination among central and state agencies for a) revised/ updated rules, norms b) adopt of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies</p>	<p>DMD, SDMA, RD & DDMA</p> <p>Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring</p>	<p>Panchayats, ULBs & NGOs</p> <p>Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring</p>

8.2.5 Drought Risk Mitigation

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	<p>MoAFW</p> <p>Providing coordination, technical inputs, and support</p>	<p>DMD, SDMA, RD, IRD & DDMA</p> <p>Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks</p>	<p>Panchayats, ULBs & NGOs</p> <p>All aspects of disaster risk management and mainstreaming DRR</p> <p>Ensuring coherence and mutual reinforcement of DRR, CCA and development</p>
Response	<p>MoAFW</p> <p>Organising and coordinating central assistance</p>	<p>DMD, SDMA, RD, IRD & DDMA</p> <p>Organising and coordinating the immediate response</p> <p>Coordinate with central agencies</p>	<p>Panchayats, ULBs & NGOs</p> <p>Coordinating with central and state agencies</p>
Warnings, Information, Data	<p>MoAFW, MOES, MJS, DOS, MOST, MEITY & NDMA</p> <p>Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data</p>	<p>SDMC, DMD, SDMA, RD, AGD, IRD, WRD & DDMA</p> <p>Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk</p>	<p>Panchayats, ULBs & NGOs</p> <p>Last mile connectivity, Regular updates to people in areas at risk</p>

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Non-structural measures	MoAFW, MJS, MOES, MHA, BIS & NDMA Coordination among central and state agencies for a) revised/ updated rules, norms b) adopt of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD, SDMA, RD & DDMA Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Panchayats, ULBs & NGOs Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

8.2.6 Cold Wave, Frost Risk Reduction, Hailstorm

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MOES, MIB, DOT, MPWR, MHA, MoAFW, MHA, NEC & NDMA Providing coordination, technical inputs, and support	DMD, SDMA, RD, IRD & DDMA Preparation and implementation of DM plans and ensuring the functioning of agencies with DM tasks	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MOES, MIB, DOT, MPWR, MHA, MoAFW, MHA, NEC & NDMA Organising and coordinating central assistance	DMD, SDMA, RD, IRD & DDMA Organising and coordinating the immediate response Coordinating with central agencies	Panchayats, ULBs & NGOs Coordinating with central and state agencies
Warnings, Information, Data	MOES, MIB, DOT, MPWR, MHA, MoAFW, MHA, NEC & NDMA Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	SDMC, DMD, SDMA, RD, AGD, IRD, WRD & 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	Panchayats, ULBs & NGOs Last mile connectivity, Regular updates to people in areas at risk

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Non-structural measures	MOES, MIB, DOT, MPWR, MHA, MoAFW, MHA, NEC & NDMA Coordination among central and state agencies for a) revised/ updated rules, norms b) adopt of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD, SDMA, RD & DDMA Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring	Panchayats, ULBs & NGOs Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

8.2.7 Heat Wave Risk Reduction

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MHFW, NDMA, MHUA, & MRD 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	DMD, SDMA, RD, DRD, UDD, DWSD, ED, PD, EFD, AHD, HD, WCD & DDMA Ensuring that the local administration (city/district) 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 Coordinating with IMD regarding forecasts, early warning and alert system based on drought severity	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MHUA, MORD, MOWR, MoRTH, MHRD, MoPR, MoLE, MoP & MHFW Directives/ Advisory on	DMD, SDMA, RD, DRD, UDD, DWSD, ED, PD, FED, AHD, HD, WCD, PRD & DDMA Organising and coordinating	Panchayats, ULBs & NGOs Coordinating with central and state agencies

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
	shelters, creating awareness, managing resources, organizing medical support & strengthening hospital preparedness	the immediate response Coordinating with central agencies Implementing heat action plan	
Warnings, Information, Data	MOES & MHFW Issue Heat wave alerts and weather forecasts on Short / Medium / Long range duration Public awareness and community outreach	DMD, SDMA, RD, DRD, UDD, DWSD, ED, PD, EFD, AHD, HD, WCD & PRD Coordinating the dissemination of warnings to all, to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Panchayats, ULBs & NGOs Follow the alerts/warning “Do's-and-Don't's” during a heat wave should be available in local languages and disseminated through media.

8.2.8 Pest Attack

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MoAFW, MHA, MOES, MOEFCC & NDMA Preparing guidelines Technical inputs for implementation based on experience from different locations Collaboration with NGOs/CSOs	DMD, SDMA, RD, DRD & DDMA Implementation as per specific conditions in the state Team mobilization and coordination - officials and agencies Involving local administration	Panchayat, ULB, NGOs & Private companies Coordinating with the state MOES (IMD) office regarding forecasts, early warning and alert system based on colour codes corresponding to different thresholds Developing a clearly defined interagency emergency response plan with roles and information flows clearly marked out
Response	MoAFW, MHA, MOEFCC & NDMA Strengthening of integrated surveillance systems based on epidemiological surveys; detection and investigation	DMD, SDMA, RD, DRD & DDMA	Panchayat, ULB, NGOs & Private companies

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Information, Data	MOEFCC & NDMA	DDMA Follow the alerts/warning	Private companies Follow the alerts/warning
	Public awareness and community outreach Documentation Collecting Data from States	Dissemination of warnings to all, to the last mile – remote, rural or urban	“Do's-and-Dont's” should be available in local languages and widely disseminated Regular updates to people in areas at risk

8.2.9 Fire Risk Reduction

Area of intervention	Inter-agency coordination and responsibilities		
	Centre	State	Other stakeholders
Overall disaster governance	MHA, NDMA, MOES, MoD, DOS & MHUA Providing coordination, technical inputs, and support	DMD, SDMA, RD, IRD & DDMA Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	Panchayats, ULBs & NGOs All aspects of disaster risk management and mainstreaming DRR Ensuring coherence and mutual reinforcement of DRR, CCA and development
Response	MHA, NDMA, MOES, MoD, DOS & MHUA Organising and coordinating central assistance Strengthening Incident Response System involving multiple agencies	DMD, SDMA, RD, IRD & DDMA Organising and coordinating the immediate response Coordinate with central agencies	Panchayats, ULBs & NGOs Coordinate with central and state agencies
Warnings, Information, Data	MHA, NDMA, MOES, MoD, DOS & MHUA Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	SDMC, DMD, SDMA, RD, AGD, IRD, WRD & DDMA Coordinating the dissemination of warnings to all, to the last mile – remote, rural or urban; Regular updates to people in areas at risk	Panchayats, ULBs & NGOs Last mile connectivity, Regular updates to people in areas at risk

8.3 Division wise Roles and Responsibilities

Pre Disaster (PD), During Disaster (DD) and Post Disaster (POD)

S.No	Divisions	Roles and Responsibilities
1	Administration	<ul style="list-style-type: none"> • Providing coordination, technical inputs and support (POD)
2	Credit	<ul style="list-style-type: none"> • Provide credit and financing products relevant to the drought-prone areas (PD and POD) • Promote agricultural insurance programmes, and ensure that farmers are informed about the availability of insurance products (PD) • Promote use of insurance/risk transfer (PD)
3	Crops	<ul style="list-style-type: none"> • Technical inputs on better crop management including inputs supply chain (PD and POD)
4	Drought Management	<ul style="list-style-type: none"> • Monitoring key drought indices at National and State levels as per Manual for Drought Management, 2016. (PD) • Provide technical assistance to the State Govt./SDMC to prepare vulnerability maps(PD) • Provide advisory to the states having large areas that may face drought/ acute water deficit(PD)
5	Economic Administration	<ul style="list-style-type: none"> • Systematic data management of data on disaster damage and loss assessments(POD)
6	Extension	<ul style="list-style-type: none"> • Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques(PD)
7	Mechanization and Technology (MTS)	<ul style="list-style-type: none"> • Creating awareness among stakeholders through demonstration and capacity building activities (PD) • Protecting environment from air pollution and preventing loss of nutrients and soil micro-organisms caused by burning of crop residue (PD)
8	Natural Resource Management (NRM)	<ul style="list-style-type: none"> • Technical support for water conservation structures, integrated water re sources management infrastructure needs (surface and ground water) (PD) • Ensure rainwater harvesting and storage in the social housing schemes in drought- prone-areas(PD)
9	Rainfed Farming System (RFS)	<ul style="list-style-type: none"> • Technical support for water conservation structures, integrated water resources management infrastructure needs (surface and ground water) (PD) • Ensure rainwater harvesting and storage in the social housing schemes in drought- prone areas(PD)
10	Rashtriya Krishi Vikas Yojana(RKVY)	<ul style="list-style-type: none"> • Promote agricultural insurance programmes, and ensure that farmers are informed about the availability of insurance products (PD)

S.No	Divisions	Roles and Responsibilities
11	DARE (ICAR)	<ul style="list-style-type: none"> • Preparation of sub-district level risk and vulnerability assessment of agriculture to climate change (PD) • Promote research scaling out of climate resilient technologies from NICRA and other sources(PD, POD) • Ensure availability of qualified and experienced trainers conversant with climatic stresses adaptation and mitigation (PD) • Focus on research in climate resilient agriculture and strengthening on-going NICRA programme (PD) • DARE(CAUs) to be involved appropriately in the above programmes(PD, DD, POD)

CHAPTER 9

Chapter 9: Preparedness and Response

This chapter mentions about the preparedness and response measures for various disasters. It details out the standard operating procedures (SoPs), including specific tasks, responsibilities and timeframe for preparedness and response for dealing with the various disasters.

9.1 Preparedness

Preparedness is the process of turning awareness of the natural hazards and risks faced by a community into actions that improve its capability to respond to and recover from disasters. Disaster preparedness has been defined as “the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof”. India is one of the severest disaster-prone countries of the world. The country is prone to disasters due to the number of factors; both natural and human-induced, including adverse geo-climatic conditions, topographic features, environmental degradation, population growth, urbanization, industrialization, non-scientific development practices etc. The factors either in original or by accelerating the intensity and frequency of disasters are responsible for the heavy toll of human lives and disrupting the life support system in the country. The Ministry of Agriculture and Farmers Welfare (MoAFW) may review their “state of readiness” and prepare a “strategic action plan” to deal with possible disaster situations. Some of the key functions the MoAFW is expected to strengthen the resilience of agriculture and the farming community. The level of preparedness of each of the department was analyzed on 5 parameters viz., governance, risk knowledge, early warning system, emergency response plans and disaster recovery plans. The MoAFW has fairly good response mechanisms for four disasters namely, flood, drought, pest attack and hailstorms but remaining disasters, as identified under HRVCA, need to be given due consideration.

Table 20: Responsibilities of Center/State and Departments for Preparedness and Response

Preparedness and Response				
S.No.	Emergency Function	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
1	Communication	<p>Lead Agencies: MCOM, DOT & MoAFW</p> <p>Support Agencies: MOD, Telecom Providers & MOES</p>	<ul style="list-style-type: none"> Detailed plans for fail-safe communication with all the early warning agencies (such as IMD, CWC, MOAFW, 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 VHFsets, portable mobile towers, etc Contingency plans including pre-disaster contracts with suppliers – government and private– for easy availability of resources at the time of emergency Operational plan for establishing temporary telecommunication facilities in the affected areas jointly with the State Government Secure, fail-safe 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> <p>Support Agencies: State/UT, SDMA, RD, DMD\$, SEOC, DDMA & all other relevant Depts.</p> <ul style="list-style-type: none"> Fail-safe 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 the 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				
S.No.	Emergency Function	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
			<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 an emergency basis Ensure Inter-Operability among different telecom service providers
2	Data Collection and Management	Lead Agencies: MHA, NDMA & MoAFW Support Agencies: NIDM, MOIB, MOST, MOES, MOJS, MOEFCC, ministries/depts. with hazard- specific responsibilities	<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 	Lead Agencies: DMD Support Agencies: State/UT, RD, SEOC, SDMA, DDMA, Bureau of Economics and Statistics & all other relevant Depts.
				<ul style="list-style-type: none"> Representative of SDMA works with the planning section at state level for making of Incident Action Plan (IAP) and dissemination of information. Creation of a cell at the District level (preferably as part of DEOC) and place dedicated resources to collect/ update data on all essential services (as per the template given in the IRS guidelines) which will help during the response phase for effective reporting and compilation.

<i>Preparedness and Response</i>				
S.No.	Emergency Function	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
3	Disposal of Animal Carcasses	Lead Agencies: MoAFW & MAHDF Supporting Agencies: MHA	<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. • If necessary, assist the state government to contain any public health challenges beyond the capabilities of the state administration 	Lead Agencies: AHD Support Agencies: State/UT, SDMA, RD, DMD\$, 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
4	Early Warning, Maps, Satellite Data, Information Dissemination	Lead Agency MoAFW & MOES Support Agencies: Ministries and agencies as described in the relevant NDMA guideline	<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 	Lead Agencies: DMD\$ Support Agencies: State/UT, SDMA, RD, SEOC, DDMA, all other relevant Depts. <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 • Ensure appropriate compilation/ analysis of received data • Use of satellite imageries and other scientific methods for risk assessment and forecasting

Preparedness and Response				
S. No.	Emergency Function*	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
5	Evacuation of People and Animals	<p>Lead Agency: MHA</p> <p>Support Agencies: MOD, CAPF, MRTH, MOR, MOCI, ministries/depts. with hazard-specific responsibilities, NDRF, CDEF</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><u>Special Situations:</u></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 a 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 	<p>Lead Agencies: DMD\$</p> <p>Support Agencies: State/UT, SDMA, SDRF, RD, SEOC, F&ES, DDMA, CDEF, all other relevant Depts</p> <ul style="list-style-type: none"> 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, air crash, high speed boats and ships to be provided to the affected state government Coordinate with central agencies to mobilize 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 Undertake review and revise DMPs and SOPs after each major incident

Preparedness and Response				
SN	Emergency Function*	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
				<ul style="list-style-type: none"> • 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
6	Fodder for Livestock in Scarcity-hit Areas	<p>Lead Agency:</p> <p>MoAFW & MAHDF</p> <p>Support Agencies:</p> <p>MIRTH & MOR</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 	<p>Lead Agency:</p> <p>AHD</p> <p>Support Agencies:</p> <p>State/UT, SDMA, RD, DMID, SEOC, DDMA, EFD, AGD & Animal Welfare Organizations</p> <ul style="list-style-type: none"> • Mobilize fodder and cattle feed to meet shortages, as in drought, flood, cyclone or scarcity conditions • Transport fodder from storage facilities or collection centre to the scarcity-hit areas • Organize fodder resource and mobilization centres • Organize collection centre for fodder and cattle feed • Enlist PSUs and private agencies for providing fodder and other support

Preparedness and Response				
SN	Emergency Function	Central/ State Ministries/ Departments and their Responsibilities		
		Centre	Responsibility – Centre	State
7	Livestock and Other Animals: Veterinary Care, Rehabilitation and Ensuring Safety	<p>Lead Agency: MAHDF & MoAFW</p> <p>Support Agencies: MRTH & MOR</p>	<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 	<p>Lead Agency: AHD</p> <p>Support Agencies: State/UT, SDMA, RD, DMD\$, SEOC, DDMA, EFD, AGD, Animal Welfare Organizations</p> <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 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
8	Search and Rescue of People and Animals	<p>Lead Agencies: MHA, NDRF</p> <p>Support Agencies: MOD, CAPF, MHFW, MHA, MRTH, MOCI, MOR, ministries/departments with hazard-specific responsibilities, CDEF</p>	<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) SOPs for sending rescue/ relief material from other adjoining States to the affected state immediately 	<p>Lead Agencies: DMD\$</p> <p>Support Agencies: State/UT, SDMA, RD, SEOC, SDRF, F&ES, DDMA, CDEF, all other relevant Depts.</p> <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

9.2 Early Warning/ Alert System

9.2.1 Central Agencies Designated for Natural Hazard-Specific Early Warnings

Table 21: Central Agencies Designated for Natural Hazard-Specific Early Warnings

SN	Hazard	Ministry	Agency
1.	Cold Wave	MOES	India Meteorological Department (IMD)
2.	Cyclone	MOES	India Meteorological Department (IMD) Regional Specialized Meteorological Centre (RSMC) Tropical Cyclone Warning Centres (TCWC) for different regions
3.	Drought	MoAFW	Central Drought Relief Commissioner (CDRC) and Crop Weather Watch Group (CWWG)
4.	Earthquake	MOES	National Centre for Seismology (NCS)
5.	Floods/ High Intensity Rainfall	MOJS	Central Water Commission (CWC)
6.	Heat Wave	MOES	India Meteorological Department (IMD)
7.	Landslides	MOM	Geological Survey of India (GSI)
8.	Tsunami	MOES	India National Centre for Oceanic Information Services (INCOIS)
9.	Pest Attack	MoAFW	ICAR

The GOI has designated specific agencies 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 an 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 will conduct imulation 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.

9.2.2 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 the State Government. The NRDF will always be in operational readiness.

9.3 Hazard Specific Response Plans

9.3.1 Fire

9.3.1.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	Fire alarm		
Assess and notify	Informing every division of the Ministry.	MOAFW / NIDM	Immediately
Activate control room	After getting the information, quickly rush to the scene of emergency/disaster.	NIDM / MOAFW	Immediately
Establish command	Check for supply of power and then cut power supply of incident area as and when required.		As required
	Assess type of fire and start fire fighting operation.		Immediately
prioritize actions	Deploy personnel, equipment and supplies during fire fighting operations as per requirement.	Concerned department	As required
	Procure personnel, equipment and supplies from private agencies as required.		As required
	In case of hazardous material mishap, equip the fire fighting teams with Personal Protective Equipment.		As required

Categories	Specific tasks	Agency/person responsible	Response time
Search and rescue	Carry out necessary evacuation in and around incident area.		Immediately
	Safe guard the adjacent property/ population from fire by confining the fire spread.		Immediately
	Search and rescue injured/ trapped/ buried persons and casualties.		Immediately
	Cordon off affected area.		Immediately
	Clear traffic for emergency service vehicles.		As required
	Assist in carrying out necessary evacuation, search and rescue operations in and around incident area.		As required
	Ensure debris clearance on roads in its jurisdiction for unhindered passage of emergency service vehicles.		Immediately
Establish relief operations	Provide necessary health and ambulance services to the affected people.		Immediately
	Assist Health Department in providing necessary health services to affected people.		Immediately
Assessment of situation dynamics to readjust action plan			

9.3.2 Cold Wave/ Frost

Occurrences of extremely low temperature in association with incursion of dry cold winds from the north into the subcontinent are known as cold waves. The northern parts of India, especially the hilly regions and the adjoining plains, are influenced by transient disturbances in the mid-latitude westerlies which often have weak frontal characteristics. Cold wave/frost is a localized seasonal phenomenon prevalent in the country except in Southern India. A cold wave or frost condition is a rapid fall in temperature within a 24-hour period requiring substantially increased protection to agriculture and other activities. As Cold Wave/Frost is a localized disaster event, location-specific mitigation plans should be drawn by the concerned State Government.

9.3.2.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Early warning	Inform divisions through advance weather forecast.	IMD, MNCFC & MoAFW	As required
Raise alert	Weather forecasting and agro-met advisory.	MoAFW IMD & MNCFC	Immediately
Prioritise actions	Initiate location specific measures as outlined in District Crop Contingency Plans	State Department	As required
	Disseminate agro-advisories regularly for different crops different stages of crops.	ICAR / KVKs	As required
Assess damage and notify	Informing every division of the Ministry.	MoAFW	Immediately
Assessment of situation dynamics to readjust action plan			

9.3.3 Heatwave

Extreme positive departures from the normal maximum temperature result in a heatwave during the summer season. Climate change is causing an increase in extreme weather events as well as the severity and frequency of natural disasters such as extreme heat waves. Heatwave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the pre-monsoon (April to June) summer season. Heatwaves typically occur between March to June, and in some rare cases even extend till July affecting economic activities such as agriculture & livestock including agricultural workforce. Thus, Kharif crops are more impacted than Rabi crops. Within Kharif, particularly rice production is significantly affected with a decreased yield which is a matter of concern as rice is a staple diet in many States experiencing heatwave impacts.

9.3.3.1 ActionPoints

Categories	Specific tasks	Agency/person responsible	Response time
Early warning	Inform divisions through advance weather forecast.	IMD, MNCFC & MoAFW	As required
Raise alert	Weather forecast and agro-met advisories.	MoAFW, IMD & MNCFC	Immediately

Categories	Specific tasks	Agency/person responsible	Response time
Prioritise actions	Initiate location specific measures as outlined in District Crop Contingency Plans.		As required
	Disseminate agro-advisories regularly for different crops/ for different stages of crops.		As required
Assess damage and notify	Informing every division of the Ministry.		Immediately
Establish Relief operations	Provide necessary health and vet services.		Immediately
	Assist Health Department in providing necessary health services to affected farm labours. Assist Animal Husbandry Dept in providing necessary vet services to affected livestock.		Immediately
Assessment of situation dynamics to readjust action plan			

9.3.4 Cyclone

Cyclones are atmospheric disturbances and are formed around a low-pressure area. It is distinguished by swift and often destructive air circulation. The cyclones cause severe damage to the infrastructure. Installations, dwellings, communication system etc. get destroyed resulting in loss of life and property. The continuous rains cause floods resulting in loss of shelter. Also, heavy rains due to cyclone cause landslides, soil erosion and weakening of the embankments. An abnormal rise in sea level near the coast due to severe tropical cyclone results in the drowning of low-lying areas in the coastal region. It results in loss of lives, destruction of vegetation and the salt content in seawater reduces the soil fertility.

9.3.4.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	Cyclone warning and forecasting.	IMD / NDMA	Immediately
Assess and notify	Informing every division of the Ministry.	MOAWF / State	Immediately

Categories	Specific tasks	Agency/person responsible	Response time
Activate control room	After getting the information, quickly rush to the scene of emergency/disaster.	NIDM / MOAWF	As required
	Check for supply of power and then cut power supply of incident area as and when required.		As required
Establish command	For quick action for management.		Immediately
Prioritise actions	Deploy personnel, equipment and supplies during rescue operations as per requirement.		As required
	Procure personnel, equipment and supplies from private agencies as required.		As required
	In case of hazardous material mishap, equip the rescuers with Personal Protective Equipments.		As required
Search and rescue	Carry out necessary evacuation in and around incident area.		Immediately
	Search and rescue injured/ trapped/ buried persons and casualties.		Immediately
	Cordon off affected area.		Immediately
	Clear traffic for emergency service vehicles.		As required
	Assist in carrying out necessary evacuation, search and rescue operations in and around incident area.		As required
	Ensure debris clearance on roads in its jurisdiction for unhindered passage of emergency service vehicles.		Immediately
Establish Relief operations	Provide necessary health and ambulance services to the affected people.		Immediately
	Assist Health Department in providing necessary health services to affected people.		Immediately
Assessment of situation dynamics to read just action plan			

9.3.5 Pest Attack

Early warning and surveillance is key to successful control activities for desert locust, involving routine surveys in likely outbreak areas. Some of the measures for protection from pest attacks are as follows:

9.3.5.1 Cultural Practices

Cultural methods of pest control consist of regular farm operations in such a way which either destroys the pests or prevents them from causing economic loss. The various cultural practices are as under:

- a. Preparation of nurseries or main fields free from pest infestation by removing plant debris, trimming of bunds, treating of soil and deep summer ploughing which kills various stages of pests.
- b. Testing of soil for nutrients deficiencies based on which fertilizers should be applied.
- c. Selection of clean and certified seeds and treating seeds with fungicide or bio-pesticides before sowing for seed-borne disease control.
- d. Selection of seeds of relatively pest resistant / tolerant varieties which play a significant role in pest suppression.
- e. Adjustment of time of sowing and harvesting to escape peak season of pest attack.
- f. Rotation of crops with non-host crops. It helps in the reduction of incidence of soil-borne diseases.
- g. Proper plant spacing which makes plants healthier and less susceptible to pests.
- h. Optimum use of fertilizer. Use of farm yard manure and bio-fertilizers should be encouraged.
- i. Proper water management as the high moisture in the soil for a prolonged period is conducive for the development of pests, especially soil-borne diseases.
- j. Proper weed management. It is well-known fact that most of the weeds besides competing with the crop for micronutrients also harbour many pests.
- k. Setting up of yellow pan sticky traps for whiteflies and aphids at far above canopy height.

- l. Synchronized sowing. Here community approach is required to sow the crops simultaneously in the vast area so that pest may not get different staged crops suitable for its population to build-up and if pest appears in damaging proportion, the controlled operation could be applied effectively in the entire area.
- m. Growing trap crops on the borders or peripheries of fields. There are certain crops which are preferred more by a pest species are known as trap crops for that pest. By growing such crops on the border of the fields, pest population are made to develop there which can be either killed by using pesticides or its natural enemies are allowed to develop there for natural control.
- n. Inter-cropping or multiple cropping wherever possible. All the crops are not preferred by each pest species and certain crops act as repellents, thus keeping the pest species away from preferred crops resulting in reduction of pest incidence.
- o. Harvesting as close as to ground level. This is because certain developmental stages of insect pests/diseases remain on the plant parts which act as primary inoculum for the next crop season. Hence, harvesting crops at ground level will lessen the incidence of pests in the next season.
- p. Before planting, nursery plants are sprayed / dipped in copper fungicide/ biopesticide solutions to protect the plants from soil-borne diseases.
- q. While pruning fruit trees, remove crowded / dead / broken / diseased branches and destroy them. Do not pile them in the orchards which may act as a source of pest infestation.
- r. Large pruning wounds should be covered with Bordeaux paste / paint to protect the plants from pest / disease attack.
- s. Keeping beehives or placing flower bouquets of pollinizer to cultivars facilitate better pollination and subsequent fruit set.
- t. Selection of high yielding varieties for different crops.
- u. Selection of comparatively pest resistant / tolerant crops.

9.3.5.2 Mechanical Practices

- a. Removal and destruction of egg masses, larvae, pupae and adults of insect pests and diseased parts of plants wherever possible.

- b. Installation of bamboo cage cum bird perchers in the field and placing parasitized egg masses inside them for the conservation of natural enemies and withholding of pest species wherever possible.
- c. Use of light traps and destruction of trapped insects.
- d. Use of rope for dislodging leaf-feeding larvae e.g. caseworm and leaf folders.
- e. Installation of bird scarer in the field where required.
- f. Installation of bird perchers in the field for allowing birds to sit and feed on insects and their immature stages viz., eggs, larvae and pupae.
- g. Use of pheromones for mating disruption and kill zone creation.
- h. Use of pheromone traps for monitoring and suppression of pest population.
- i. Use of pheromone traps for mass trapping.

9.3.5.3 Regulatory Practices

In this process regulatory rules framed by Govt. are brought into force under which seeds and infested plant materials are not allowed to enter the country or from one part to other parts of the country. These are known as quarantine methods and are of 2 types i.e. domestic and foreign quarantine.

9.3.5.4 Biological Practices

Biological control of insect pests and diseases through biological means is the most important component of Integrated Pest Management. In a broader sense, bio-control is the use of living organisms to control unwanted living organisms (pests). In other words, deliberate use of parasitoids, predators and pathogens to maintain pest population at level below those causing economic loss either by introducing a new bio-agent into the environment of pest or by increasing effectiveness of those already present in the field.

9.3.5.5 Parasitoids

These are the organisms which lay eggs in or on the bodies of their hosts and complete their life cycles on host bodies as a result of which hosts die. A parasitoid may be of different type depending on the host developmental stage in or on which it completes its life cycle. For example, egg, larval, pupal, adult, egg-larval and larval pupal parasitoids. Example are different species of *Trichogramma*, *Apanteles*, *Bracon*, *Chelonus*, *Brachemeria*, *Pseudogonotopus* etc.

9.3.5.6 Predators

These are free-living organisms which prey upon other organisms for their food. Examples are different species of spiders, dragonflies, damselflies, ladybird beetles, Chrysopa species, birds etc.

9.3.5.7 Bio-Pesticides

These are micro-organisms which infest and cause diseases in their hosts as a result of which hosts are killed. Major groups of pathogens are fungi, viruses and bacteria. Some nematodes also cause diseases in some insect pests. Important examples of fungi are different species of Hirsutella, Beauveria, Nomurae and Metarhizium which have been reported to infest and kill large number of insects (upto 90%) in the fields. Among viruses, most important examples are of nuclear polyhedrosis virus (NPV) and granulosis viruses. Outbreak of viruses in armyworms, cut worms, leaf folders, hairy caterpillars and plant hoppers have been reported many times. Among bacteria, Bacillus thuringiensis (B.t.) and B. popillae are very common examples.

Diseases of pests can be mass multiplied in the laboratory at a low cost in liquid or powdered formulations that can be sprayed like ordinary chemical pesticides. These formulations are known as bio-pesticides. The different types of bio-control practices are grouped as under:-

Introduction

In this process, a new species of bio-agent is introduced into a locality for its establishment against its host. This is done only after thorough laboratory examination and field trials for its efficacy.

Augmentation

In this process, the population of natural enemies already present in the area is increased by releasing either laboratory-reared or field-collected bio-agents of same species in such number as would require to suppress the pest population in that area.

Conservation

This is most important component of biological control and plays a major role in pest suppression. In this process, natural enemies present in nature are protected from being killed. The different practices required to protect the natural enemies are as below:

- Collection of parasitised egg masses and placing them in bamboo cage-cum-bird perchers for allowing the emergence of parasitoids and withholding of pest larvae.

- Educating farmers through field days, radios & TV to differentiate pests and defenders and sparing the defenders during field sprays
- Chemical spray should be adopted as last resort and that too after observing pest defender ratio.
- Use of broad-spectrum pesticides should be avoided.
- Only selective and Relatively Environmental Friendly (REF) pesticides should be used wherever necessary.
- As far as possible strip or spot application of pesticides, be carried out.
- Adjustment of time of sowing and harvesting to avoid the peak season of pest attack.
- Growing trap crop on the borders of main fields before the actual sowing of the crop to trap pest and develop natural enemies.
- Root dip/seedling treatment for gall midge prone area.
- Crop rotation and inter-cropping also help in conservation of defenders.
- Recommended dose and concentration of pesticides should be used.

9.3.5.8 Chemical Practices

Use of chemical pesticides is the last resort when all other methods fail to keep the pest population below economic loss. Although there is a great advancement in pest management research, yet pesticides would continue to play an important role in crop protection given complexity of pest problems. Therefore, the use of pesticides should be need-based, judicious, based on pest surveillance to minimize not only the cost involved but also to reduce associated adverse effects. While going for chemical control which is specially done for locust control, we must understand thoroughly what, when, where to spray and how to spray, keeping in mind the following points:-

- Pest defender ratio must be observed.
- Relatively safer pesticides should be selected e.g. bio-pesticides.
- If a pest is present in strips or isolated patches, the whole field should not be sprayed.

Relevance of IPM practices are more important in vegetable and fruit crops because of their unique mode of consumption by a human being. Central Insecticides Board and Registration

Committee approved pesticides should be used against target pest for recommended crops. Farmers should not use another pesticide until waiting periods of first pesticides complete and the crop should be harvested after completion of the waiting period. We have to be more careful and cautious in applying pest control practices in field crops.

Locusts may cause serious damage to crops and pastures. Therefore, control operations are conducted to keep locust populations at bay and minimize losses to crops and grazing land. Locust control is mainly conducted with conventional chemical pesticides. Control staff is well trained to use such toxic chemicals effectively and to avoid adverse effects on human health and the environment. This includes information of local populations about planned control operations. However, as long conventional chemical insecticides are used, precautions should be taken to minimize adverse effects on human health and the environment. Locust Control is mainly done with conventional chemical pesticides. The most commonly used pesticide, fipronil, acts on the locust's nervous system. It should be sprayed in strips positioned so a marching band will cross two strips in a 48 hours period giving them a lethal dose. While going for insecticide spraying for locust control, the following points must be in mind:-

- Generally, locust control is carried out well away from villages, farms or other dwellings. In some situations, however, insecticide applications may need to be done closer to habitations. During and immediately after spraying, you should not approach the fields that are being treated.
- Keep a distance from the insecticide treatments to avoid exposure to the spray droplets. If so instructed by the control team or the local authorities, cover the wells or drinking water points in the village or close to the house with a tarpaulin. Do not enter the sprayed fields for at least 48 hours after spraying.
- If your field is treated with insecticides, you should wait for a minimum number of days before you can harvest the crop. This is called the pre-harvest interval.
- If your livestock grazes in or close to pastures treated with insecticides, you should wait for a minimum number of days before you can let the animals re-enter the treated plots. This is called the withholding period. If you respect the withholding period, pesticide residues on the grass will not pose a risk for your livestock nor for consumers who are drinking milk or eating meat from your animals.

9.3.5.9 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	To notify about any new kind of pest/insect attack	MOAFW/MOAFW	Immediately
Assess and notify	Informing every division of the Ministry	MOEFCC/MOAFW	Immediately
Monitoring and documentation	Monitoring import of varieties of pesticides	MOAFW/ICAR	Regularly
	Checking new pest attacks		
Establish command	Encourage farmers to use various ecologically sustainable pest management approaches rather than relying only on chemical pesticides		Immediately
prioritize actions	Procure personnel, equipment and supplies from private agencies as required.		As required
	Conducting regular pest surveillance & monitoring to assess pest/disease situation.		As required
	Training to master trainers, extension workers and farmers through Farmers' Field Schools (FFSs).		As required
	Season Long Training (SLT) programme on major agricultural/horticultural crops		
Assessment of situation dynamics to readjust action plan			

9.3.6 Earthquake

Massive earthquakes generally occur near the junction of two tectonic plates, e.g., along with the Himalayan range, where the Indian plate goes below the Eurasian plate. The Indian subcontinent situated on the boundaries of two continental plates is very prone to earthquakes. Some of the most intense earthquakes of the world have occurred in India.

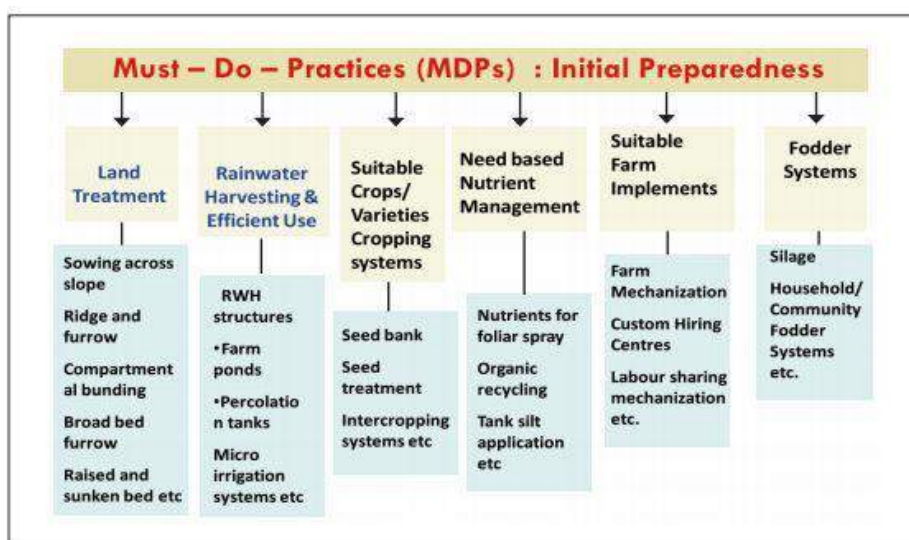
9.3.6.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert			
Assess and notify	Informing every division of the Ministry		Immediately
Activate control room	After getting the information, quickly rush to the scene of emergency/disaster.		
	Check for supply of power and then cut power supply of incident area as and when required.		As required
Establish command	For quick action for management		Immediately
prioritize actions	Immediate rescue operation		
	Deploy personnel, equipment and supplies during rescue operations as per requirement.		As required
	Procure personnel, equipment and supplies from private agencies as required.		As required
	In case of hazardous material mishap, equip the rescuers with Personal Protective Equipment		As required
Search and rescue	Carry out necessary evacuation in and around incident area.		Immediately
	Search and rescue injured/ trapped/ buried persons and casualties.		Immediately
	Cordon off affected area		Immediately
	Clear traffic for emergency service vehicles.		As required
	Assist in carrying out necessary evacuation, search and rescue operations in and around		As required

Categories	Specific tasks	Agency/person responsible	Response time
	incident area.		
	Ensure debris clearance on roads in its jurisdiction for unhindered passage of emergency service vehicles.		Immediately
Establish Relief operations	Provide necessary health and ambulance services to the affected people.		Immediately
	Assist Health Department in providing necessary health services to affected people.		Immediately
Assessment of situation dynamics to readjust action plan			

9.3.7 Drought

Management of drought has been outlined in elaborated manner in the Manual for Drought Management, 2016 issued by the Ministry of Agriculture and Farmers Welfare. It is necessary that these measures are undertaken promptly to mitigate the hardship faced by the people. Though these measures are sector-specific, they require immense inter-departmental coordination. Implementing these measures would require a continuous flow of information from the village level to the highest level of decision making in the State and a responsive administrative structure. It would also require careful financial planning so that the implementation of these measures could be undertaken on a sustained basis



(Source: Manual for Drought Management, 2016 ; AICRPDA-CRIDA 2013)

9.3.7.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	Information on monsoon behavior	MOAFW/ICAR/IMD	Immediately
	Drought declaration		
Assess and notify	Informing every division of the Ministry	MoAFW	Immediately
Contingency planning	Preparedness and real time implementation	MoAFW ICAR, SAUs & State line Departments	As required
	Advocacy for crop diversification		As required
Establish command	For quick action for management		Immediately
	Provision of water		
	Reservoir Management		
	Repairs and Augmentation of Existing Water Supply Schemes		
Prioritize actions	Immediate rescue operation		
	Issue of pumps, irrigation water		As required
	Procure personnel, equipment and supplies from private agencies as required.		As required
	Crisis Management Plan		As required
	Financing Relief Expenditure		
Implementation of DACPs	Seed Banks		Immediately
	Fodder Banks		Immediately
	Nutrient Banks, Fertilizers		As needed
	Custom Hiring Centre (CHC) - Farm implements		As needed
Relief Components	Crop Insurance		Immediately
	Relief Employment (MGNREGA)		Immediately
	Extension Support		Immediately
	Cattle Camps and Fodder Supply		Immediately
	Drinking water supply		
Assessment of situation dynamics to readjust action plan			

9.3.8 Landslide

Landslides constitute a major natural hazard in our country, which accounts for considerable loss of life and damage to communication routes, human settlements, agricultural fields and forest lands. Landslides mainly affect the Himalayan region and the Western Ghats of India. Landslides are also common in the Nilgiri range. It is estimated that 30 percent of the world's landslides occur in the Himalayas.

9.3.8.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Monitoring	Continuous monitoring of the quantity of water flow of all major rivers in the upper reaches by all possible means i.e. visual, instrumental, satellite photographs	District Admin/ NRSC/CWC	Regularly
	Prepare flood inundation/DEM Chart to indicate level of potential threat in the event of the dam break/overflow scenario	CWC	
Assess and notify	Convene a meeting at the earliest depending upon the severity of the situation.		Immediately
	Refer/handover the situation to NDMA if it is beyond the capability/resources of State Govt	State Admin/ NDMA	Immediately
Precaution	Informing the populace living both down/upstream of the impending danger		Immediately
	Installing water monitoring gauges downstream		Immediately
	Preparing rehabilitation and relocation plans		Immediately
	Establishing communication facilities at the likely affected areas		Immediately
	Erecting banners/ boards with warning signs		Immediately
	Taking immediate steps to relocate personnel from high risk zones and priorities for others		Immediately
Detailed action plan	Transportation		Immediately
	Communication		Immediately
	Medical		Immediately
	Safety		Immediately
	Logistics stocking, replenishment and reserves		Immediately
	Induction, execution and de-induction phases		Immediately
	Media plan, photography & videography of events		Immediately
Relief Components			Immediately
Assessment of situation dynamics to readjust action plan			Immediately

9.3.9 Flood

Of all the disasters that regularly strike India, floods are possibly the most recurrent and impacting large areas. India is one of the most flood-prone countries of the world, with 23 out of the 36 states and Union Territories vulnerable to floods (Source: MHA). In terms of geographical area, about 1/8th or 40 million hectares of land is prone to flooding, with 8 million hectares prone to annual flooding.

All river basins of India are vulnerable to floods. The main causes of devastating floods are attributed to heavy rainfall and antecedent conditions of the catchment area, inadequate drainage, or a breach in flood control structures like embankments and levees. Poor permeability of soil causes flash floods as water fails to seep down to deeper layers. Human interventions like constructions on riverbeds, poor planning and implementation, poor storm-water drainage and sewerage are the main causes of urban floods.

9.3.9.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	Develop Flood forecasting and early warning tool.	State/IMD/CWC	Immediately
Assess and notify	Informing every division of the Ministry	MOFAW	Immediately
Activate control room	After getting the information, quickly rush to the scene of emergency/disaster.		
	Check for supply of power and then cut power supply as and when required.		As required
Establish command	Start evacuation and relief measures		Immediately
Prioritize actions	Deploy personnel, equipment and supplies during rescue operations as per requirement.		As required
Search and rescue	Carry out necessary evacuation in and around flooded area.		Immediately
	Safe guard the adjacent property/ population from flood		Immediately
	Cordon off affected area		Immediately
	Clear traffic for emergency service		As required

Categories	Specific tasks	Agency/person responsible	Response time
	vehicles.		
	Assist in carrying out necessary evacuation, search and rescue operations in and around the area		As required
Establish Relief operations	Provide necessary health and ambulance services to the affected people.		Immediately
	Assist Health Department in providing necessary health services to affected people.		Immediately
	Adequate animal health care, fodder/feed supply and shelter management for animals		Immediately
Assessment of situation dynamics to readjust action plan			

9.3.10 Tsunami

Tsunamis and earthquakes happen after centuries of energy built up within the earth. A preliminary risk assessment has been done for the Indian Coast with reference to tsunamis, taking into account the seismo-tectonic setting, historical seismicity and past tsunami events. The east and west coasts of India and the island regions are likely to be affected by Tsunamis generated mainly by subduction zone related earthquakes from the two potential source regions, viz., the Andaman-Nicobar-Sumatra Island Arc and the Makran subduction zone north of Arabian Sea.

9.3.10.1 Action Points

Categories	Specific tasks	Agency/person responsible	Response time
Raise alert	Tsunami alarm system	IMD/MOEFCC	Immediately
Assess and notify	Informing every division of the Ministry	NIDM/MOAFW	Immediately
Activate control room	After getting the information, quickly rush to the scene of emergency/disaster.	NIDM /MOAFW	Immediately
	Check for supply of power and then cut power supply as and when required.		As required
Establish command	Start evacuation and relief measures	NIDM	Immediately
prioritize actions	Deploy personnel, equipment and		As required

Categories	Specific tasks	Agency/person responsible	Response time
	supplies during rescue operations as per requirement.		
Search and rescue	Carry out necessary evacuation in and around the affected area.		Immediately
	Safe guard the adjacent property/ population from tsunami		Immediately
	Cordon off affected area		Immediately
	Clear traffic for emergency service vehicles.		As required
	Assist in carrying out necessary evacuation, search and rescue operations in and around the area.		As required
Establish Relief operations	Provide necessary health and ambulance services to the affected people.		Immediately
	Assist Health Department in providing necessary health services to affected people.		Immediately
Assessment of situation dynamics to readjust action plan			

9.4 Activation of Response Plan:

Agencies responsible for disaster response should develop 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. Data Collection and Management
3. Disposal of animal carcasses
4. Drinking-Water/ Dewatering Pumps
5. Early Warning, Maps, Satellite inputs, Information Dissemination
6. Evacuation of People and Animals
7. Fodder for livestock in scarcity-hit areas
8. Food and Essential Supplies
9. Fuel

10. Housing and Temporary Shelters
11. Management of the dead people / animal
12. Media Relations
13. Medical care
14. Power supply
15. 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

9.5 Logistics / Service Delivery Mechanism during Disaster:

Disaster affects not only human population, resources and structures but also interrupts the whole functioning of the organization. The plan should therefore have all possible scenarios of effective logistics and service delivery mechanism at the time of disaster. The framework includes:

- Institutional reforms, modernization, and changes in the 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 the 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

CHAPTER 10

Chapter 10. Recovery and Reconstruction

This chapter presents a systematic approach for post-disaster recovery and reconstruction. It highlights the importance of resilient and sustainable recovery after disasters to promote resilience in the agriculture sector against future disasters. It highlights the steps for Post-disaster need assessment (PDNA) and approaches for recovery.

10.1 Introduction

The aftermath of disasters (natural disasters in particular) is preceded by the need for large, multifaceted recovery, reconstruction as well as rehabilitation programs. Lack of adequate knowledge, capacity, plan and management skills often jeopardizes the very objective of such programs. Ineffective policies as well as unprepared institutions and agencies are the roadblock to the recovery processes resulting in prolonged suffering in terms of livelihoods and shelter as well as delay in restoration of basic services. Hence, resilient and sustainable recovery after disasters is an important opportunity to prepare the agriculture sector for future disasters.

The International Strategy for Disaster Reduction (ISDR) defines recovery as the **“decisions and actions taken after a disaster to restore or improve the pre-disaster living conditions of the stricken community while encouraging and facilitating necessary adjustments to reduce disaster risk”**. The process demands co-ordinated focus on multi-disciplinary aspects of reconstruction and rehabilitation for recovery and is essential to understand disaster reconstruction and rehabilitation under the holistic framework of post-disaster recovery.

10.2 Post-Disaster Needs Assessment (PDNA)

After a disaster, Post-Disaster Needs Assessment (PDNA) must be undertaken. Depending on the disaster, this may be undertaken by the concerned Ministry 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 as per the need. 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 that can be used to estimate damages arising from a hazardous event, and the subsequent economic losses caused by the event. The DALA highlights the possible consequences on the economy, the external sector and the fiscal balances, as well as the impact due to the decline of income and livelihoods of households or individuals.

The HRNA focuses on the social impact of disasters, analyzing 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 planing for financing the BBB.

Damage due to disasters should be measurable by creating a database as pre-disaster baseline information and post-disaster information on damages and losses. Each department of the Ministry should keep this information as per their need and action.

10.2.1 Create pre-disaster baseline information (common to all departments of the Ministry of Agriculture and Famers Welfare).

Sl.no.	Sector	Sub-sector	Division
1	Population and income	Social and economic profile	Agriculture census
		Farmers profile	Agriculture census
		Gender	Agriculture census
		Person with disability	
2	Crop information	Planting to harvest season	Respective division
		Production and prices	Trade and policy
		Investment costs in crops as per crop cycle	Trade and policy
3	Infrastructure	Irrigation assets	Mechanization and technology, RFS, NRM,
		Farm equipment	Mechanization and technology
		Storage infrastructure	
		Buildings/establishment	Administration
4	Animals and allied sectors	To be seen by the Ministry of Animal Husbandry <ul style="list-style-type: none"> • Fund allocation towards live stocks • Camp restriction to be barred • Fodder Seeds should be distributed to farmers • Prompt medical supplement for livestock during the disaster • Fodder supplement 	

10.2.2 Assess damages

Post disaster assessment is important to provide necessary short-term and long-term support that will help the different departments of the Ministry of Agriculture and Farmers Welfare to recover.

S.no	Damages	Value (in Rs)	Remarks
1	General physical assets		
2	Farming assets		
3	Irrigation assets		
4	Damages to crops		
5	Livestock		
6	Others		

10.2.3 Damage data collected by different departments of the MoAFW

S.no.	Division	Data collected
1	Agriculture Census	
2	Agricultural marketing	
3	Cooperation	
4	Credit	
5	Crops	
6	Extension	
7	Drought management	
8	Horticulture	
9	Information technology	
10	Integrated nutrient management	
11	Mechanization and technology	
12	Natural resource management	
13	Oilseeds	

S.no.	Division	Data collected
14	Plant Protection	
15	Policy	
16	Rainfed farming system	
17	Rashtriya Krishi Vikas Yojana	
18	Seeds	
19	Agriculture trade policy, promotion and logistics development division	
20	Farmer welfare	
21	Administration	
22	Budget, Finance & Accounts	
23	General Coordination	
24	Official Language	
25	Economic Administration	
26	International Cooperation	
27	Agricultural Trade Policy, Promotion and Logistics Development Division	
28	Vigilance	

10.3 Build Back Better Approach for Recovery

The approach to re-construction and recovery is guided by the National Policy on Disaster Management (NPDM) 2009. Its salient clauses/ sections are given below:

- Para 9.1.1 - the approach to the reconstruction process has to be comprehensive to convert adversity into opportunity. Incorporating disaster resilient features to 'build back better' will be the guiding principle.
- Para 9.2.1 - 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, the 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 - 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 2 to 3 years. Relevant Central Ministries/Departments and the State Governments should create dedicated project teams to speed up the reconstruction process.

- Para 9.3.2 - 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 various stakeholders.
- Para 9.5.1 - State governments should emphasize the restoration of the 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 the marginalized and vulnerable sections.

10.3.1. Early, Mid and Long Term Recovery

The recovery process is best described as a sequence of interdependent and often concurrent activities that progressively advance a community towards a successful recovery. However, decisions made and priorities set early in the recovery process will have a cascading effect on the nature and speed of the recovery progress. BBB approach begins with pre-disaster preparedness and includes a wide range of planning activities. It clarifies the roles and responsibilities for stakeholders in recovery, both pre- and post-disaster. It recognizes that recovery is a continuum and that there is an opportunity within recovery. It promotes a process in which the impacted community fully engages and considers the needs of all its members. 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 (3-18 months), b) Mid-Term (upto 5 years), and c) Long-Term (within 10 years).

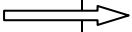
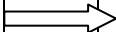
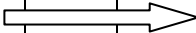
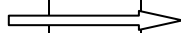
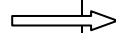


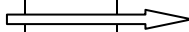
Table 22: The recovery framework for Ministry of Agriculture and Farmers Welfare

Components	Description	Concerned division
Institutional arrangements	Forming secretariat for disaster management in the Ministry	Drought management division
	Defining roles and responsibilities in recovery	Drought management division
Coordination	Interdependence between stakeholders – government, international agencies, private sector, civil society organizations	Respective divisions
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 process	Respective divisions
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	IT department, Extension

Components	Description	Concerned division
Decision Support System (DSS)	Setting up an adequate DSS that includes Management Information System (MIS), databases, deployment of spatial data management technologies	Drought management division, DARE with other relevant departments
Pool of Expertise	Pooling of professional skills and expertise in diverse areas	Drought management division
Community Participation	Ensuring the pro-active involvement of communities, proper community outreach, empowerment, and gender equity in programme formulation and implementation	Respective division
Monitoring and Evaluation	Important component required for promoting transparency in the recovery processes and should include technical and social audits	Drought management division

10.3.2. Major steps of recovery processes (applicable to all identified disasters as per HRVCA)

Major steps	Processes	Concerned dept/division	Recovery continuum		
			Early	Mid	Long
Post-Disaster Needs Assessment and Credible Damage Assessment	Preliminary assessment reports	All concerned divisions	→		
	Compilation and transmission of damage and loss data as per the crop cycle	Drought management division with other divisions	→	→	
	Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment	Drought management division		→	
	Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts	Drought management division with other departments of States and within Ministry		→	
	Results monitoring and evaluation plan for recovery program	Drought management division	→		
	Selecting the most appropriate and achievable processes and methodology for conducting early and credible damage and need assessments	Drought management division		→	
Developing a vision for Build-Back Better (BBB)	High level meetings as well as broad-based, wider consultations with experts, civil society and key stake holders	Drought management division	→		

Major steps	Processes	Concerned dept/division	Recovery continuum		
			Early	Mid	Long
	Build consensus among the stakeholders within and outside government	Drought management division with concerned divisions			
Ensure coherence of BBB with the development programs and goals	Discussions at top level to align the recovery vision with the government's broader, longer term development goals and growth and poverty reduction strategies	All divisions			
Incorporating resilience and BBB in recovery vision	Consultations and background studies on: Disaster resistant physical recovery, Options for fast economic recovery, Gender and equity concerns, Vulnerability reduction, Natural resource conservation and environmental protection, Social recovery	DARE with concerned departments			
Balancing recovery across sectors	Balance between public and private sectors BBB programs	Drought division, crops, policy, Rainfed Farming System			
	Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities	All concerned divisions of crop cycle			
	Prioritize infrastructure reconstruction	All divisions with administration			
	Address the recovery of the lives and livelihoods of disaster affected communities	Drought division with respective divisions			
Prioritising sectors for recovery	Determine relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications infrastructure, environment, livelihoods, agroforestry, tourism, social protection, health, and education.	Drought division with respective divisions			

CHAPTER 11

Chapter 11: Budgetary Provisions

This chapter presents an overview of budgetary provisions for Disaster Management. It highlights the various sources of funds within the ongoing programmes/schemes/plans for disaster management, implementation of DRR in planned schemes and proposed institutional framework for strengthening the budgetary provisions.

11.1 Introduction

The DM Act 2005 has mandated upon the Government to ensure that the funds are provided by the Ministries and Departments within their budgetary allocations for 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. The 13th Finance Commission recognized the importance of mitigation funds in the context of disaster management for the first time. The 15th Finance commission has proposed for measurable performance-based incentives for States and at the appropriate level of government in the field of disaster management and sustainable development goals. The 15th Commission has also suggested for the review of financial arrangements across the three components of disaster management i.e. mitigation, response and reconstruction. The other funds are green climate fund of UNFCCC, Tribal Development Fund, National Adaptation Fund for Climate Change, Climate Change Fund etc.

Table 23: Financial arrangement from other sources

Fund name	Organization	Vulnerabilities addressed (as identified in Chapter 2 based on HRVCA)			
		Environmental	Social	Physical	Economic
15 th Finance Commission	Ministry of Finance			Disaster resilient infrastructure	
Green Climate Fund	Ministry of Environment, Forest and Climate Change	Solar rooftop program channelized through NABARD			
		Restoring ecosystems in three coastal states in partnership with UNDP in Andhra Pradesh, Odisha and Maharashtra	Promotion of climate resilient livelihood options (e.g. sustainable farming of mud crabs)		
Tribal Development Fund	NABARD, Ministry of Finance	Sustainable agriculture practices	<p>Sustainable and participatory livelihood programs</p> <p>Health care and other support to tribal</p> <p>Enabling women participation</p> <p>Capacity building through trainings</p>		<p>Support to traditional economic activities</p> <p>Non-farm based livelihoods</p> <p>Establishing marketing linkages</p>
National Adaptation Fund for Climate Change	NABARD is the National Implementing Entity	Funding adaptation projects under NAPCC and SAPCCs in particular agriculture and water	Strengthening awareness and increasing adaptive capacity		Diversification of livelihood options at local levels
Climate Change Fund	NABARD	Activities aimed at addressing climate change impacts	Training and capacity building related to adaptation		

Fund name	Organization	Vulnerabilities addressed (as identified in Chapter 2 based on HRVCA)			
		Environmental	Social	Physical	Economic
			and mitigation measures Addressing gender issues		

11.2 Implementation of DRR in Planned Schemes

The primary mechanism for funding DRR related schemes and projects in India are through Plan Schemes at Central and State level. Various nodal Ministries play a key role in disaster management as far as specific disasters are concerned. These nodal Ministries with other Ministries and Departments have dedicated schemes, aimed at disaster prevention, mitigation, capacity building, etc. within their particular domain. Outlay for reconstruction activities is normally embedded in the plan schemes of the Union Government to ensure that “Building Back Better” aligns with the approved programs. Post-disaster reconstruction work is funded by the Union Government through increased outlay for the ongoing 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.

11.2.1 Flexi Funds as a part of Centrally Sponsored Schemes

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

The utilisation of Flexi-funds for mitigation/restoration activities in the event of natural calamity must be in accordance with the broad objectives of the CSS. It is possible to combine Flexi-fund component across schemes within the same sector but the flexi-funds of a CSS in a particular sector however, shall not be diverted to fund activities/schemes in another sector. The Flexi-funds constitute a source of funding for mitigation activities within overall objectives of the particular CSS(s) under which they are allocated and this would still leave a gap in terms of funding purely mitigation related projects especially those addressing cross cutting themes that cover multiple sectors. The latter would be covered by setting up of National Disaster Mitigation Fund and National Disaster Mitigation Funds.

11.2.2 Externally Aided Projects

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

Table 24: Sector wise schemes for financial integration

Sector	National/ state schemes	Point of integration
Housing	Pradhan Mantri Awaas Yojna	<ul style="list-style-type: none"> • Safety audit of existing housing stock • Establishing Technology Demonstration Units for public education and awareness. • Certification of masons and creating database of master trainers. • Strengthen compliance and enforcement procedures of local building laws in the hazard prone areas • Adding construction elements for special needs groups in design and planning of all public buildings and mass housing projects
Agriculture and rural development	National Mission for Sustainable Agriculture National Water Mission MGNREGA National Rural Livelihood Project Special Package for Drought Mitigation Strategies PMKSY	<ul style="list-style-type: none"> • Construction of irrigation channels • Renovation of traditional water management system • To mainly undertake rain water conservation, construction of farm pond, water harvesting structures, small check dams and contour bunding etc. packaging farm pond technology • Groundwater recharging • Strengthening/construction of embankments, flood walls and flood levees • Drainage improvement/management in order to avoid congestion. • Crop improvement • Micro irrigation technology
Water and sanitation	National Rural Drinking Water Program	<ul style="list-style-type: none"> • Flood mitigation- retaining wall, strengthening embankments, etc. • Groundwater management, raising hand pumps, water back ups, etc.
	Total Sanitation Campaign	<ul style="list-style-type: none"> • Rainwater Harvesting • Safe drinking water • Drainage system • Construction of toilets
Employment	Pradhan Mantri Gramodaya Yojna	<ul style="list-style-type: none"> • Prioritizing and taking up works for flood control and drought proofing
	Mahatma Gandhi National Rural Employment Guarantee Scheme	<ul style="list-style-type: none"> • Land development including plantation • Renovation of water bodies

Sector	National/ state schemes	Point of integration
Natural Resources Management	Integrated watershed Management Program	<ul style="list-style-type: none"> • Integrated watershed management • <i>In situ</i> rainwater management as community approach • Revival of traditional water harvesting structures • Soil health management • To address land degradation issues
Health	National Rural Health Mission	<ul style="list-style-type: none"> • Develop emergency plans and conduct mock drill in hospitals
	National Food Security Mission	<ul style="list-style-type: none"> • Developing projects on community monitoring and reporting in major health and food security schemes.
Education	Sarva Siksha Abhiyan	<ul style="list-style-type: none"> • Upgradation of infrastructure for DRR • Special needs of vulnerable groups including disabled children in design of school building, amenities and learning processes ; • Development and dissemination of learning material on risk awareness, preparedness and preventive measures in school • Curricula and integration of DRR modules in the regular training course of the “Teachers Training Institutes” • Training in life saving skills such as first aid, search and rescue, swimming to the school children, teachers and education administrators • Preparing disaster preparedness plans and conducts mock drills through School Management Committees (SMC).
	Mid day meal Scheme	<ul style="list-style-type: none"> • Providing food at the time of disaster
Energy	National Solar Mission	<ul style="list-style-type: none"> • Promoting renewable energy program in the district
	PM KUSUM	<ul style="list-style-type: none"> • Promotion of solar lights other renewable based energy • Solar pumps, solar heater, Smart-grid metering system

11.3 Risk Transfer and Disaster Insurance

Risk Transfer is a tool that enables a concerned party to share/transfer a portion of the disaster risk to another party, for a certain fee. This party can be the government itself or the microfinance institutions. The absence of disaster insurance means that the government has to bear a huge cost for compensation and rehabilitation work in post-disaster situations. At

present, there are four insurance mechanisms under the Ministry of Agriculture and Farmers Welfare as shown in the table below:

Insurance name	Key objectives	Vulnerabilities addressed			
		Environmental	Social	Economic	Physical
Pradhan Mantri Fasal Bima Yojna	Insurance protection for food crops, oilseeds, annual horticultural crops/commercial crops notified by State Government	Claims up to 25% of sum insured at the time of sowing if delayed due to adverse weather Covers climate induced disasters like heavy and unseasonal rainfall, landslides and hail storm		Post harvest losses assessment Crop yield is less than guaranteed yield	
Weather based crop insurance scheme	Insurance protection for notified crops, oil seeds, horticultural and commercial crops	Based on the weather based indices Hailstorm and cloudburst are covered at individual farm level		Claim payment equals to deviation to all insured farmers	
Coconut Palm Insurance Scheme	Insurance protection for coconut palm growers			50-75% subsidy of premium provided to all types of farmers	
Unified Package Insurance Scheme	To provide financial and comprehensive risk coverage of crops, assets, life and safety of the school going children of farmers		Loss of life and accident insurance		Household, agriculture implements and tractor insurance

11.4 Proposed institutional framework for further strengthening the budgetary provision

Apart from the above mentioned funding mechanisms, institution provisions have been suggested to tap the funds from other sources.

Table 25. Financial sources available/to be tapped for different components of disaster management

Name	Purpose	Financial arrangements	Activities	Nodal agency
NITI Aayog	Capacity Building	100% Centre	Training Awareness Generation IEC material Mock drills	NITI Aayog
State Fund	Capacity Building	100% State	Training Awareness Generation IEC material Mock drills	SDMA
Line Department Funds	Preparedness and mitigation	Budgetary allocation	Activities falling in purview of departments for DRR, Preparedness and mitigation	Line Departments
District Planning Fund	Any public works	MP and MLA aid and grants	Preparedness, Mitigation capacity building, recovery	Local Bodies, Line departments
External Institutional Funding	Projects on DRR, Recovery, Mitigation and Preparedness	Total external or bilateral or multilateral arrangements	Infrastructure upgradation Technological interventions and technical studies DRR projects	
Corporate Social Responsibility	Corporate	2% of profit	Any	

CHAPTER 12

Chapter 12: Plan Management

This chapter presents an overview of updating, monitoring and evaluation of the NADMP. It highlights the importance of periodically updating the NADMP to make it consistent with the changes in Government policies, initiatives, and priorities as well as to incorporate technological changes and global experiences.

12.1 Introduction

Regular updating is critical to ensure the relevance and effectiveness of the NADMP. Plan maintenance is a 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. The training, 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 to be taken 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.

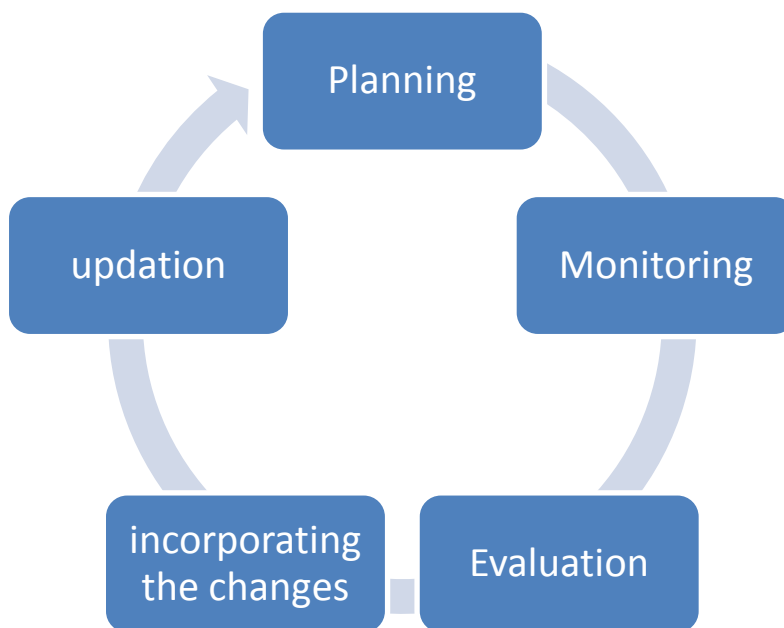


Figure 15: Plan management cycle

12.2 Monitoring and Evaluating the Plan

Periodic revisions of the updated plan are required to ensure that the goals, objectives, and mitigation action plans are kept current. Monitoring the plan update will be the responsibility of the person as appointed by the committee for disaster management. The committee responsible will review mitigation actions, response mechanisms and recovery and rehabilitation as laid down in the plan and submit a report in writing to the disaster management committee if any changes are needed e.g. recommending and action for funding. The disaster management committee will meet annually and minutes should be shared with all the departments of the Ministry of Agriculture and Farmers Welfare.

The meeting outcome should assess any changes in risk; determine whether the implementation of mitigation actions is on schedule or if there are any implementation problems (such as technical, political, legal or coordination issues). The plan monitoring also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned.

12.3 Updating the Plan

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

- Major review and revisions after each major incident
- After a 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
- Enactment of new or amended laws or ordinances

At any time, changes may be made to the Plan to keep it current. The plan will be thoroughly reviewed by each member annually from the date of adoption to determine whether there had been any significant changes in the types of actions proposed.

12.4 Incorporating the Plan into Other Planning Mechanisms

The National Agriculture Disaster Management Plan is an integrated living planning document and cannot be viewed in isolation. This plan should be incorporated with other development initiatives of the government for identifying opportunities for establishing or enhancing mitigation policies, programs or projects; and establishing goals based on an understanding of the organizational capacity and technical capability of each department.

12.5 Continued Public Involvement

NADMP is a community document; hence input from the other relevant stakeholders should be an integral part of the preparation of this document. Involving the community will provide a sense of ownership and thus add meaning to the whole process. Relevant stakeholders can be involved at various levels as shown below:



Figure 16: Stakeholder involvement at various levels

Involvement of Different Groups in Disaster Management

Activities	Name of the group	Role of the groups in DM
Early Warning	Village level Institutions including Gram Panchayat and PRIs	<ul style="list-style-type: none">Dissemination of Early Warning to Community
Preparedness and Prevention	Village level Institutions including Gram Panchayat PRIs, CSOs, Local Administration at village level	<ul style="list-style-type: none">Generating confidence, awareness, knowledge, partnership, and ownership for planning and rolling out local disaster management plansCapacity building and training of community volunteersDevelopment of Community Based Disaster Preparedness PlansHazard, vulnerability and capacity assessments, disaster management planning, early warning system
Mitigation and Response	Village level Institutions including Gram Panchayat CSOs, Local Administration, and PRIs members	<ul style="list-style-type: none">Coordinate with district agenciesRelief distribution, providing shelter to the victims, medical assistance, etc.

The Ministry of Agriculture and Farmers Welfare must ensure the coordination, monitoring and implementation of NADMP activities in a planned way. This can be done in the form of a checklist as provided below which is based on the SFDRR priorities.

Table 26: Checklist for planning, review, updation, implementation and coordination*

SFDRR priorities	Activities	Details	Y/N	Remarks
Understanding the disaster risks	Planning (Mitigation and preparedness)	Planning and preparing in close consultation with different division/dept. of the Ministry.		
		Maintaining coordination and preparation of division/dept. wise plan.		
		Establish regular communication and sharing of information between disaster management secretariat and departments		
		Defining roles and responsibilities of departments during various facets of disasters as per roles and responsibilities		
Strengthening disaster risk governance	Implementation	Schemes of Central/State Government based on the parameters of mitigation, relief and rehabilitation are identified and implemented.		
		All division heads must ensure to identify their suitable and relevant schemes which will be suitable to be used in disaster risk.		
Investing in disaster risk reduction for resilience	Monitoring	Monitor the functioning and adequacy of the resources present in the Ministry, every six months.		
		Monitor that the officers of the different division have to be trained as per their requirements. For example training on Ecosystem based disaster risk reduction		
Enhancing disaster preparedness for effective response	Review and update	Valuable inputs from actual disasters		
		Lessons learnt from trainings		
		Changes in disaster profile of district-increase in intensities, types and patterns of disasters		
		Changes in regulatory requirements		
		Updation of databases using GIS		
		Technological developments/innovations in identifying potential hazards or mitigating them.		
		Understanding the bottlenecks for addressing the impacts/damages/losses		

*Note: The list is not the final and can be added as per the need of the MoAFW.

Part II

Emergency Contingency and Business Continuity Plan for the Ministry

1. Institutional Arrangements for Response/ Incident Command System

This section summarizes the function and responsibilities of the Ministry in disaster response for its own disaster management from hazards like earthquake, urban flood and fire and emergency services. No single agency or department/division can handle a disaster situation of any scale alone. Different departments/ division must work together to manage the disaster with an objective to reduce its impact. However, the administrative division is responsible for communication with other agencies. The roles and responsibilities of all the related nodal agencies have already been described in Chapter 1, 3 and 9.

The institutional arrangement for the response system consists of the following elements:

- a) Nodal central ministries with disaster-specific responsibilities for national-level coordination of the response and mobilization of the necessary resources (Nodal Ministry mentioned in Chapter 1).
- b) Administrative Division of the Ministry of Agriculture and Farmers Welfare
- c) National Disaster Response Force.

Fire and Emergency Services play the primary role for responding to fire incidents. The Fire and Emergency Services (F&ES) fall within the mandate of the urban local bodies (municipalities/ Nagar Palikas) as per constitutional provisions (Section 7, Schedule 12, Article 243W). F&ES attends to other emergencies such as building collapse, human, 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. The administrative division may contact the F&ES when in an emergency.

2. Prevention and Mitigation of Disaster

The possible disasters that may affect the Ministry's infrastructure are earthquake, fire and urban flood. For these three hazards, appropriate prevention and mitigation measures to be adopted have been described in Chapter 3 at Section 3.7 and Section 3.9 respectively.

For urban floods, the prevention and mitigation measures are described in the following tables.

Sl. No.	Sub-Thematic Area for DRR	Centre	Responsibility <u>Recurring/ Regular (RR)</u>
1	Mapping/ Zoning, Estimation of Possible Inundation levels, monitoring networks	MHUA*, MOES, MOJS, DOS	<ul style="list-style-type: none"> • Technical support • Develop guidelines for assessment of potential and actual damages to be done separately • MoES (IMD) to prioritize the establishment • Establish satellite-linked Automatic Rain Gauge Stations, Automatic Weather Stations for 24X7 weather monitoring • <u>Medium Term (T2)</u> Maximize real-time hydro-meteorological network to cover all urban centres • MoES (IMD) and MHUA to work out a strategic expansion of DWR network • <u>Long Term (T3)</u> Ward Level Information System to be developed using high resolution satellite images/ aerial photos integrated with socio economic data covering natural resources and infrastructure facilities on appropriate scale at community level
2	Information Systems, Monitoring, Forecasting, Early Warning	MOES, MOJS	<ul style="list-style-type: none"> • <u>Recurring/ Regular (RR)</u> Regular monitoring • <u>Medium Term (T2)</u> Establishing technical umbrella for urban flood forecasting and warning

Sl. No.	Sub-Thematic Area for DRR	Centre	Responsibility
3	Overall disaster governance	MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Providing coordination, technical inputs, and support
4	Response	MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Organising and coordinating central assistance
5	Establishment/ strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Ensure round the clock operations of EOCs during the Flood season with adequate manpower/resources
6	Civil Works	MHUA*, MCVA, NBCC, BMITPC, CBRI, SERC, IE(I), CRRI	<ul style="list-style-type: none"> Building Design Considerations Design Technical Support
7	Preparation of comprehensive Urban Storm Drainage Design Manual (USDDM)	MHUA	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> MHUA will consider current international practices, specific locations and rainfall pattern of the cities and future needs for preparing USDDM
8	Operation and Maintenance of Drainage Systems	MHUA	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Provide guidelines, and carry out monitoring
9	Training	MHUA*, MHRD, MHFW, NDRF, NIDM, CPWD, MYAS	<u>Medium Term (T2)</u> <ul style="list-style-type: none"> Training of Office Staff
10	Mock Drills/ Exercises	MHUA, NDMA, All Govt. Ministries/ Agencies, NDRF, Armed Forces, CAPF	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Promoting the planning and execution of emergency drills by the ministry
11	Research, Forecasting / Early Warning, Data Management, Zoning, Mapping	MOES, MOJS*, MAFW, MOEFCC, DOS, NLRTI	<u>Recurring/ Regular (RR)</u> <ul style="list-style-type: none"> Assessment, Monitoring, and Scientific studies <u>Short Term (T1)</u> <ul style="list-style-type: none"> Flood vulnerability maps under GACC scenarios

3. Ensuring Business Continuity of the Ministry

Disaster not only affects the human population and infrastructure but also disrupts the whole functioning of the Ministry. Part 1 of the plan describes and prescribes all the prevention, mitigation, capacity development and recovery mechanism based on the Ministry's Business. The Businesses of the Department of Agriculture, Cooperation and Farmers Welfare and Businesses of the Department of Agricultural Research and Education (DARE) are given in Chapter 1, Section 1.1.1.1 and 1.1.1.2 respectively. To ensure continuity of these businesses, timely and effective implementation of the plan is to be done.

4. Monitoring

The administrative division of MoAFW is responsible for communication with related central agencies for hazard-specific early warning and regular monitoring. The division is also responsible to conduct drills for fire, earthquake coordinating with CPWD. The central agencies for monitoring all the disasters have already been described in Part I.

5. Recovery

A post-disaster recovery for the Ministry consists of physical recoveries like restoration and reconstruction of the damaged building, critical infrastructure, offices, parking sheds, shops, canteen and other infrastructures, normal functioning of the office and social and psychological recovery of the office staffs.

After a disaster, a Post-Disaster Needs Assessment (PDNA) must be undertaken, which will be a government-led exercise while coordinating with the Administrative Division of the Ministry.

The Disaster recovery process is rarely a set of orderly actions. It should 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.
- 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.

Mainstreaming PM's 10 point Agenda in the Plan

NDMA has finalized the NDMP 2019 giving special emphasis on the PM's 10 point agenda on DRR. Accordingly, NADMP has been prepared duly incorporating PM's 10 point agenda and following NDMP 2019. The sections where the key elements of PM's 10 point agenda have been imbibed are highlighted below:

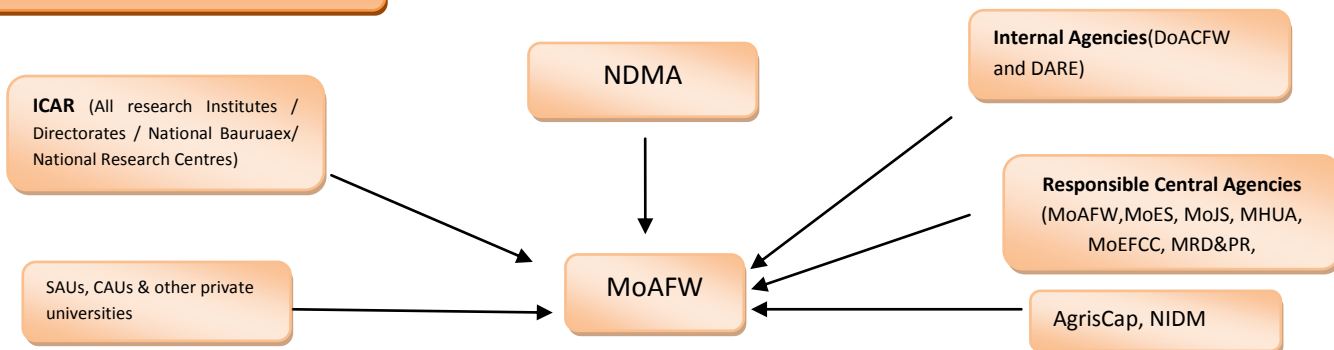
S. No.	Agenda Points of PM Ten Point Agenda	Chapter and Section
1	Agenda – 1 : All development sectors must imbibe the principles of disaster risk management	NADMP comprehensively draws integrated approach towards PM's 10 point agenda on disaster risk reduction and management.
2	Agenda – 2 : Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states	<p>Chapter 3 covers <i>capacity development</i> as a thematic area for DRR for training of volunteers, farming communities ,CDEF, etc.</p> <p>Chapter 4, Section 4.2 emphasizes on mainstreaming existing programmes and policies / Schemes towards DRR especially focusing on small and marginal farmers.</p> <p>Chapter 7, Section 7.1.5 highlights about capacity development activities at central and state level.</p>
3	Agenda – 3: Women's leadership and greater involvement should be central to disaster risk management	<p>Chapter 3 incorporates gender sensitive and equitable approaches in capacity development covering all aspects of disaster management under Capacity Development theme.</p> <p>Chapter 5 covers social inclusion including mainstreaming DRR with vulnerable groups like women, children and elderly people.</p>
4.	Agenda – 4: Invest in risk mapping globally to improve global understanding of Nature and disaster risks	Chapter 3 covers "Understanding Risk" which is one of the six thematic areas in NADMP for all the notified disasters, which includes risk mapping / zonation etc.

S. No.	Agenda Points of PM Ten Point Agenda	Chapter and Section
5.	Agenda – 5: Leverage technology to enhance the efficiency of disaster risk management efforts	Chapter 7, Section 7.1.5 , highlights role of concerned nodal ministries towards capacity development activities with effective use of science, technology and traditional knowledge in all aspects of DRR.
6.	Agenda – 6: Develop a network of universities to work on disaster-related issues	Responsibilities of documentation, training, research etc.is covered under Chapter 3 ,non structural measures as a thematic area. Chapter 7 under capacity building framework deals with establishing network of educational institutions
7.	Agenda – 7: Utilize the opportunities provided by social media and mobile technologies for disaster risk reduction	Chapter 3, non structural measures as a thematic area covers Extensive IEC campaigns to create awareness through print, electronic and social media. Thematic area “Understanding Risk” also covers dissemination of warnings, data, and information through onlineand offline and interface with mobile network service and also providing warnings on radio, TV, and mobile phones Chapter 4,Section 4.2.1 highlights to develop App to communicate information to farmers on early warning related to pest attack and other related disasters. Chapter 10 highlights <i>Communication</i> as an emergency function
8.	Agenda – 8: Build on local capacity and initiative to enhance disaster risk reduction	Chapter 3 highlights about promotion of traditional management practices along with promoting of improved climate resilient technologies from NICRA and other sources in agriculture and allied sectors in all agro ecosystems under Climate Risk Management thematic area and also to sponsor and promote state-specific efforts and local efforts

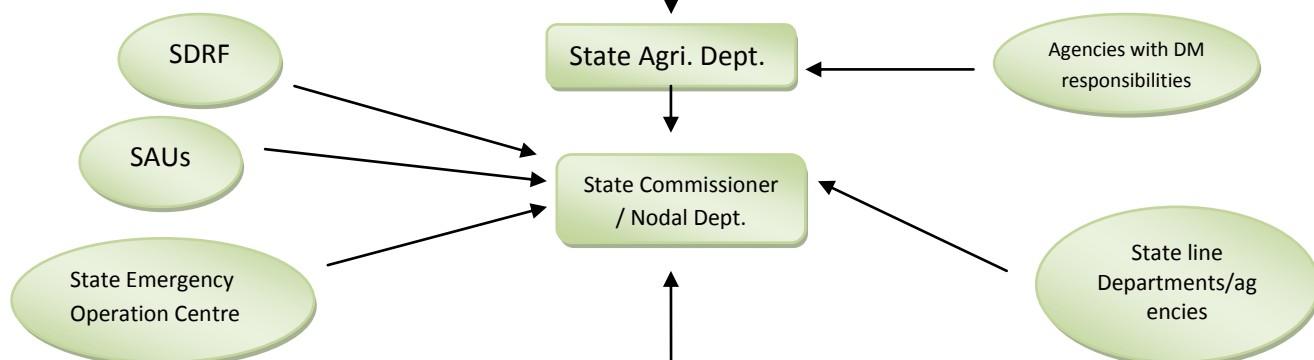
S. No.	Agenda Points of PM Ten Point Agenda	Chapter and Section
9.	Agenda – 9: Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster	<p>Chapter 3 highlights about roles and responsibilities at central and state level for documentation of lessons learnt, best practices, success stories under the thematic area “Capacity Development” to manage all disasters.</p> <p>Chapter 10 highlights systematic approach for post disaster recovery and reconstruction and importance of resilient and sustainable recovery after disasters to promote resilience in agriculture sector against future disasters</p>
10.	Agenda – 10: Bring about greater cohesion in international response to disasters	Chapter 6 details out the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs) and UNFCCC Paris Agreement on Climate Change and establishes the linkages with these policies through a framework

Operational Framework for NADMP

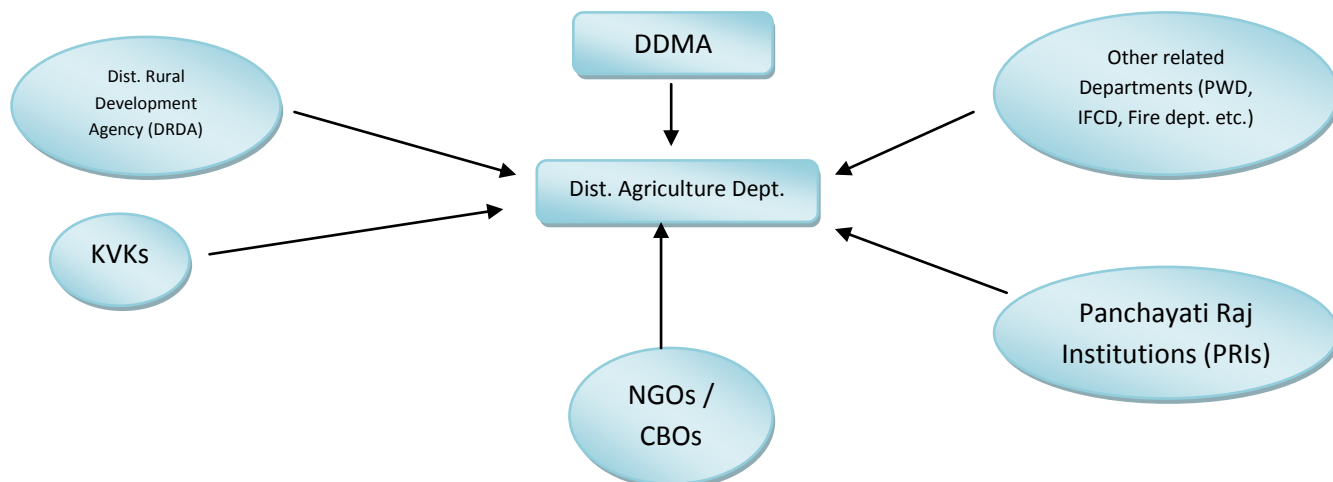
National Level Coordination



State Level Coordination



District Level Coordination



The NDMA is the nodal agency at national level responsible for the approval of the NADMP and facilitating its implementation. If the disaster is onset, the guidelines are released by NDMA at National level, SDMA at State and DDMA at District level

At national level, NDMA lays down policies, plan and guideline for Disaster Management to be followed by different Central Ministries, Department and State Governments. If any agriculture-related disaster occurs the sole responsibility for Disaster Management will be operationalized by MoAFW which will be further extended to responsible Nodal Ministries / Agencies.

At National level coordination, the MoAFW is Nodal Ministry for 4 disasters (drought, cold wave /frost, pest attack and hailstorm), MoES is responsible for cyclone, earthquake and tsunami, MoJS is responsible for flood, MoM is responsible for Landslide, MoEFCC is responsible for forest fire and MHUA is responsible for urban floods. All these nodal ministries are responsible for planning, management and response activities before, during and after any disaster. Other than this, NIDM is responsible for training and capacity development and NDRF is responsible for response activities.

At State level coordination, the centre provides guidelines to the states based on the severity of the disaster. For all agriculture-related disasters, State Agriculture Department notifies State Commissioner / Nodal Department and they further give responsibilities to line agencies like RRD, IFCD, PWD etc which are under state Government. Meanwhile, agencies under State Agriculture Departments which are assigned with DM responsibilities also provide their support towards DRR. In the worst scenario, SDRF and SEOC are assigned for all the rescue and response activities.

At District level coordination, DDMA ensures that the guideline for prevention, mitigation, preparedness and response measures lay down by NDMA and SDMA are followed by all the district level offices of the various departments of the State Government. Accordingly, if any agriculture-related disaster happens the district agriculture department gives instructions to all the related departments and stakeholders e.g. DRDA, PRIs, PWD etc including KVKs, NGOs, CBOs.

References:

1. Ahmad, F. & Haseen, S. (2012). The Performance of India's Food grains Production: A Pre and Post Reform Assessment. *International Journal of Scientific and Research Publications*, 2(3), pp.1-15.
2. APEDA. 2018-19. Annual Report for Agricultural & Processed Food Products Export Development Authority. Ministry of Commerce & Industry, Govt. of India.
3. Annual Report. 2013. All India Coordinated Research Project for Dryland Agriculture, ICAR-CRIDA, Hyderabad.
4. Central Statistical Organisation (CSO) (2007) Annual Survey Of Industries. Summary Results for Factory Sector 2005-2006. New Delhi (www.mospi.nic.in)
5. Ministry of Water Resources, GoI. (2006). Report of Sub-Committee on More Crop and Income per Drop of Water. Retrieved from <http://wrmin.nic.in/forms/list.aspx?lid=473> on 21 July 2016.
6. MoAFW, GoI (2019). Annual Report 2018-19. Department of Agriculture, Cooperation and Farmers Welfare.
7. Muhamad, F and Kadambot, H. M. S. 2016. Innovations in Dryland Agriculture. Book Published by Springer International Publishing AG 2016. ISBN No. 978-3-319-47928-6. <https://doi.org/10.1007/978-3-319-47928-6>
8. Niti Ayog. 2012. Report of working group on risk management in agriculture: for the eleventh five year plan 2007-2012. Government of India Report.
9. Srinivasa . R. Ch , Gopinath, K.A. , Prasad, J.V.N.S., Prasannakumar, and Singh, A. K. 2016. Climate Resilient Villages for Sustainable Food Security in Tropical India: Concept, Process, Technologies, Institutions, and Impact. *Advances in Agronomy*, Volume 140, ISSN 0065-2113. <http://dx.doi.org/10.1016/bs.agron.2016.06.003>.
10. Srinivasa Rao, Ch., Prasad, R.S. and Mohapatra, T. (2019) Climate Change and Indian Agriculture: Impacts, Coping Strategies, Programmes and Policy. Technical Bulletin/Policy Document 2019. Indian Council of Agricultural Research, Ministry of Agriculture and Farmers' Welfare and Ministry of Environment, Forestry and Climate Change, Government of India, New Delhi. p25.
11. Srinivasarao, Ch., Srinivas, T., Rao, R.V.S., Srinivasarao, N., Vinayagam, S.S., Krishnan, P. (2020). Climate Change and Indian Agriculture: Challenges and Adaptation Strategies, ICAR-National Academy of Agricultural Research Management, Hyderabad,

12. Swaminathan, M.S. & Bhavni, R.V. (2013). Food Production and Availability. Essential Prerequisites for Sustainable Food Security. *Indian J Med Res*, 138, pp. 383-391. Telangana, India. p-584.

List of Existing Documents Referred and Integrated

Sl. No	Title
1.	Manual for Drought Management, MoAFW
2.	Drought Management Plan, MoAFW
3.	Drought Proofing Plan
4.	District Agriculture Contingency Plans
5.	Crisis Management Plan for Drought
6.	Standard Operating Procedure for Responding to Natural Disasters
7.	Guidelines for Preparation of Action Plan - Prevention and Management of Heat Wave
8.	Landslide Risk Management Strategy
9.	Guidelines on Temporary Shelters for Disaster-Affected Families
10.	Guidelines on Prevention & Management of Thunderstorm & Lightning/Squall/Dust/Hailstorm & Strong Winds
11.	Guidelines on Minimum Standards of Relief
12.	Guidelines on Seismic Retrofitting of Deficient Buildings and Structures.
13.	Guidelines on Scaling, Type of Equipment and Training of Fire Services
14.	Guidelines on National Disaster Management Information and Communication System
15.	Guidelines on Management of Drought
16.	Guidelines on Management of Urban Flooding
17.	Guidelines on Management of Dead in the Aftermath of Disaster
18.	Guidelines on Management of Tsunamis
19.	Guidelines on Incident Response System
20.	Guidelines on Management of Landslides and Snow Avalanches
21.	Guidelines on Management of Cyclones
22.	Guidelines on Management of Floods
23.	Guidelines on Medical Preparedness and Mass Casualty Management
24.	Guidelines on Preparation of State Disaster Management Plans
25.	Guidelines on Management of Earthquakes

Do's and Don'ts

Annexure II

1. Fire

1.1 Do's and don'ts (For establishments)

Do's:

- Get your premises fire audited; check for loose electric connections; don't store combustible material near loose electric wires.
- In case of fire, dial 101 (or the special number for FIRE SERVICE in your area/town).
- If trapped lay down/sit near the floor; curtail the entry of smoke into the room; look for exit; breathe through wet cloth; learn about at least 2 escape routes and ensure they are free from obstacles. Remain calm, unplug all electrical appliances. Meet at the safe place after exit.
- Keep buckets of water and blankets ready.
- Keep fire extinguishers in working condition and regularly re-fill them.
- If clothes catch fire, STOP, DROP and ROLL. Conduct regular drills.
- In case of an uncontrolled fire, wrap the victim in a blanket, till the fire ceases.

Don'ts:

- Don't burn crackers in crowded, congested places, narrow lanes or inside the house. Don't cover crackers with tin containers or glass bottles for extra sound effect/fun.
- Avoid long loose clothes, as they are fast in catching fire.
- Don't dispose of lighted cigarette ends carelessly.
- Don't remove burnt clothing (unless it comes off easily).
- Don't apply adhesive dressing on the burnt area.

1.2 Do's and don'ts (For crops)

- Do not smoke near thick vegetation, do not leave a lighted cigarette/ bidi in dry vegetation areas.
- Do not leave any open fire in agriculture area after use.

- Lightning in places of dry vegetation causes fires, create a buffer zone to manage such fires, if possible, else alert forest officials and seek help.
- Try to put the fire out by digging or circle around it by water, if not possible, call the Fire brigade.
- Move farm animals & movable goods to safer places.
- Teach the causes and harm of fire to your family, friends and others. Make people aware of fire safety.
- One should not leave the burning wood sticks in or near the vegetation.
- Discourage Community from using slash & burn method for cultivation. This also has severe health impacts as CO₂ levels rise.

2.Cold Wave/ Frost

2.1 Do's and Don'ts

- Developing a crop inventory at the appropriate level which is more susceptible to cold wave/ frost like pulses.
- Promoting cultivation of cold/frost resistant plants/crops/ varieties in frost-prone areas to minimize crop loss.
- Initiate location-specific measures as outlined in District Crop Contingency Plans.
- Developing extension manual for cold wave/ frost management for different types of crops/ stages of crop development etc as per the local contingency plan.
- Manual on low-cost design of climate-resilient livestock shed/ shelter.
- Thermal insulation by the application of locally available organic mulches to reduce the cooling rate of the soil surface and keeps the soil warm.
- Planting of windbreaks/shelter belts around orchards in cold wave prone areas to reduce the wind speeds and the wind chill effect in the leeward side besides minimizing the sensible heat losses from the protected crop.
- Design & implement sensitization programmes-frost management educational programmes for farmers, extension workers etc. with special emphasis on risk reduction and preparedness.

3. Heat wave

3.1 Do's and Don'ts

- Establish Early Warning System and Inter-Agency Coordination for raising alerts on high and extreme temperatures.
- Initiate location-specific measures as outlined in District Crop Contingency Plans.
- Sensitization cum training programme at the local level to recognize and respond to heat-related stresses both on agriculture and farm labour.
- Disseminating public awareness messages on how to protect against the extreme heat using IEC material.
- Provide the manual on design of climate-friendly animal sheds/ shelters.

4. Cyclone

4.1 Do's and don'ts

- Listen to radio or TV weather reports and alert everyone through a loudspeaker or by going home to home.
- During the eye of the storm, move to the other side of your shelter, since the wind will now come from the opposite direction.
- Do not go out till officially advised that it is safe. If evacuated, wait till advised to go back.
- Do not use power points until they have been checked.
- For agricultural fields, the most important measure is protecting the livestock of affected farm families. Livestock must be provided shelter and feed immediately.
- Selecting rice variety with kneeing ability (the ability to keep the reproductive parts above water).
- Biological drainage by specific kind of vegetation like Casuarina, Eucalyptus is a promising tool to improve drainage situation.
- Salinity tolerant crops should be grown.
- Facilitation for quick harvest and post-harvest management.
- Planting time should be adjusted so that reproductive stage of the crop does not coincide with the peak period of cyclone occurrence.

- Provision of support, using bunch of stakes made of bamboo often overcomes moderate wind speed.
- Wind-brake help in reducing wind speed. Promotion of several tiers of wind-brake plants near the sea coast effectively reduces wind speed. Also, it helps in reducing the adverse effects of high tides by lowering the amount of saline water and sand mass.
- Cyclonic rainfall and water logging forces the farmers for delaying field preparation and planting of winter season vegetables. Post-cyclone rainfall may damage the vegetable nursery. Vegetable seedlings should be raised under low-cost poly houses for getting healthy seedlings, well in advance in the season.

5. Pest Attack

While going for insecticide spraying for locust control, the following points must be in mind:-

- Generally, locust control is carried out well away from villages, farms or other dwellings. In some situations, however, insecticide applications may need to be done closer to habitations. During and immediately after spraying, you should not approach the fields that are being treated.
- Keep a distance from the insecticide treatments to avoid exposure to the spray droplets. If so instructed by the control team or the local authorities, cover the wells or drinking water points in the village or close to the house with a tarpaulin. Do not enter the sprayed fields for at least 48 hours after spraying.
- If your field is treated with insecticides, you should wait for a minimum number of days before you can harvest the crop. This is called the pre-harvest interval.
- If your livestock grazes in or close to pastures treated with insecticides, you should wait for a minimum number of days before you can let the animals re-enter the treated plots. This is called the withholding period. If you respect the withholding period, pesticide residues on the grass will not pose a risk for your livestock nor for consumers who are drinking milk or eating meat from your animals.

6. Earthquake

6.1 Do's and don'ts (Before and during)

- Make new constructions earthquake-resistant in consultation with a professional structural engineer.
- Conduct regular Mock Drills for students, farmers, staff and the local community.

- Falling objects must be given retro filling so that they don't fall while shaking and cause harm.
- During an earthquake stay calm; if inside, Stay inside. "DROP, COVER and HOLD! Drop under firm furniture. Cover as much of your head and upper body as you can. Hold onto any secure furniture. Move to an inside wall and sit with your back to the wall, bring your knees to your chest and cover your head. Stay away from the mirror and windows. Do not exit the building during the shaking. Do not use the lift.
- If outdoors, move to an open area away from all structure, especially building, bridges, trees and overhead power lines

6.2 Do's and don'ts (After)

- Move cautiously and check for unstable objects and other hazards above and around you. Check yourself for injuries. Help those in need.
- Check all power connections at home/ office before switching them ON. BEWARE: chances of Short circuits might happen. Stay out of damaged buildings.
- Anticipate aftershocks, especially if the shaking lasted longer than two minutes.
- Listen to the radio or watch local TV for emergency information and additional safety instructions.

7. Drought

7.1 Do's and don'ts

- For preparedness , adopt Rainwater management practices(both in situ and ex situ), groundwater recharging, soil fertility management, integrated nutrient management practices , intercropping systems, provision for farm mechanization through custom hiring centres, seed and fodder production systems either at individual or community level, nutrient banks for soil health, animal health care,
- For real-time contingency plan implementation to cope with delayed onset of monsoon, early/midseason/terminal drought, provision for seed of contingency/alternate field crops/fodder crops, pesticides or plant protection, chemicals to mitigate dryspells, provision for water for life saving irrigation to crops and drinking water for human and animal population
- Do not have water harvesting structures like farm pond etc. in unsuitable locations

- Roof water harvesting.
- Never wastewater, use it to water your indoor plants or garden, especially in summers.
- Repair dripping taps by replacing washers.
- Check all plumbing for leaks and get them repaired.
- Choose appliances that are more energy and water-efficient.
- Install irrigation devices that are the most water efficient for each use, such as micro and drip irrigation.
- Avoid flushing the toilet unnecessarily.
- Avoid letting the water run while brushing your teeth, washing your face or shaving etc. Use buckets instead of showers while bathing.

8. Landslide

8.1. Do's and don'ts (Before and During)

- Avoid building houses near steep slopes, close to mountain edges, near drainage ways or along natural erosion valleys.
- Become familiar with the land around you. Avoid areas with debris flow.
- In mudflow areas, build channels to direct the flow around buildings.
- Stay alert and awake. Stay Calm and do not panic. Stay together.
- Listen for unusual sounds that might indicate moving debris, such as trees cracking or boulders knocking together.
- Move away from the path of a landslide or debris flow quickly.
- Avoid river valleys and low-lying areas.
- If you are near a stream or channel, be alert for any sudden increase or decrease in water flow and notice whether the water changes from clear to muddy. It is a sign of mudslide/landslide nearby. Inform nearest tehsil/ district headquarters.
- Plant trees and mesh the hillocks to protect soil from eroding.

8.2 Do's and don'ts (After)

- Go to designated public shelter if you have been asked to evacuate.

- Stay away from the slide area as there may be danger of additional slides.
- Check for injured and trapped persons near the slide, without entering the direct slide area. Direct rescuers to their locations.
- Do not move injured person without rendering first aid unless in acute danger state.

9. Flood

9.1 Do's and don'ts

- *All your family members should know the safe route to nearest shelter/raised shelters.*
- Tune to your local radio/TV for warnings and advice. Have an emergency kit ready with basic medicines and sanitary pads, baby food items, important documents etc.
- Keep dry food, drinking water and clothes ready.
- Use sandbags to seal entry points around doors and vents. Also, seal windows if the water is likely to rise that high.
- Do not let children and pregnant women remain empty stomach.
- Be careful of snake bites which are common in post floods.
- Move to high rise floor, raise furniture, clothing and valuables onto beds, tables etc from getting wet.
- Do not get into the water of unknown depth and current.
- Do not allow children to play in, or near floodwaters.
- Keep the harvested crops in a safe and elevated area.
- Store the seeds in a dry area.
- Use levees, bunds, reservoirs, and weirs to prevent rivers from bursting their banks.
- Identify fields at the higher ground where livestock can be moved to safety and gain permission to use them in advance.
- Identify stock, machinery and tools that can easily be moved off the farm to prevent loss or damage.
- Identify any chemicals or fuels on the farm that could contaminate floodwater and need to be moved to safety during a flood.

10. Tsunami

10.1 Do's and don'ts

- Find out if your home and agriculture field is in the danger zone.
- Coastal areas within 1 mile (1.6 km) of the sea and less than 25 ft (7.5 m) above sea level are at high risk; make an early assessment of the best route to higher ground.
- People living along the coast should consider an earthquake or a strong ground rumbling as a warning signal.
- Try and climb a raised platform or climb the highest floor of any nearby house or building.
- Make evacuation plans and a safe route for evacuation. Stay away from the beach.
- Listen to a radio or television to get the latest information and be ready to evacuate if asked to do so.
- Familiarize yourself with warning signs, such as a sudden change in the level of coastal waters.
- If you hear an official warning, evacuate at once, protect your seeds, harvested crops, farm implements and types of equipments by shifting it to a safer place.
- Tsunamis often cause severe floods; make sure that you are prepared for it.
- Stay away from flooded and damaged areas until officials say it is safe to return.

Follow up activities proposed:

- 1) All the institute and organizations under the Ministry should prepare their plan.
- 2) A simplified user manual should be prepared.
- 3) District Handbook on Disaster Risk Management should be prepared.
- 4) Detailing of under AgrisCap (Agriculture Sector Resilience Capacity Building Programme).
- 5) Training and Capacity development under AgrisCap (Agriculture Sector Resilience Capacity. Building Programme) should be taken up
- 6) Development of training module.
- 7) Development of training tool kit.

Organizations under DARE

- 1 ICAR
- 2 Central Agricultural Universities (CAUs)
- 3 Agrinnovate India
- 4 Agricultural Scientists Recruitment Board (ASRB)

List of ICAR institutes

1. ICAR-Central Island Agricultural Research Institute, Port Blair
2. ICAR-Central Arid Zone Research Institute, Jodhpur
3. ICAR-Central Avian Research Institute, Izatnagar
4. ICAR-Central Inland Fisheries Research Institute, Barrackpore
5. ICAR-Central Institute Brackishwater Aquaculture, Chennai
6. ICAR-Central Institute for Research on Buffaloes, Hissar
7. ICAR-Central Institute for Research on Goats, Makhdoom
8. ICAR-Central Institute of Agricultural Engineering, Bhopal
9. ICAR-Central Institute for Arid Horticulture, Bikaner
10. ICAR-Central Institute of Cotton Research, Nagpur
11. ICAR-Central Institute of Fisheries Technology, Cochin
12. ICAR-Central Institute of Freshwater Aquaculture, Bhubneshwar
13. ICAR-Central Institute of Research on Cotton Technology, Mumbai
14. ICAR-Central Institute of Sub Tropical Horticulture, Lucknow
15. ICAR-Central Institute of Temperate Horticulture, Srinagar
16. ICAR-Central Institute on Post harvest Engineering and Technology, Ludhiana
17. ICAR-Central Marine Fisheries Research Institute, Kochi
18. ICAR-Central Plantation Crops Research Institute, Kasargod
19. ICAR-Central Potato Research Institute, Shimla
20. ICAR-Central Research Institute for Jute and Allied Fibres, Barrackpore
21. ICAR-Central Research Institute of Dryland Agriculture, Hyderabad
22. ICAR-National Rice Research Institute, Cuttack
23. ICAR-Central Sheep and Wool Research Institute, Avikanagar, Rajasthan
24. ICAR- Indian Institute of Soil and Water Conservation, Dehradun
25. ICAR-Central Soil Salinity Research Institute, Karnal

26. ICAR-Central Tobacco Research Institute, Rajahmundry
27. ICAR-Central Tuber Crops Research Institute, Trivandrum
28. ICAR-ICAR Research Complex for Eastern Region, Patna
29. ICAR-ICAR Research Complex for NEH Region, Barapani
30. ICAR-Central Coastal Agricultural Research Institute, Ela, Old Goa, Goa
31. ICAR-Indian Agricultural Statistics Research Institute, New Delhi
32. ICAR-Indian Grassland and Fodder Research Institute, Jhansi
33. ICAR-Indian Institute of Agricultural Biotechnology, Ranchi
34. ICAR-Indian Institute of Horticultural Research, Bengaluru
35. ICAR-Indian Institute of Natural Resins and Gums, Ranchi
36. ICAR-Indian Institute of Pulses Research, Kanpur
37. ICAR-Indian Institute of Soil Sciences, Bhopal
38. ICAR-Indian Institute of Spices Research, Calicut
39. ICAR-Indian Institute of Sugarcane Research, Lucknow
40. ICAR-Indian Institute of Vegetable Research, Varanasi
41. ICAR-National Academy of Agricultural Research & Management, Hyderabad
42. ICAR-National Institute of Biotic Stresses Management, Raipur
43. ICAR-National Institute of Abiotic Stress Management, Malegaon, Maharashtra
44. ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru
45. ICAR-National Institute of Research on Jute & Allied Fibre Technology, Kolkata
46. ICAR-National Institute of Veterinary Epidemiology and Disease Informatics, Hebbal, Bengaluru
47. ICAR-Sugarcane Breeding Institute, Coimbatore
48. ICAR-Vivekananda Parvatiya Krishi AnusandhanSansthan, Almora
49. ICAR-Central Institute for Research on Cattle, Meerut, Uttar Pradesh
50. ICAR-National Institute of High Security Animal Diseases, Bhopal
51. ICAR-Indian Institute of Maize Research, New Delhi
52. ICAR- Central Agroforestry Research Institute , Jhansi
53. ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi
54. ICAR- Indian Institute of Wheat and Barley Research, Karnal
55. ICAR- Indian Institute of Farming Systems Research, Modipuram
56. ICAR- Indian Institute of Millets Research, Hyderabad
57. ICAR- Indian Institute of Oilseeds Research, Hyderabad
58. ICAR- Indian Institute of Oil Palm Research, Pedavegi, West Godavari

59. ICAR- Indian Institute of Water Management, Bhubaneswar
60. ICAR-Indian Institute of Rice Research, Hyderabad
61. ICAR- Central Institute for Women in Agriculture, Bhubaneswar
62. ICAR-Central Citrus Research Institute, Nagpur
63. ICAR-Indian Institute of Seed Research, Mau
64. ICAR-Indian Agricultural Research Institute, Post Box No. 48, Hazaribag 825 301, Jharkhand

List of National Research Centres

1. ICAR-National Research Centre for Banana, Trichi
2. ICAR-National Research Centre for Grapes, Pune
3. ICAR-National Research Centre for Litchi, Muzaffarpur
4. ICAR-National Research Centre for Pomegranate, Solapur
5. ICAR-National Research Centre on Camel, Bikaner
6. ICAR-National Research Centre on Equines, Hisar
7. ICAR-National Research Centre on Meat, Hyderabad
8. ICAR-National Research Centre on Mithun, Medziphema, Nagaland
9. ICAR-National Research Centre on Orchids, Pakyong, Sikkim
10. ICAR-National Research Centre on Pig, Guwahati
11. ICAR-National Research Centre on Plant Biotechnology, New Delhi
12. ICAR-National Research Centre on Seed Spices, Ajmer
13. ICAR-National Research Centre on Yak, West Kemang
14. ICAR-National Centre for Integrated Pest Management, New Delhi
15. National Research Centre on Integrated Farming (ICAR-NRCIF), Motihari

National Bureaux

1. ICAR-National Bureau of Plant Genetics Resources, New Delhi
2. ICAR-National Bureau of Agriculturally Important Micro-organisms, Mau, Uttar Pradesh
3. ICAR-National Bureau of Agricultural Insect Resources, Bengaluru
4. ICAR-National Bureau of Soil Survey and Land Use Planning, Nagpur
5. ICAR-National Bureau of Animal Genetic Resources, Karnal
6. ICAR-National Bureau of Fish Genetic Resources, Lucknow`

Directorates/Project Directorates

1. ICAR-Directorate of Groundnut Research, Junagarh
2. ICAR-Directorate of Soybean Research, Indore
3. ICAR-Directorate of Rapeseed & Mustard Research, Bharatpur
4. ICAR-Directorate of Mushroom Research, Solan
5. ICAR-Directorate on Onion and Garlic Research, Pune
6. ICAR-Directorate of Cashew Research, Puttur
7. ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand
8. ICAR-Directorate of Floricultural Research, Pune, Maharashtra
9. ICAR-Directorate of Weed Research, Jabalpur
10. ICAR-Project Directorate on Foot & Mouth Disease, Mukteshwar
11. ICAR-Directorate of Poultry Research, Hyderabad
12. ICAR-Directorate of Knowledge Management in Agriculture (DKMA), New Delhi
13. ICAR-Directorate of Cold Water Fisheries Research, Bhimtal, Nainital

Central Agricultural Universities (CAUs)

1. Central Agricultural University, P.O. Box 23, Imphal-795004, Manipur
2. Rani Laxmi Bai Central Agricultural University, Jhansi, Uttar Pradesh
3. Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur)

List of Existing Resources with DoAC&FW and DARE

The various important infrastructures are listed below:

1. Seed production plot
2. Seed conditioning unit
3. Seed processing machinery
4. Seeds Storage structures
5. Central Seed testing labs
6. Seed certification officers
7. Seed banks under National Seed Reserve
8. Seed dealer outlets
9. Research farms/fields
10. Farm machineries/implements sheds
11. Post Harvest Storage Structures
12. Bank RBI involved only
13. NABARD
14. DFS (Administrative control)
15. Gene Banks
16. Laboratories
17. Class rooms
18. Dispensaries
19. Agromet Observation Units
20. Water Storage Structures
21. Irrigation systems and units
22. Animal shelters and sheds
23. Polyhouses
24. Offices
25. Parking lots
26. Plant Quarantine
27. Plant Health clinics
28. Fertilizer storages

The various important human and animal resources are listed below:

1. Seed grower and producers
2. Seed processing officials and Storages
3. Seed testing officials
4. Seed Certification officials
5. Seed storage in-charge

Seed dealer and distributor and Institutions like National Seed Corporation Ltd., KRIBCO, IFFCO, NAFED, HIL, ICAR, KVKs, 17 State Seed Corporations, 24 Seed Certification Agencies, 3 Central Seed testing labs, 130 State Seed testing labs

6. Farmers
7. Stakeholders
8. Students
9. Faculties
10. Scientists
11. Field/Lab Assistants
12. Other administrative/Office staff

Disaster Management Plan Template for the CAUs/ ICAR Institutes / Research Centres

As per the Disaster Management Act 2005 that every ministry/department/institute has to prepare their disaster management plan, Ministry of Agriculture and Farmers Welfare have prepared national disaster plan which is a blend of prescription and description. Accordingly, the other subordinate offices/ departments/institutes/ centres under MoAFW has to prepare their separate plan following the given template below and in accordance with the National Agriculture Disaster Management Plan. The process for making the plan of the institute is also shown below in the Figure 17.

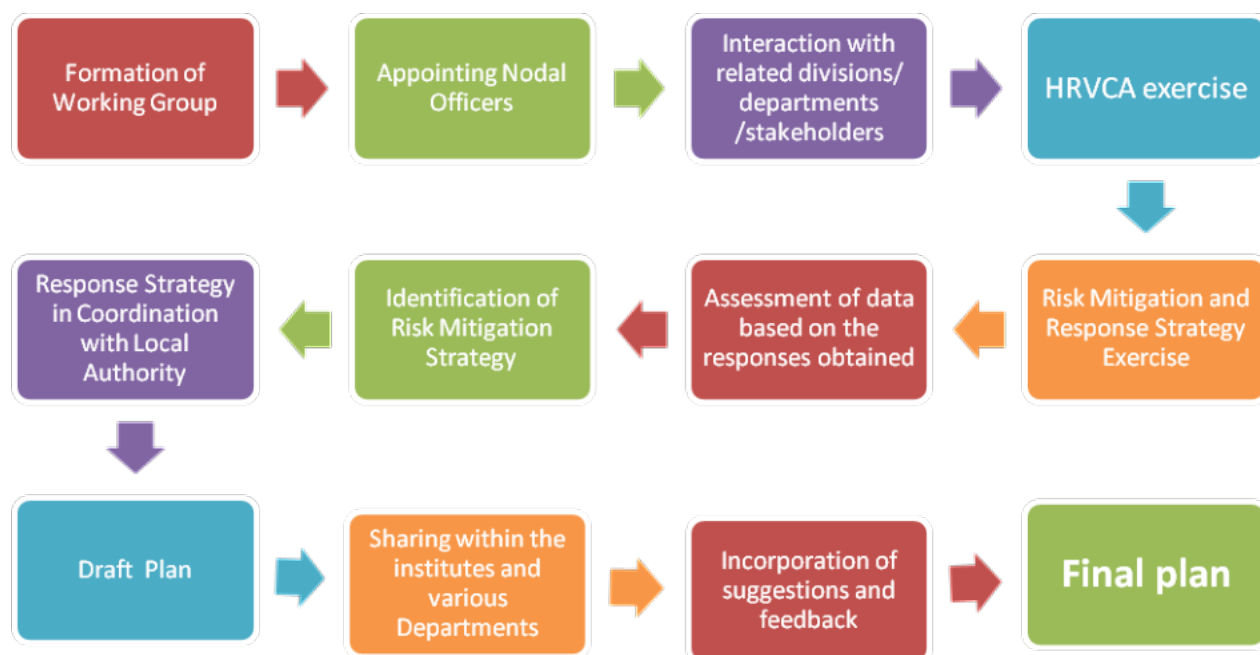


Figure 17: Process for making the plan of the Institute

1. Preliminaries

1.1 Profile of the Department/ Institute / Research Centre

(Describe mandate, domain of activities, whether the Department/ Institute / Research Centre has any primary nodal responsibility for Disaster Management or supporting roles)

1.2 Rationale

- In accordance with National Agriculture Disaster Management Plan (NADMP)
- Legal Mandate: As per DM Act and other relevant Acts, Roles and Regulations for addressing issues relating to disaster management/concerning issues.
- Compliance, conformity and alignment with NADMP.

1.3 Scope of the plan

- Disaster Management Cycle (from NADMP to provide clarity for full scope of DM responsibilities).

1.4 Vision

1.5 Time frames

- Short, Medium and Long Term- as per NADMP.
- Describe how the department/ institute/ research centre is committed to realizing the goals of NADMP.

1.6 Institutional Framework for Disaster Management

2. Hazard, Risk, Vulnerability and Capacity Analysis (HRVCA)

2.1 Disaster Risks, Vulnerabilities and Challenges

Highlight what is relevant to the department/institute/research centre; abstract from NADMP highlighting what is relevant to the department/institute/research centre. HRVCA to be conducted only for respective disasters.

2.2 Understanding Disaster Risks

- Role of department/institute/research centre in understanding and addressing various hazards described in the NADMP.
- Mapping of Hazards, Risks and Vulnerabilities and emerging concerns- those relevant to the department/institute/research centre.
- Capacity Analysis- Existing and those that must be developed.

3. Hazard specific Prevention and Mitigation Measures

- Short, Medium and Long term measures- as envisaged in NADMP.
- Instead of narrative and long description, the approach used in NADMP- i.e., a matrix giving plan and responsibility framework- should be used for each

thematic area and sub thematic area given in the NADMP where the Institute/Department has a role.

- Implementation should be given in terms of important action points vis-à-vis time frame, i.e., short, medium and long term- as in NADMP.
- Hazard specific Action Plans, as envisaged in NADMP but not limited to those.

4. Mainstreaming DRR

- Investing in DRR- structural measures (creating Disaster Resilient Infrastructure).
- Investing in DRR- non- structural measures.
- Strategies for sustainable development practices.
- Disaster Risk Governance- programmes and policies of the institute/department.

5. DRR

- Importance of special focus on more vulnerable groups- see NADMP, summarise the reasons based on relevant sections of NADMP.
- Gender concerns, including sexual minorities (LGBTQ).
- SC/ST or any other vulnerable group based on the geographical area and specific context.
- Children/aged/senior citizens/persons with disabilities/physically challenged.

6. Coherence of Disaster Risk Management across Resilient Development and Climate Change Action

- Sustainable Development Goals and DRR: Department's or institutes specific role/ plans to meet India's commitments for addressing global climate change and specific activities relating to DRR.
- Explain how this plan is aligned to the Sendai Framework- follow the approach adopted in NADMP.

7. Capacity Development and Communication

7.1 Capacity Development

- Overall capacity building of Department- Institutional/ Human Resource.

- Yearly calendar, keeping in view short, medium and long term time frames used in the NADMP.

7.2 Communication Strategy

- Internal- within the institute/ department.
- External (with other agencies).

8. Coordination- \horizontal and Vertical Linkages

- Inter-agency coordination.
- Coordination with state governments.
- Coordination with other stakeholders, like NGOs, private sector, civil society, etc.

9. Preparedness and Response

9.1 Preparedness

- Strategies and Corresponding Human Resource Planning (based on institutional framework and HRVCA process at all levels as explained above).
- Lay down strategies and activities for preparedness and response phases, such as early warning and rescue (SAR), relief, coordination, etc.
- Description of teams and nodal officers with their respective roles and responsibilities.
- Flow chart of activities with timelines.

9.2 Early warning/Alert System

- Internal and External (On-site and off-site plans for field entities, as applicable depending on the role of the department/institute).
- Control Room- Structure/ Protocols/Activation and Deactivation.
- Procedures for receiving and disseminating warnings (Nodal agencies responsible for issuance of early warning need to develop appropriate strategy for timely and effective dissemination of early warning and forecast to all concerned.

9.3 Hazard Specific Response Plans

(For major hazards relevant to the role of the department/institute).

- Follow the approach in NADMP- used table/matrix, not narratives
- Define scenario/hazard/ incident
- Define impact zones
- Identify resources required for scenario/hazards/ incident under consideration and their positions.
- SOP and relevant manuals

Action Plan

Task	Agency/Person Responsible	Remark
Raise alert		
Assess and notify		
Activate control room		
Establish command		
Prioritise actions		
Mobilise and deploy resources		
SAR/ Evacuation		
Establish Relief operations		
Assess situation dynamics to readjust action plan		

9.4 Activation of Response Plan

Departments/Institutes to develop their SOPs for actions to be taken by all concerned on the receipt of an early warning or the occurrence of a disaster and prescribe intensified response activities for the range of -72 hrs to +72 vis-s-vis disaster event, where early warning available or for +72 hrs on the occurrence of a disaster if early warning not available..

9.5 Logistics/Service Delivery Mechanism during disasters

- Preparedness plan for the uninterrupted functioning of departments/institutes

10. Recovery and Reconstruction

Roles envisaged for the ministry/department in the different aspects:

- Recovery and Reconstruction
- Damage, Loss and Need Assessment
- Early, mid and long-term recovery (linkages with other programmes of central and state governments)
- Build Back Better Approach

11. Budgetary Provisions

Explanatory note: A plan and disaster management cannot be successful without suitable budgetary provisions. Budgetary provisions should be made different activities and for different phases of disaster management.)

12. Plan Management

- Development, Approval, Implementation, Review and Revision
- Documentation of incidents/ best practices/lessons learned.

Annexures

- Maps (hazard location)
- Directories (Emergency Contact Number)
- Other important / related references
- Index for quick reference to relevant sections

