



KARNATAKA STATE DISASTER MANAGEMENT PLAN 2020-21



Volume - 1 OVERVIEW



KARNATAKA STATE DISASTER MANAGEMENT PLAN 2020-21

**VOLUME-1
OVERVIEW**

KARNATAKA STATE DISASTER MANAGEMENT AUTHORITY
(Department of Revenue (DM) Government of Karnataka)

B.S. YEDIYURAPPA
CHIEF MINISTER



VIDHANA SOUDHA
BENGALURU - 560 001

Date: 12/08/2020

MESSAGE

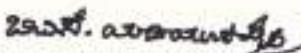
I am happy to note that the Karnataka State Disaster Management Authority (KSDMA) has prepared the Karnataka State Disaster Management Plan2020-21, in accordance with the provisions of the DM Act 2005. This plan has been prepared by carefully following the guidance given in the National Policy on Disaster Management (NPDM-2009), Karnataka State Disaster Management Policy-2020, Prime Minister's 10 Point Agenda for Disaster Risk Reduction and SENDAI Framework for DRR (2015-30). This Plan has been developed aligning to the National Disaster Management Plan (NDMP-2019).

The new plan has incorporated the experiences learnt from the disasters in the past and also the best practices adopted in Disaster Management elsewhere. This plan is very comprehensive and has adopted an inclusive approach. Relevant features have been added to cover more disasters including Pandemic and climate change. This plan will certainly guide the stakeholders understanding about the various factors involved in Disasters Management.

The responsibility framework brought out in this plan clearly defines the actions to be taken by the Departments concerned and the community. It also inspires a culture of preparedness and mitigation. The plan envisages participation of all the stakeholders to set in motion of DM activities for response and recovery without loss of critical time in the event of any disaster. The vision of disaster resilient Karnataka will be achieved through effective implementation of this plan collectively by the Government, Private, NGO sand Community.

I appreciate the efforts of KSDMA in preparing this comprehensive Plan and hope this will help in achieving Disaster Resilient Karnataka in days to come.

Date: 12.08.2020
Place: BENGALURU


(B.S. YEDIYURAPPA)

R. ASHOKA

Revenue Minister and vice chairman,
Karnataka State Disaster Management Authority



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MESSAGE

The Karnataka State Disaster Management Authority (KSDMA) has been providing effective overall disaster governance in the State by ensuring inter-agency coordination both at the State and district levels. State of Karnataka has been proactively adopting innovative and path-breaking initiatives and approaches to deal with the Disasters.

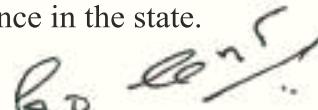
In continuation of that practice, the State Disaster Management Plan: 2020-21 has been prepared and aligned with the National DM plan 2019. The revised plan encompasses the components of the Global Agreements like SENDAI framework on DRR and Sustainable Developmental Goals. The plan provides a framework for the short-term, medium-term and long-term strategies aiming at Disaster Risk Reduction at all levels of Disaster Governance.

The Karnataka Government has initiated proactive measures to constitute and setup SDMF and SDRF to cater to the speedy mitigation and response. The need based training programs are being conducted for the officers of Government Departments, PRIs, ULBs and other organizations to build the capacity for preparedness, mitigation, prevention and response. The KSDMP-2020-21 clearly defines the responsibilities, operating procedures for the stakeholders which have to be taken up before, during and after the disaster.

For the first time, a model Gram panchayath level DM plan has been included in this plan. The long term strategy for combating the Pandemic/Endemic outbreak has also been included in this plan

I congratulate Dr. Manoj Rajan, Commissioner, KSDMA and his team for bringing out an inclusive SDMP which is going to serve as a guiding tool for the administrators at all level to align their DM plans and accomplish Disaster resilience in the state.

Date: 11.08.2020
Place: Bengaluru


(R.ASHOHA)

Revenue Minister & Vice Chairman
Karnataka State Disaster Management Authority



Government of Karnataka
Karnataka State Disaster Management Authority
Government of Karnataka

FOREWORD

The recurring natural disasters like flood, landslides, drought and human-induced hazards has necessitated the Government of Karnataka to constantly be vigilant and prepared to face the challenges. Recognising the fact, Government of Karnataka has established improved institutional mechanisms for Disaster Risk Reduction to mitigate the impact of disasters on the community. Some of the proactive Disaster Management initiatives taken up in Karnataka have been hailed as exemplary and emulated in other parts of the country.

In order to facilitate and guide the Disaster Management activities in the state, Karnataka State Disaster Management Plan (KSDMP) has been prepared and updated annually under the guidance of State Executive Committee (SEC). The KSDMP has been providing relevant inputs to the stakeholders to effectively deal with disasters.

This Disaster Management Plan (KSDMP 2020-21) is on the lines of National Disaster Management Plan 2019 and streamlined as per the post-2015 Global agreements like SENDAI Framework for DRR (2015-30), Sustainable Developmental Goals and COP-21. The Plan also incorporates the vision of the Prime Minister's 10-point agenda on DRR, the guidance given in the National Policy on Disaster Management (NPDM-2009) and the Karnataka State Disaster Management Policy-2020.

The KSDMP-2020-21 is an improved version of the earlier plans, the plan encompasses and elucidate various thematic areas of disaster management including Understanding the Risk, Inter-Agency Coordination, Preparedness & Mitigation, Disaster Risk Reduction, Capacity Development, Build Back Better Recovery, Rehabilitation and Reconstruction. As climate change significantly impacts on the frequency and the intensity of disasters, a new thematic area "Climate Change Risk Management" for disaster risk management has also been added in the responsibility framework. This apart, a unique Gram-panchayath level DM Plan is included in this Plan besides a

comprehensive strategy for managing Pandemic & Epidemic situations, in the background of the COVID 19 Pandemic situation.

The Plan clearly defines the responsibilities of the State, District and Departmental level authorities. Building Disaster Resilience Responsibility Framework and Preparedness & Response, outlined in Volume II of this plan are the cornerstone of this document. Efforts have been made to streamline the plan to make it easier for the execution.

Although disasters have no boundary, sections of the community both in urban and rural areas are generally found to be more susceptible to natural and man-induced disasters due to inadequate physical and socio-economic capacities. Thus, a special emphasis has been given to make the plan inclusive of social, economic and other vulnerable sections of the community. Respective departments, district authorities, PRIs, ULBs etc. may include the DRR initiatives in their plans and programs.

We hope that this plan will assist and help all the stakeholders in their efforts and initiatives towards creating disaster-resilient Karnataka.

We compliment Commissioner, KSDMA and his team for preparing this comprehensive State Disaster Management Plan.

Anjum Parwez
Principal Secretary
Revenue Department (DM)

V Manjula
Director General
ATI, Mysore

Vandita Sharma
ACS & Development
Commissioner

T.M.Vijaya Bhaskar
Chief Secretary &
Chairman, SEC



Government of Karnataka
Karnataka State Disaster Management Authority
Government of Karnataka

PREFACE

The Karnataka State has been facing successive disasters threatening normal life and property, of a large number of people and unsettling communities at large. To deal with such devastating situations of huge magnitude and to gear up in short time a Comprehensive Disaster Management Plan has to be in place, detailing the various action plans to enable the state machinery to handle the situations efficiently and effectively.

Disaster Management Planning is a dynamic one in as much as each disaster unravels its changing face and it is essential to evolve a revised strategic plan to deal with such new threats. Accordingly, the Karnataka State Disaster Management Authority (KSDMA) took up the important task of preparing a new Karnataka State Disaster Management Plan 2020-2021 (KSDMP) in line with the provisions of the DM Act 2005. The new KSDMP includes relevant factors from the Global Agreements on DRR, the guidelines in the National and State DM Policies and also experiences gained from the recent Disasters in the state.

The State Executive Committee (SEC) has provided valuable guidance and inputs for the revision of this Plan. The CDM-ATI activated the process of cross-learning workshops, consultative meetings with various stakeholders. The draft plan was prepared after incorporating the valuable inputs and suggestions from departments concerned and KSDMA's advisory committee. The draft Plan after meticulous review by KSDMA and KSNDMC was approved by the State Executive Committee.

The KSDMP-2020-21 has several new and important features. The responsibility of different stakeholders with respect to several thematic areas of Disaster management has been clearly defined. The responsibility framework, outlined in Volume II of this plan provides valuable and actionable information to the Government agencies and the community at large to effectively deal with the Disasters. In order to facilitate the stakeholders to comprehend different phases of disasters and take necessary action, efforts have been made to make the Plan simpler. A special emphasis has also been made to make the plan inclusive of social, economic and other vulnerable sections of the community.

The new DM plan will serve as a guide for the District administrations to prepare Disaster Management plans for their Districts by customizing to the vulnerability of the area. It also provides inputs for the Departments to revise their DM Plans by mainstreaming the Disaster Risk Reduction measures in planning and executing programs and schemes.

A novel feature in the New Plan is about the preparation of DM plan at Gram panchayath level. This initiative, a first of its kind in the country, is intended to facilitate the respective Gram Panchayaths to involve, prepare and implement their own DM plan.

In order to deal with the very rare Pandemic disasters like COVID-19 and minimize the impact on the community, the state government has taken several innovative and effective measures. Although the return period of the pandemic situation is said to be a century, it is necessary to be prepared with an effective plan to deal with such rare situations also. In this background, with the lessons learnt from the current COVID-19 management, a long-term comprehensive strategy for managing Pandemic & Epidemic situations have been incorporated.

With contributions from various people, all efforts are made to make this SDMP 2020-21 include methodologies and enable all the concerned to handle emerging dimensions of disasters more effectively. However, as the DM plan is a dynamic document even after careful analysis and revision, it has a scope for further improvement.

I express my sincere gratitude to Chairman and Members of KSDMA, I express my thanks to Sri. Vijay Bhaskar T M, Chief Secretary, Smt. Vandita Sharma, ACS & Development Commissioner, Smt. Manjula V, Director General, ATI, Sri. Anil Kumar T K Principal Secretary, Sri. Anjum Parvez, Principal Secretary whose continuous support, guidance and critical suggestions have greatly enhanced the quality of this Plan.

I acknowledge my thanks to the contributions of faculty and staff of CDM, ATI, Officers of Line departments, Experts from KSDMA, KSNDMC and Consultants supported by UNICEF.

Dr. Manoj Rajan
Commissioner
KSDMA

ABBREVIATIONS

AMCDRR	Asian Ministerial Conference on Disaster Risk Reduction
ANM	Auxiliary Nurse Midwife
ANSSIRD	Abdul Nazeer Sab State Institute of Rural Development
ASHA	Accredited Social Health Activist
ATI	Administrative Training Institute
AWS	Automatic Weather Stations
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
BBB	Building Back Better
BBBP	Beti Bachao Beti Padhao
BIS	Bureau of Indian Standards
BMTPC	Building Materials and Technology Promotion Council
BPHE	Biological and Public Health Emergencies
CAPF	Central Armed Police Forces
CBDM	Community Based Disaster Management
CBDR	Common but Differentiated Responsibilities
CBO	Community Based Organization
CBRN	Chemical, Biological, Radiological and Nuclear
CCA	Climate Change Adaptation
CCS	Cabinet Committee on Security
CIMAH	Control of Industrial Major Accident Hazards
COP21	Conference of Parties-21
DALA	Damage and Loss Assessment
DEOC	District Emergency Operation Centre
DM	Disaster Management
DMA-ULBs	Directorate of Municipal Administration- Urban Local Bodies
DMG	Department of Mines & Geology
DRR	Disaster Risk Reduction
DSJE	Department of Social Justice and Empowerment
DTCP	Department of Town and Country Planning
DWCD	Department of Women and Child Development
DWDSC	Department for the Empowerment of Differently Abled and Senior Citizens
EFC	Expenditure Finance Committee
EFD	Ecology & Forest Department
EIA	Environmental Impact Assessment
EMPRI	Environmental Management and Policy Research Institute
EOC	Emergency Operations Center
ESF	Emergency Support Functions
EWS	Early Warning Systems
FCI	Food Corporation of India
FSI	Forest Survey of India
GACC	Global Agreement on Climate Change
GSI	Geological Survey of India
HAZCHEM	Hazardous Chemicals
HAZMAT	Hazardous Materials
HFL	Highest Flood Level

HRNA	Human Recovery Needs Assessment
HRVCA	Hazard Risk Vulnerability and Capacity Assessment
IAEA	International Atomic Energy Agency
ICMBA	Important Coastal and Marine Biodiversity Areas
IDRN	Indian Disaster Resource Network
IGMSY	Indira Gandhi MatruTwa Sahayoga Yojana
INCOIS	Indian National Centre for Ocean Information Services
IND	Improvised Nuclear Device
IPCC	Inter-Governmental Panel on Climate Change
IRS	Incident Response System
IRT	Incident Response Team
ISRO	Indian Space Research Organization
KFD	Kyasanur Forest Disease
KSCCW	Karnataka State Council for Child Welfare
KSF&ES	Karnataka State Fire & Emergency services
KSNDMC	Karnataka State Natural Disaster Monitoring Centre
KSPCB	Karnataka State Pollution Control Board
KRSRAC	Karnataka State Remote Sensing Application Centre
KSWAN	Karnataka State Wide Area Network
KSY	Kishori Shakthi Yojana
KUWS&DB	Karnataka Urban Water Supply and Drainage Board
LH&DC	Livestock Health & Disease Control Scheme
LSA	Learning Support Assistant
MAH	Major Accident Hazard
MCH	Mean Corpuscular Hemoglobin
MDGs	Millennium Development Goals
MOEFCC	Ministry of Environment, Forest and Climate Change
MoES	Ministry of Earth Sciences
NBC	National Building Code
NBCC	National Buildings Construction Corporation
NCMC	National Crisis Management Committee
NCRMP	National Cyclone Risk Mitigation Project
NDC	Nationally Determined Contributions
NDMF	National Disaster Mitigation Fund
NDMP	National Disaster Management Plan
NDRF	National Disaster Response Fund
NDRMF	National Disaster Risk Mitigation Fund
NDVI	Normalized Differential Vegetation Index
NEC	National Electrical Code
NICRA	National Initiative on Climate Resilient Agriculture
NIDM	National Institute of Disaster Management
NLM	National Livestock Mission
NMSA	National Mission on Sustainable Agriculture
NPDM	National Policy on Disaster Management
NRE	Nuclear and Radiological Emergencies
NRSC	National Remote Sensing Centre
ODR	Owner Driven Reconstruction
OIEWG	Open-ended Intergovernmental Expert Working Group
PDNA	Post-Disaster Needs Assessment
PHI	Protected Health Information

PMFBY	Pradhan Mantri Fasal Bima Yojana
POA	Prevention of Atrocities
PPE	Personal Protective Equipment
PPQS	Plant Protection Quarantine and Storage
PRD	Panchayat Raj Department
PWD	Persons with Disabilities
QRMT	Quick Reaction Medical Teams
RCH	Reproductive and Child Health
RDD	Radiological Dispersal Device
RGRHCL	Rajiv Gandhi Rural Housing Corporation LTD
RMI	Risk Management and Insurance
SCMC	State Crisis Management Committee
SCPS	State Child Protection Society
SCZMP	State Coastal Zone Management Plan
SDG	Sustainable Development Goals
SDMF	State Disaster Mitigation Fund
SDRF	State Disaster Response Force
SDRMF	State Disaster Risk Mitigation Fund
SEBC	Socially and Educationally Backward Classes
SEC	State Executive Committee
SEOC	State Emergency Operation Centers
SFC	Standing Finance Committee
SFDRR	Sendai Framework for Disaster Risk Reduction
TAA	Thematic Area for Action
ULB	Urban Local Bodies
UNDESA	United Nations Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction
WAP	Wildlife Action Plan
WCDRR	World Conference on Disaster Risk Reduction
WFP	World Food Program
WMO	World Meteorological Organization
WSUD	Water Sensitive Urban Design

EXECUTIVE SUMMARY

The Karnataka State Disaster Management Plan (KSDMP) provides a framework and guidance to the State Government agencies and other stakeholders for managing the disasters, in accordance with the provisions of the DM Act 2005. The KSDMP is being revised and upgraded annually, by incorporating the lessons learnt from the recent disasters that occurred in the State and also the best practices adopted elsewhere towards disaster management. The plan has been prepared by carefully incorporating the guidance given in the National Policy on Disaster Management (NPDM-2009), Karnataka State Disaster Management Policy-2020, Prime Minister's 10 Point Agenda for Disaster Risk Reduction and SENDAI Framework for DRR (2015-30). This Plan has been developed aligning to the National Disaster Management Plan (NDMP-2019).

The following 12 chapters of KSDMP Volume-1 encompasses different phases of Disaster Management viz. Disaster Risk Reduction (DRR), Mitigation, Preparedness, Response, Recovery and betterment reconstruction.

Introduction Chapter briefly present the rationale, vision and broader approach towards preparing this plan. The approach adopted for this plan may broadly be grouped into preparedness, response, recovery and mitigation. The classification of different disasters and the Time frames for implementing the short, medium and long-term Disaster Risk Reduction (DRR) measures are given in this Chapter. The institutional mechanism employed at State and District levels for Disaster Risk Reduction (DRR) in Karnataka has also been enlisted in it.

The information on **Hazard Risks and Challenges**, provided in **Chapter 2** is one of the prerequisites for developing a disaster management plan. The physiographic features of the State, Rainfall distribution, major Disaster events occurred in the State in the last decade and the vulnerability of the State for both Natural & Man-made disasters have been given in this Chapter. It also deals with the impact of Climate Change on Disaster vulnerability, Ecology & Wildlife.

The State Disaster Management Plan needs to be in **Coherence and Mutual Reinforcement** for DRR of Post- 2015 Global Frameworks and the state DM plan has to be aligned with the National plan. Thus the focus of **Chapter 3** is towards the prioritization and consolidation of the State initiatives in DRR component

for achieving the Sustainable Development Goals (SDG) through implementing the Sendai Framework for DRR and Climate Change Agreement.

The socially and economically weaker sections of the society is highly vulnerable to both the Natural and Human-induced disasters. Therefore, the disaster Management Plan has to give a special emphasis on this section. **Chapter 4** underlines the importance of Social Inclusion in DM, underlines the responsibilities of State & Districts towards setting the social order by eliminating the structural inequalities and addressing the Gender-based vulnerabilities etc. It also includes the responsibility of the State towards protecting the rights and equality of the individual and / or community, acknowledging diversity and contributing to resilience for everyone.

The disasters can be effectively managed with a clear vision and plan with a well-defined timeline. Also, the Government Agencies should have respective DM plans at all levels, by **Mainstreaming the DRR** into the Development plans. **Chapter 5** provides guidance for incorporating the sector-specific disaster mitigation measures in the SDMP & DDMP's as per the DM Act 2005. It also mentions the key areas for mainstreaming the DRR component.

An overview of **Building Disaster Resilience** for effective DRM is given in **Chapter 6**. This includes all aspects of pre-disaster risk management viz., Understanding the Risk, Inter-Agency Coordination, Investing in DRR - Structural & Non-Structural Measures, Capacity Building and Climate Change Risk Management.

Disasters result in considerable disruption of normal life, enormous suffering, loss of lives and property. The management of the post-disaster phase provides an opportunity to build the system and communities more resilient to disasters. Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of building back better. Thus, The **Approaches of Recovery and Building Back Better** to be employed after a disaster event is the focus of **Chapter 7**. It underlines the institutional responsibilities of implementing the recovery and rehabilitation measures with a focus on restoring the livelihood and, shifting to a path of sustainable development that reduces disaster risk.

An overview of the **Capacity Building / Development** measures to be taken up at State and District level for providing appropriate sector-specific training to the government functionaries, communities and volunteers at Rural and Urban areas is given in **Chapter 8**. Capacity development covers the strengthening of institutions, mechanisms, and capacities of all stakeholders at all levels. The plan recognizes the need

for a strategic approach to capacity development and the need for the enthusiastic participation of various stakeholders to make it effective. The plan addresses the challenge of putting in place appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters. The planning needs of capacity development are described for all phases of disaster management.

Chapter 9 deals with the **Financial Arrangements** of the disaster management. The DM Act 2005 provides the legal framework for disaster management and all related matters, including the financial aspects. The primary responsibility for undertaking rescue, relief, and rehabilitation measures during a disaster lies with the State Governments. The financing of the entire disaster management cycle will be as per norms set by the Government of India. This Chapter provides details about the distribution of Funds as per the NDRF, SDRF allocations and further recommendations of the 15th Finance Commission inclusive of SDRMF.

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices in DM. The Governance encompasses the exercise of political, economic and administrative authority in the management system. It comprises mechanisms, processes and institutions, through which groups articulate their interest, exercise their legal rights, meet their obligations and mediate their differences. Risk governance encompasses the full range of risks

recognized by human societies, including health and medical, safety and security, and environmental risks, such as hazards and disasters. [Chapter 10](#) provides an outline of the responsibility framework for Strengthening the Disaster Risk Governance at State and District levels.

As India plays an active role in global initiatives on disaster management and also a signatory to the Sendai Framework for Disaster Risk Reduction and is committed to achieving the priorities and the objectives through systematic and institutional efforts, the State and District level DM plans need to be aligned with the national commitments, plan and priorities. [Chapter 11](#) emphasizes the importance of **International Cooperation** in Disaster Management and also briefly provide information on accepting Foreign & Multilateral Assistance, Fostering Partnerships and utilizing the expertise of NGOs & CBOs for effectively dealing with disasters.

Regular maintenance is critical to ensure the relevance and effectiveness of the DM plans. 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. Chapter 12 provides information on Maintaining, Updating and reviewing the State Disaster Management Plan annually as per the DM Act 2005.

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CHAPTER1

INTRODUCTION

RATIONALE

The revised UNISDR terminology, defines ‘disaster’ as: “*A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.*” (UNISDR 2016)

The effect of the disaster can be immediate and localized but is often wide spread, often persisting for long after the event. The effect may challenge or overwhelm the capacity of a community or society to cope using their sources immediately and therefore may require assistance from external sources, which could include neighboring jurisdictions, or those at the national or international levels. UNISDR considers disaster to be a result of the combination of many factors such as the exposure to hazards, the conditions of vulnerability that are present, and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injuries, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

THE DM ACT 2005 USES THE FOLLOWING DEFINITION FOR DISASTER:

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

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

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

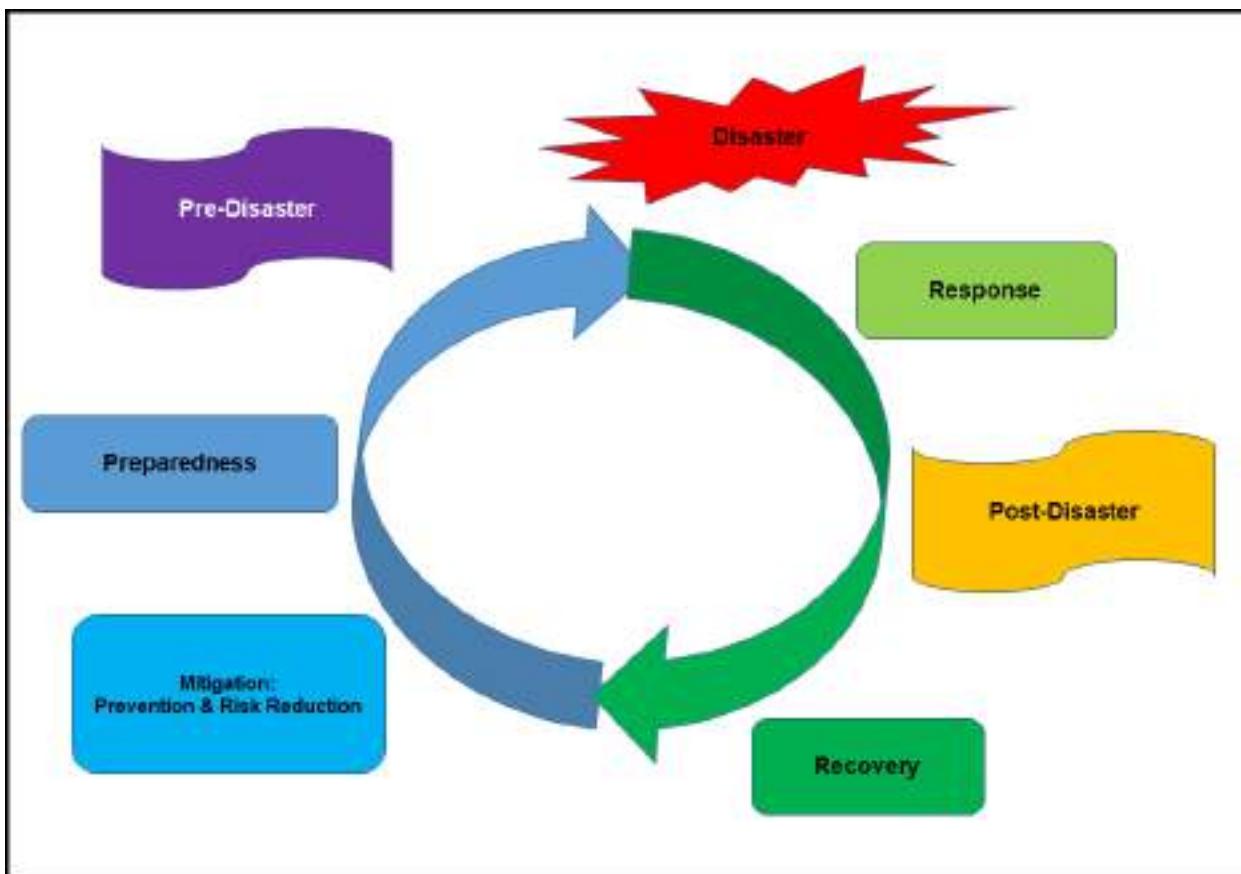


Figure 1-1 Disaster Management Cycle

The SDMP provides a framework covering all aspects of the disaster management cycle. It covers disaster risk reduction, mitigation, preparedness, response, recovery, and better men reconstruction. It recognises that effective disaster management necessitates a comprehensive framework encompassing multiple hazards. The SDMP incorporates an integrated approach that ensures the involvement of Government agencies, numerous other relevant organizations, private sector participants, and local communities.

The SDMP recognizes the need to minimize, if not eliminate, any ambiguity in the responsibility framework. It, therefore, specifies who is responsible for what at different stages of managing disasters. The SDMP is implementing in a scalable manner overall phases of disaster management:

- a) Mitigation (prevention and risk reduction),
- b) Preparedness,
- c) Response and
- d) Recovery (immediate restoration to long-term betterment reconstruction).

The SDMP provides a framework with role clarity for rapid mobilization of resources and effective disaster management by the State Government. While it focuses primarily on the needs of the Government agencies, it envisages all those involved in disaster management including communities and non-government agencies as potential users. The SDMP provides a well-defined framework for disaster management covering scope of work and roles of relevant agencies along with their responsibilities and accountability necessary to ensure effective mitigation, develop preparedness, and mobilize adequate response. The measures included in the SDMP, which is a dynamic document, are indicative and not exhaustive. Based on global practices and national experiences, the plan will incorporate changes during the periodic reviews and updates.

According to the revised UNISDR terminology, Disaster Management (DM) is “the organization, planning and application of measures preparing for, responding to and recovering from disasters” and Disaster Risk Management (DRM) is “the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses” (UNISDR 2016). The sense, in which DM Act 2005 uses the term disaster management, covers nearly both DM and DRM without maintaining a strict distinction between the two.

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

"A continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient" for the following:

- 1) Prevention of danger or threat of any disaster,
- 2) Mitigation or reduction of risk of any disaster or its severity or consequences,
- 3) Capacity-building,
- 4) Preparedness to deal with any disaster,
- 5) Prompt response to any threatening disaster situation or disaster,
- 6) Assessing the severity or magnitude of effects of any disaster
- 7) Evacuation, rescue and relief, and
- 8) Rehabilitation and reconstruction.

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

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

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

PARADIGM SHIFT

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

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

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

MAIN PILLARS OF THE SDMP

The SDMP, in a sense, can be said to have the following five main pillars:

- Conforming to the national legal mandates – the DM Act 2005, NPDM 2009 and Karnataka State Disaster Management Policy 2020.
- Participating proactively to realise the global goals as per agreements to which India is a signatory – Sendai, SDG and COP21 (Paris Agreement) – consistent with the international consensus for achieving mutual reinforcement and coherence of these frameworks
- PM-TPA for DRR articulating contemporary national priorities
- Social inclusion as a ubiquitous and cross-cutting principle
- Mainstreaming DRR as an integral feature

Across these five ‘pillars’, there are overlapping and non-overlapping themes as well as some nuanced differences in emphasis. The SDMP has attempted a grand synthesis of all this within a considerably ambitious and futuristic plan. To explicitly incorporate the Sendai Framework. The period envisaged as ‘Long-Term’ in this plan is co-terminus with year 2030, the ending year of the major post-2015 global frameworks.

Since the first of these four that constitute the legal mandate of the SDMP is integral and ubiquitous to the plan making it difficult to provide a separate enunciation. However, discusses it to an extent, contextualizing it. The second and fourth have been briefly described here for the sake of completeness but are elaborated in two independent chapters to add clarity. The third, the PM-TPA, has been described in detail in this chapter itself as it provides an overall guidance to the revised plan.

LEGAL MANDATE

Section 23 of the DM Act 2005 mandates that there shall be a State Disaster Management Plan (SDMP) for the State. The proposed SDMP complies with the National Policy on Disaster Management (NPDM) of 2009 and conforms to the provisions of the section 31 of DM Act making it mandatory for the Government of Karnataka and various district administrations to have adequate DM plans for districts. While the State plan will pertain to the disaster management for the State, the hazard-specific nodal ministries and departments notified by the Government of Karnataka will prepare detailed DM plans specific to the disaster assigned. As per Section 38, 39 & 40 of the DM Act, administrations and department of the Government of State, be it hazard-specific shall prepare comprehensive DM plans detailing how each of them will contribute to the national efforts in the domains of disaster prevention, preparedness, response, and recovery.

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

MUTUAL REINFORCEMENT AND COHERENCE

The adoption in 2015 of three landmark global agreements - the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs) and COP21 Paris Agreement on Climate Change has opened the significant opportunity to build coherence across DRR, sustainable development and response to climate change. The adoption of Sustainable Development Goals (SDGs) – ‘Transforming Our World: The 2030 Agenda for Sustainable Development’ is a global transformative plan of action that has poverty eradication as an overarching aim. It has, at its core, the integration of the economic, social and environmental dimensions of sustainable development. The Paris Agreement on global climate change points to the importance of averting, minimizing, and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.

DRR and resilience are recurring common theme in the three global agreements. All three agreements share a common aim of making development sustainable. The most significant shift recognized in the Sendai Framework is a strong emphasis on disaster risk management in contrast to disaster management. These three agreements recognize the desired outcomes in DRR as a product of complex and interconnected social and economic processes, which overlap across the agendas of the three agreements. Intrinsic to sustainable development is DRR and the building of resilience to disasters. Further, effective disaster risk management contributes to sustainable development.

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

PRIME MINISTER'S TEN-POINT AGENDA FOR DISASTER RISK REDUCTION

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

THE KEY ELEMENTS OF PRIME MINISTER'S TEN-POINT AGENDA FOR DRR

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

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

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

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

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

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

SIXTH, it will be helpful to develop a network of universities to work on disaster-related aspects since universities have social responsibilities too. Over the first five years of the Sendai Framework, an effort can

be made to develop a global network of universities working together on problems of disaster risk management. As part of this network, different universities could specialize in multi-disciplinary research on disaster issues most relevant to them. Universities located in coastal areas could specialize in managing risks from coastal hazards, and the ones located in the hill cities could focus on mountain hazards.

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

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

NINTH, ensure that the opportunity to learn from a disaster is not wasted. After every disaster there are studies and reports on lessons learnt that are rarely applied. Often the same mistakes are repeated. It is necessary to have a vibrant and visual system of learning. The United Nations could start an international competition of documentary films that record disaster events, their scale, and relief, rehabilitation, reconstruction and recovery afterwards. Post-disaster recovery is an opportunity to not just ‘build back better’ in terms of physical infrastructure, but also in terms of improved institutional systems for managing risk. For this, it is necessary to put in place systems that can quickly provide risk assessments. India must work with partner countries and multilateral development agencies to establish a facility for technical support to post-disaster reconstruction of houses.

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

SOCIAL INCLUSION

A disaster sets back development of the affected region and at times beyond, depending on its scale. A disaster can suddenly reverse decades or more of accumulated gains. The impact can be minimized or reduced significantly if the affected community had incorporated adequate risk reduction measures into the development. The approach treating development and DRR in an integrated manner is called mainstreaming DRM. It means radically expanding and enhancing DRM so that it becomes a normal practice, fully institutionalized within each agency's regular planning and programmes in addition to the preparedness for disaster response.

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

MAINSTREAMING DRR

A disaster can set back significantly the development of an affected region and even beyond, depending on its scale, reversing decades or more of accumulated gains. Development without recognising disaster probabilities and incorporating adequate risk reduction could, in effect, worsen existing risks and carries with it likelihood of introducing new risks, aggravating the negative impact of potential disasters. Mainstreaming of DRR is the extensive and sound integration of DRR into all developmental initiatives to enhance disaster resilience, reduce losses and hasten the progress towards development goals.

Mainstreaming DRR is an approach in which both development and DRR incorporated concurrently in a seamless manner into all the aspects of development – policies, planning and implementation. Since climate change impact act as risk multipliers worsening uncertainties associated with almost every hydro-meteorological hazard, sound approaches to DRR mainstreaming naturally integrates the how climate change impacts alter the risk scenarios. The unfortunate fact that DRR mainstreaming has remained somewhat improperly understood or vaguely interpreted theme by both decision-makers and practitioners is weakness that needs to be corrected. Undoubtedly, going forward, DRR mainstreaming will assume a more central role in both development and DRM. Hence, it is one of the main pillars of the SDMP. In many ways, the actions under SDG and the responses to climate change are integral to development initiatives and building disaster resilience is common theme in all these. DRM mainstreaming focuses attention on building disaster resilience, not a sub-component of a disaster-specific plan, but an approach that must tightly integrated into all developmental plans.

VISION

Make Karnataka a disaster resilient State across all development sectors, achieve substantial and inclusive disaster risk reduction by building on local capacities, decrease the losses of life, livelihood as well as all forms of assets and enhance the ability to cope with disasters at all levels of administration and Communities.

SCOPE

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

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

The SDMP provides an over-arching planning framework for DM for the whole country, which must be reviewed and updated periodically. State Government shall make appropriate provisions for financing the plan implementation. Disaster management, covering prevention, preparedness, response, and recovery,

necessarily involves multiple agencies and it is even more so in a large country like India. Hence, the inter-agency coordination and collaboration among stakeholders are of utmost importance for the successful implementation of the SDMP and in ensuring effective risk reduction, response and recovery.

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

The plan is based on detailed hazard-specific guidelines prepared by the NDMA. Unless otherwise specified, the guidelines issued by NDMA serve as the primary reference for this document.

The GoK has notified certain ministries and departments for hazard-specific nodal responsibilities for overall coordination of disaster management for different hazards. In addition, GoK has notified disaster-wise certain ministries for coordinating immediate post-disaster response. These notified departments must prepare detailed DM plans to carry out the roles assigned to them. At the same time, each State Government department, and district must formulate respective DM plans specifying how each entity can contribute to effectively manage disasters.

OBJECTIVES

Along with the mandate given in the DM Act 2005 and NDMP 2016 & 2018, the State plan has incorporated the national commitments in the domain of DRM associated with the three major post- 2015 global frameworks and the PM's Ten Point Agenda. Accordingly, the broad objectives of the SDMP are:

- 1) Improve the understanding of disaster risk, hazards, and vulnerabilities
- 2) Strengthen disaster risk governance at all levels from local to centre
- 3) Invest in disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development
- 4) Enhance disaster preparedness for effective response
- 5) Promote "Build Back Better" in recovery, rehabilitation and reconstruction
- 6) Prevent disasters and achieve substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental)

- 7) Increase resilience and prevent the emergence of new disaster risks and reduce the existing risks
- 8) Promote the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures to prevent and reduce hazard exposure and vulnerabilities to disaster
- 9) Empower both local authorities and communities as partners to reduce and manage disaster risks
- 10) Strengthen scientific and technical capabilities in all aspects of disaster management
- 11) Capacity development at all levels to effectively respond to multiple hazards and for community-based disaster management
- 12) Provide clarity on roles and responsibilities of various Departments and Officers involved in different aspects of disaster management
- 13) Promote the culture of disaster risk prevention and mitigation at all levels
- 14) Facilitate the mainstreaming of disaster management concerns into the developmental planning and processes
- 15) Ensuring DRM is socially inclusive, gender sensitive and empowering
- 16) Build and strengthen the resilience of poor communities to prevent disasters aggravating poverty and to protect livelihoods
- 17) Enhanced mainstreaming of disaster risk reduction and climate adaptation strategies within the agriculture sector including sustainable farming
- 18) Special focus on disaster risk reduction measures for agriculture and livestock
- 19) Promoting resilient health systems to develop the capacities and resilience of communities to cope and recover from disaster impacts
- 20) Enhance the resilience of health systems by integrating DRM into all levels of health care
- 21) Promote disaster-resilient schools, colleges and other educational facilities
- 22) Promote women's leadership and active participation in disaster risk reduction
- 23) Strengthen efforts to mainstream DRR into water management and reduce the likely impacts of water-related hazards
- 24) Strengthening and promoting the resilience of new and existing critical infrastructure
- 25) Integration of disaster risk reduction considerations and measures into financial and fiscal instruments
- 26) Mainstreaming DRR into land-use, development and implementation of (rural and urban)

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

TIME FRAMES – SHORT, MEDIUM AND LONG-TERM

The implementation of the measures in the plan must be completed within the short (T1), medium (T2), and long-term (T3), ending by 2022, 2027, 2030 respectively. 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 SDMP is also 2030. The reference to ‘Short’, ‘Medium’ and ‘Long’ are to timeframes required for completion and do not signify an order of priority. These are tentative and subject to changes depending on many factors particularly technology. Some of the actions envisaged could be shifted 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.

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 a long period for completion provided they are started as early as possible.

Time frames envisaged in the SDMP

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

There is considerable variation in the implementation status of the proposed measures across State departments. State Government Departments must appropriately categorize the items in their DM Plans according to the time frames for implementation while preparing their plan or at the time of revising existing plans.

In the case of recovery, there are three recovery periods after a disaster:

- a) Early – within eighteen months,
- b) Medium – within five years and
- c) Long-term – within five to ten years.

These depend on the specific disaster and are relevant only with reference to the types of recovery programmes. Hence, the SDMP discusses them only in general terms without time lines.

TYPES OF DISASTERS

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

NATURAL HAZARDS

The widely accepted classification system used by the Disaster Information Management System of DesInventar classifies disasters arising from natural hazards into five major categories (DesInventar 2016):

- 1) **GEOPHYSICAL:** Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Hydro-meteorological factors are important contributors to some of these processes.
- 2) **HYDROLOGICAL:** Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up

- 3) **METEOROLOGICAL:** Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)
- 4) **CLIMATOLOGICAL:** Events caused by long-lived meso- to macro-scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)
- 5) **BIOLOGICAL:** Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

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

TABLE 1-1: CATEGORIES OF NATURAL HAZARDS

Sl. No.	Family	Main Event	Short Description/ Secondary Disaster
1	Geophysical	Earthquake/ Mass movement of earth materials Volcano	<ul style="list-style-type: none"> • Landslide following earthquake; • Urban fires triggered by earthquakes; • Liquefaction - the transformation of (partially) water-saturated soil from a solid State to a liquid State caused by an earthquake • Mass movement of earth materials, usually down slopes • Surface displacement of earthen materials due to ground shaking triggered by earthquakes • Surface displacement of earthen materials due to ground shaking triggered by volcanic eruptions. • A type of geological event near an opening/vent in the Earth's surface including volcanic eruptions of lava, ash, hot vapour, gas, and pyroclastic material

Sl. No.	Family	Main Event	Short Description/ Secondary Disaster
		Volcano	<ul style="list-style-type: none"> • Ash fall; Lahar - Hot or cold mixture of earthen material flowing on the slope of a volcano either during or between volcanic eruptions; • Lava Flow • Pyroclastic Flow - Extremely hot gases, ash, and other materials of more than 1,000 degrees Celsius that rapidly flow down the flank of a volcano (more than 700 km/h) during an eruption
		Tsunami	<p>Tsunamis are difficult to categorize they are essentially an oceanic process that is manifested as a coastal water-related hazard. A series of waves (with long wavelengths when traveling across the deep ocean) that are generated by a displacement of massive amounts of water through underwater earthquakes, volcanic eruptions or landslides.</p> <p>Tsunami waves travel at very high speed across the ocean but as they begin to reach shallow water they slow down, and the wave grows steeper.</p>
2	Hydrological	Flood Landslides Wave Action	<ul style="list-style-type: none"> • Avalanche, a large mass of loosened earth material, snow, or ice that slides, flows or falls rapidly down a mountainside under the force of gravity • Coastal Erosion - The temporary or permanent loss of sediments or landmass in coastal margins due to the action of waves, winds, tides, or anthropogenic activities • Coastal flood - Higher-than-normal water levels along the coast caused by tidal changes or thunderstorms that result in flooding, which can last from days to weeks • Debris Flow, Mud Flow, Rock Fall - Types of

Sl. No.	Family	Main Event	Short Description/ Secondary Disaster
			<p>landslides that occur when heavy rain or rapid snow/ice melt send large amounts of vegetation, mud, or rock downslope by gravitational forces.</p> <ul style="list-style-type: none"> • Flash Flood Hydrological - Heavy or excessive rainfall in a short period of time that produce immediate runoff, creating flooding conditions within minutes or a few hours during or after the rainfall • Flood Hydrological - A general term for the overflow of water from a stream channel onto normally dry land in the floodplain (riverine flooding), higher-than normal levels along the coast and in lakes or reservoirs (coastal flooding) as well as ponding of water at or near the point where the rain fell (flash floods) • Wave Action: Wind-generated surface waves that can occur on the surface of any open body of water such as oceans, rivers and lakes, etc. The size of the wave depends on the strength of the wind and the travelled distance (fetch).
3	Meteorological	Hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that may last for minutes to days	<ul style="list-style-type: none"> • Cyclone, Storm Surge, Tornado, Convective Storm, Extra-tropical Storm, Wind • Cold Wave, Heat Wave, Derecho • Extreme Temperature, Fog, Frost, Freeze, Hail, Heat-wave • Lightning, Heavy Rain • Sand-Storm, Dust-Storm • Snow, Ice, Winter Storm, Blizzard
4	Climatological	Unusual, extreme weather conditions related to long-lived,	<ul style="list-style-type: none"> • Drought • Extreme hot/cold conditions • Forest/Wildfire Fires

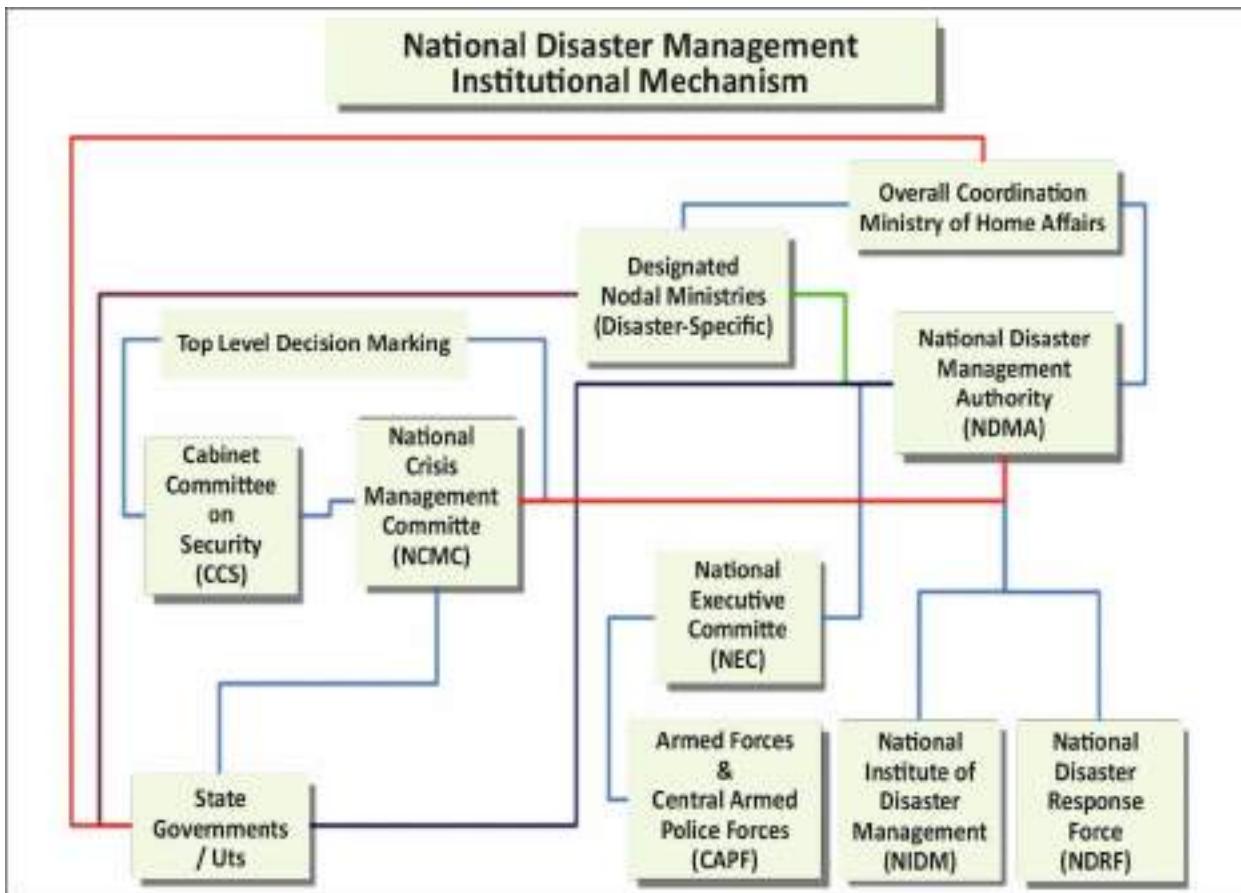
Sl. No.	Family	Main Event	Short Description/ Secondary Disaster
		meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal (long-term) climate variability	<ul style="list-style-type: none"> • Glacial Lake Outburst • Subsidence
5	Biological	Exposure to germs and toxic substances Pandemic, Endemic and Epidemic	<ul style="list-style-type: none"> • Pandemic, Endemic and Epidemics: viral, bacterial, parasitic, fungal, or prion infections • Insect infestations • Animal stampedes

HUMAN-INDUCED DISASTERS

The NPDM 2009 notes that rise in population, rapid urbanization and industrialization, development within high-risk zones, environmental degradation, and climate change aggravates the vulnerabilities to various kinds of disasters. Due to inadequate disaster preparedness, communities, and animals are at increased risk from many kinds of human-induced hazards arising from accidents (industrial, road, air, rail, on river or sea, building collapse, fires, mine flooding, oil spills, etc.). Hazards due to Chemical, Biological, Radiological and Nuclear (CBRN) threats and events rank very high among the causes that are human induced acts. Terrorist activities and secondary incidences arising from intentional or non- intentional activities also add to these risks and calls for adequate preparedness and planning.

INSTITUTIONAL FRAMEWORK

Figure 1-3: National-level disaster management Institutional Framework



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

The overall coordination of disaster management vests with the Ministry of Home Affairs (MHA). The Cabinet Committee on Security (CCS) and the National Crisis Management Committee (NCMC) are the key committees involved in the top-level decision-making regarding disaster management. The NDMA is the agency responsible for the approval of the SDMP and the execution of DM functions at the national level. Figure 1-3 provides a schematic view of the basic institutional structure for DM at national level. The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

The DM Act does not have any provisions for notifying any disaster as a 'national calamity' or a 'national disaster'. In most cases, State Governments will be carrying out disaster management with the central Government playing a supporting role. Generally, the central agencies will participate on the request from

the State Government. Within each State, there is a separate institutional framework for disaster management at the State-level. The DM Act of 2005 provides for the setting up of NDMA at national level, and, the SDMA at the State level. The role, composition and the role of the key decision-making bodies for disaster management at national-level are briefly described in the Table 1-2. The extent of involvement of central agencies will depend on the type, scale, and administrative spread of the disaster. If the situation requires the direct assistance from central Government or the deployment of central agencies, the central Government will provide all necessary support.

TABLE 1-2: KEY NATIONAL-LEVEL DECISION-MAKING BODIES FOR DISASTER MANAGEMENT

Sl. No.	Name	Composition	Vital role
1	Cabinet Committee on Security (CCS)	Prime Minister, Minister of Defence, Minister of Finance, Minister of Home Affairs, and Minister of External Affairs	<ul style="list-style-type: none"> Evaluation from a national security perspective, if an incident has potentially security implications Oversee all aspects of preparedness, mitigation and management of Chemical, Biological, Radiological and Nuclear (CBRN) emergencies and of disasters with security implications Review risks of CBRN emergencies from time to time, giving directions for measures considered necessary for disaster prevention, mitigation, preparedness and effective response
2	National Crisis Management Committee (NCMC)	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

Sl. No.	Name	Composition	Vital role
3	National Disaster Management Authority (NDMA)	Prime Minister (Chairperson) Members (not exceeding nine, nominated by the Chairperson)	<ul style="list-style-type: none"> • Lay down policies, plans and guidelines for disaster management • Coordinate their enforcement and implementation throughout the country • Approve the NDMP and the DM plans of the respective Ministries and Departments of Government of India • Lay down guidelines for disaster management to be followed by the different Central Ministries, Departments and the State Governments
4	National Executive Committee (NEC)	Union Home Secretary (Chairperson) Secretaries to the GOI in the Ministries/ Departments of Agriculture, Atomic Energy, Defence, Drinking Water and sanitation, Environment, Forests and Climate Change Finance (Expenditure), Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources, River	<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 SDMAs such men, material or resources as are available with it for emergency response, rescue and relief • Ensure compliance of the directions issued by the Central Government • Coordinate response in the event of any threatening disaster situation or disaster • Direct the relevant Ministries/ Departments of the GoI, the State Governments and the SDMAs regarding measures to be taken in response to any specific threatening disaster situation or disaster.

Sl. No.	Name	Composition	Vital role
		<p>Development and Ganga Rejuvenation, The Chief of the Integrated Defense Staff of the Chiefs of Staff Committee, ex officio as members. Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways and Secretary, NDMA are special invitees to the meetings of the NEC.</p>	<ul style="list-style-type: none"> • 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 Forces³ (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 specialised scientific institutions such as India Meteorological Department(IMD), responsible for providing early warning and monitoring agencies • Coordinate with SDRF, civil defense volunteers, home guards and fire services, through the relevant administrative departments of the State Governments
5	National Disaster Response Force (NDRF)	<p>Specially trained force headed by a Director General</p> <p>Structured like para military forces for rapid deployment</p>	<ul style="list-style-type: none"> • Provide assistance to the relevant State Government/District Administration in the event of an imminent hazard event or in its aftermath

Sl. No.	Name	Composition	Vital role
6	National Institute of Disaster Management (NIDM)	Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national levels scientific, research and technical organizations, besides eminent scholars, scientists and practitioners.	<ul style="list-style-type: none"> • Human resource development and capacity building for disaster management within the • broad policies and guidelines laid down by the NDMA • Design, develop and implement training programmes • Undertake research • Formulate and implement a comprehensive human resource development plan • Provide assistance in national policy formulation, assist other research and training institutes, State Governments and other organizations for successfully discharging their responsibilities • Develop educational materials for dissemination • Promote awareness generation

From time to time, the central Government notifies hazard-specific nodal ministries to function as the lead agency in managing particular types of disasters (see Table 1-3 for current list of disaster-specific nodal ministries notified by GoI).

TABLE 1-3: NODAL MINISTRY FOR MANAGEMENT/ MITIGATION OF DIFFERENT DISASTERS

Sl. No.	Disaster	Nodal Ministry/ Department
1.	Accident – Air (Civil Aviation)	Min. of Civil Aviation (MCVA)
2.	Accidents – Rail	Min. of Railways (MRAIL)
3.	Accidents – Road	Min. of Road Transport and Highways (MRTH)
4.	Accidents – Inland Water Transport	Min. of Road Transport and Highways (MRTH)
5.	Accidents – Coastal and marine boats, fisheries and shipping	Min. of Defence (MOD) – Indian Coast Guard (ICG)
6.	Avalanche	Min. of Defence (MOD) – Border Road Organization (BRO)

Sl. No.	Disaster	Nodal Ministry/ Department
7.	Biological Emergencies	Min. of Health and Family Welfare (MHFW)
8.	Cold-Wave	Min. of Agriculture and Farmers Welfare (MAFW)
9.	Cyclone/ Tornado	Min. of Earth Sciences (MOES)
10.	Drought	Min. of Agriculture and Farmers Welfare (MAFW)
11.	Earthquake	Min. of Earth Sciences (MOES)
12.	Flood	Min. of Water Resources, River Development and Ganga Rejuvenation (MOWR)
13.	Floods – Urban	Min. of Housing and Urban Affairs (MHUA)
14.	Forest Fire	Min. of Environment, Forests, and Climate Change (MEFCC)
15.	Frost	Min. of Agriculture and Farmers Welfare (MAFW)
17.	Hailstorm	Min. of Agriculture and Farmers Welfare (MAFW)
18.	Heatwave	Not Specified
19.	Industrial and Chemical	Min. of Environment, Forests and Climate Change (MEFCC)
20.	Landslides	Min. of Mines (MOM)
21.	Nuclear and Radiological	Dept. of Atomic Energy (DAE)
22.	Oil Spills	Min. of Defence (MOD) – Indian Coast Guard (ICG)
23.	Pest Attack	Min. of Agriculture and Farmers Welfare (MOAFW)
24.	Tsunami	Min. of Earth Sciences (MOES)

NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA)

The Government of India established the NDMA in 2005, headed by the Prime Minister. Under the DM Act 2005, the NDMA, as the apex body for disaster management, shall have the responsibility for laying

down the policies and guidelines for disaster management for ensuring timely and effective response to disaster. The guidelines of NDMA will assist the Central Ministries, Departments, and States to formulate their respective DM plans. It will approve the National Disaster Management Plan and DM plans of the Central Ministries/ Departments. It will take such other measures, as it may consider necessary, for the prevention of disasters, or mitigation, or preparedness and capacity building, for dealing with a threatening disaster situation or disaster. Central Ministries/ Departments and State Governments will extend necessary cooperation and assistance to NDMA for carrying out its mandate.

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

NATIONAL INSTITUTE OF DISASTER MANAGEMENT (NIDM)

As per the provisions of the Chapter-VII of the DM Act, Government of India constituted the National Institute of Disaster Management (NIDM) under an Act of Parliament with the goal of being the premier institute for capacity development for disaster management in India and the region. The vision of NIDM is to create a Disaster Resilient India by building the capacity at all levels for disaster prevention and preparedness. NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation, and policy advocacy in the field of disaster management. The NIDM has built strategic partnerships with various ministries and departments of the central, State, and local Governments, academic, research and technical organizations in India and abroad and other bi-lateral and multi-lateral international agencies. It provides technical support to the State Governments

through the Disaster Management Centres (DMCs) in the Administrative Training Institutes (ATIs) of the States and Union Territories. Presently it is supporting as many as 30 such centres. Six of them are being developed as Centres of Excellence in the specialised areas of risk management – flood, earthquake, cyclone, drought, landslides, and industrial disasters.

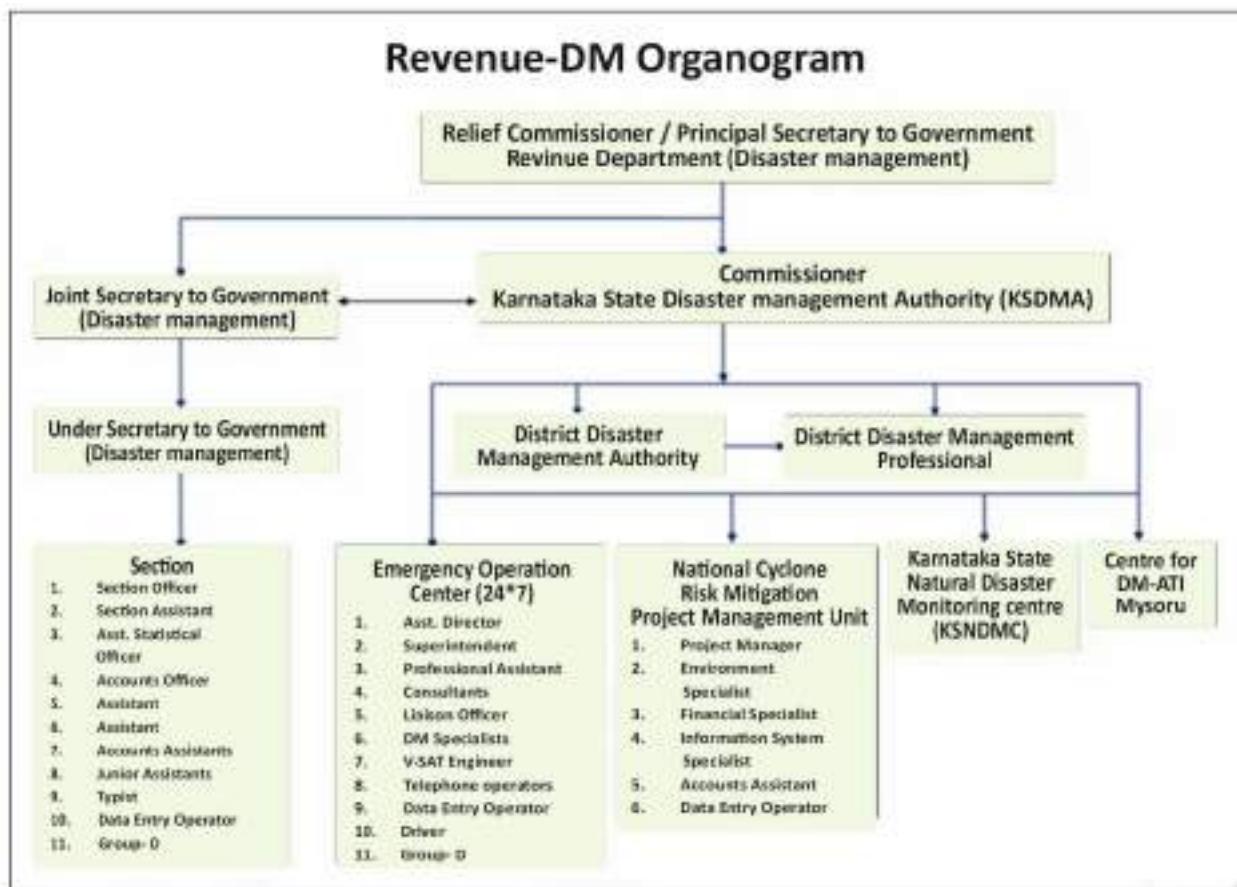
NATIONAL DISASTER RESPONSE FORCE (NDRF)

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

STATE LEVEL

The State Government in line with National Disaster Management Act, 2005, has constituted State Disaster Management Authority (GO No. RD 28 ETC 2006 dated 16.05.2008) and its composition reconstituted as per (GO No. RD 49 ETC 2010 dated 27.05.2010). The State has also constituted the State Executive committee (GO No. RD 28 ETC 2006 dated 16.05.2008). It has constituted the District Disaster Management Authority laying down the roles and responsibilities for the State and district authorities. The State Crisis Management Committee has also been constituted.

ORGANISATIONAL STRUCTURE FOR DISASTER MANAGEMENT IN KARNATAKA



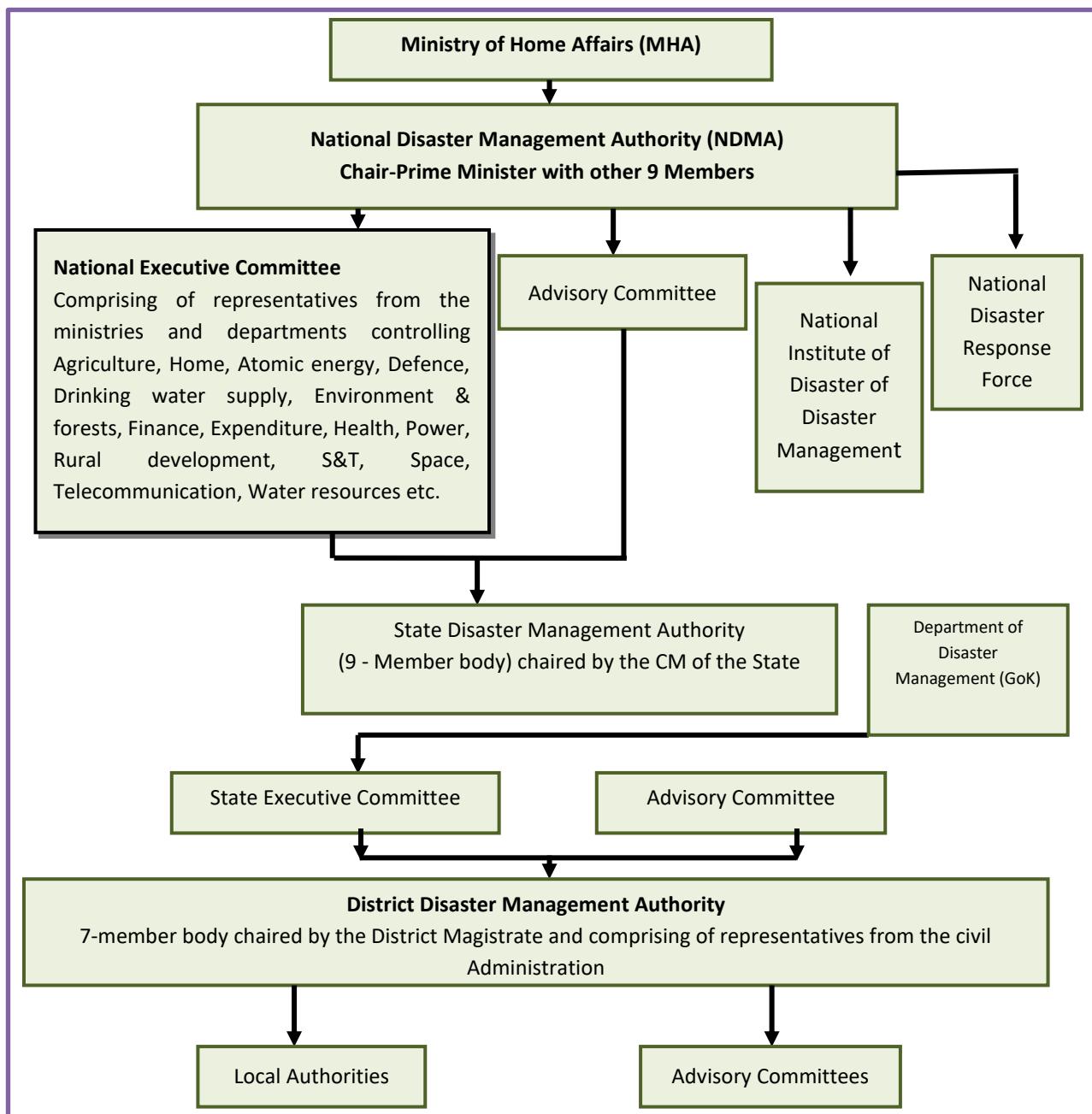
IMPORTANT PREPAREDNESS MEASURES AND CAPACITY DEVELOPMENT IN THE STATE

- Formation of Task Forces, Advisory Committees, Response Teams for Disaster Management keeping specific disaster needs and training these members
- Micro-hazard zonation for each hazard
- Display of warning boards for general public in sensitive area.
- Inventory of human and material resources available with Government, Private and Civil Society.
- Training, Capacity Building of the Search and Rescue Task Forces, IRTs, Department designated ROs and Officers being deployed for disaster management tasks.
- Training, Capacity Building of the First Aid Task Forces
- Training and capacity building of Civil police, Fire Brigades, NCC, NSS, CBOs and NGOs and Panchayat members and officials

- Medical Preparedness- nominate/ designate hospitals, doctors and paramedics to cover emergency health management, first aid and mass casualty management
- State, District, Taluk & Village level mock drills and rehearsals.
- Public awareness generation and community evacuation training.
- Community based disaster management (CBDM).
- GP, Taluk and Districts develop and maintain disaster management plans.
- Inventory of lifeline buildings such as of schools, hospitals, public buildings and assess their safety and take measures for improving safety.
- Use of Best Practices
- Create communication network
- Budgetary allocations

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

HIERARCHY OF ORGANIZATIONS FROM NATIONAL TO STATE LEVEL



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

The DM Act mandates the setting of a State Disaster Management Authority (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. Detailed DMP will be developed, subject to periodic review and revision, at the levels of State, district, towns and blocks (taluka). Figure-1-4 provides schematic view of the typical State-level institutional framework. The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command

STATE DISASTER MANAGEMENT AUTHORITY (SDMA)

As per provisions in Chapter-III of the DM Act, State Government shall establish a State Disaster Management Authority (SDMA) or its equivalent under a different name with the Chief Minister as the Chairperson. The Karnataka State Disaster Management Authority (KSDMA) will lay down policies and plans for DM in the State. The KSDMA will approve the disaster management plans prepared by various departments. It will, inter alia approve the State Plan in accordance with the guidelines laid down by the KSDMA, 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 KSDMA 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 State Plan. The SEC will also provide information to the KSDMA relating to different aspects of DM.

STRUCTURE OF KARNATAKA STATE DISASTER MANAGEMENT AUTHORITY (KSDMA)

Sl. No.	SDMA Members	Designation
1	Chief Minister of Karnataka	Chairman, <i>Ex-officio</i>
2	Minister of Revenue	Vice-Chairman
3	Minister of Home	Member
4	Minister of Rural Development and Panchayat Raj	Member
5	Minister for Health and Family Welfare	Member
6	Minister for Agriculture	Member
7	Minister for Public Works	Member
8	Minister for Animal Husbandry	Member
9	Minister for Housing, Information, ITBT and BWSSB	Member
10	Minister for Energy	Permanent Invitee
11	Chairperson of the State Executive Committee (The Chief Secretary to the Government of Karnataka)	Chief Executive Officer
12	Secretary, Disaster Management and Relief Commissioner	Member Secretary

The KSDMA has been constituted as per GO No. RD 28 ETC 2006 dated 16.05. 2008 and its composition reconstituted as per GO No. RD 49 ETC 2010 dated 27.05.2010

DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

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

DDMA STRUCTURE

Sl. No.	Members	Designation
1	Deputy Commissioner of the District	Chairperson
2	President of the Zilla Panchayat	Co-chairperson
3	Chief Executive Officer of the Zilla Panchayat	Member
4	Superintendent of Police of the district	Member
5	District Health Officer of the District	Member
6	Executive Engineer of the Zilla Panchayat of the District	Member
7	Joint Director of Agriculture	Member
8	Addl. Deputy Commissioner of the District	Member Secretary

PLAN IMPLEMENTATION

The DM Act 2005 enjoins central and State Governments to make provisions for the implementation of the disaster management plans. In this respect, the sections of the DM Act 2005 applicable for national, State, and district DM plans are 11, 23, and 31. The Chapters V and VI of the DM Act spell out the responsibilities of the central, State, and local Governments with respect to disaster management. The DM Act States that every Department of the State Government shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan.

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

The Act mandates that every Department and District of the State must prepare a Disaster Management Plan (DMP) in accordance with the KSDMP. Respective DM authorities must regularly review and update

their DM plans. Central ministries and State Governments will integrate DRR into their development policy, planning and programming at all levels. They must adopt a holistic approach and build multi-stakeholder partnerships at all levels, as appropriate, for the implementation of the DM plans. Depending on its nature, different components of the KSDMP will be implemented within short, medium and long-term timeframes ending in 2030, with the actions under these timeframes often running concurrently and not sequentially. In a broad sense, the approach described in the KSDMP applies to all those working for disaster risk reduction in the country be it Government, private, not- for-profit entities, national agencies or international organisations.

The plan is highly ambitious and the complete implementation of all elements across the country may take a very long time. Nevertheless, both central and State Governments have already made considerable progress and they are expected to make sincere efforts for the implementation of the DM plans. The guidelines covering various aspects of disaster management and including a separate one for response (list is given in Annexure-I).

CHAPTER 2

HAZARD RISKS AND CHALLENGES IN KARNATAKA STATE

BACKGROUND

The State of Karnataka is located within 11.5 degree North and 18.5-degree North latitudes and 74 degree East and 78.5-degree East longitude. It is situated on a table and where the western and eastern Ghat ranges converge into the Nilgiri hill complex, in the western part of the Deccan peninsular region of India.

AREA AND ADMINISTRATIVE DIVISIONS

Karnataka State has been divided into four revenue divisions, 49 sub-divisions, 30 districts, 176 additional 49 taluks announced by the government for administrative purposes. The jurisdictions of the Revenue Divisions are as follows.

Name of the Revenue Division	Location of RDCs	Districts under Jurisdiction
Bengaluru Revenue Division	Bengaluru	Bengaluru Urban, Bengaluru Rural, Chikaballapura, Chitradurga, Davanagere, Kolar, Ramanagar, Shivamogga, Tumkur
Mysuru Revenue Division	Mysuru	Chamarajanagar, Chikkamagaluru, Dakshina Kannada, Hassan, Kodagu, Mandya, Mysuru, Udupi
Belagavi Revenue Division	Belagavi	Bagalkote, Belagavi, Vijayapura, Dharwad, Gadag, Haveri, Uttara Kannada
Kalburgi Revenue Division	Kalburgi	Ballary, Bidar, Kalburgi, Koppala, Raichur, Yadgir

Taluks, Regions and Metrological sub – divisions of Karnataka:

The Karnataka has four Metrological sub – divisions namely South Interior Karnataka (SIK), North Interior Karnataka (NIK), Coastal Karnataka and Malnad. However, as per the India Meteorological Department, there are only three Metrological sub-divisions, where in South Interior Karnataka includes Malnad as well.

Agro Climatic Zones:

Based on climatic conditions, the Karnataka has been divided into Ten Agro-Climatic Zones. The characterisation of these zones is based on the Climate, soils and cropping pattern and they have been designated as mentioned below.

Agro-Climatic Zone of Karnataka

Sl. No	Agro-Climatic Zone	Sl. No	Agro-Climatic Zone
1	North-Eastern Transition Zone	6	Southern Dry Zone
2	North Eastern Dry Zone	7	Southern Transition Zone
3	Northern Dry Zone	8	Northern Transition Zone
4	Central Dry Zone	9	Hilly Zone
5	South eastern Dry Zone	10	Coastal Zone

Pre-Monsoon (January to May) Mean rainfall:

The average rainfall for the state in Pre-monsoon season is 135mm with a standard deviation of 43mm. The rainfall varies from 60-100mm in the North Karnataka to 100-200 mm in the southern part of the state. The total pre-monsoon rain contributes about 12% to annual rainfall. The CV of rainfall is below 50% in South Interior Karnataka (SIK) and is 80-200% in Coastal Karnataka

South-West Monsoon (June to September) Mean rainfall:

The average rainfall for the state in Southwest Monsoon season is 804 mm with a standard deviation of 120mm. The season contributes about 71% to the annual rainfall. The mean rainfall is as high as 3000 to 4000 mm in Coastal districts and sharply decreases towards east to about 400 mm in the interior parts of the state. The contours of rainfall are almost parallel to the Coast. The CV of rainfall in different parts of the state during SW monsoon season varies from 15% to 50%.

North -East Monsoon (October to December) Mean rainfall:

The average rainfall for Karnataka during the Northeast Monsoon (NE) season is 187mm with a standard deviation of 61mm. The average Rainfall in the North Interior Karnataka and South Interior Karnataka ranges from 100-200mm and remaining parts of the state ranges from 200-400mm. The CV of rainfall varies from 60-100% in North eastern part of state and less than 50% in southern parts of the state. The average rainfall in the North Interior Karnataka and parts of South Interior Karnataka ranges from 100-200mm and remaining parts of the state ranges from 200-400mm.

Annual Rainfall (January - December) Mean rainfall:

The average annual rainfall of the state is 1126 mm with a standard deviation of 149 mm. The rainfall in the coastal areas is in the range of 3000mm to 5000 mm. The rainfall gradually decreases eastward. The average annual rainfall is below 750 mm in Central Karnataka. The annual CV of rainfall for the state is 13%. The regional contributions of the rainfall to the state from four regions, namely, South Interior Karnataka (SIK), North Interior Karnataka (NIK), Malnad and Coastal regions are 11.6%, 11.0%, 25.7% and 51.6% respectively. The highest contribution is from the coastal region. The SIK and NIK contribute more or less equal to the State annual rainfall.

South-West Monsoon Seasonal rainfall contribution to the annual rainfall:

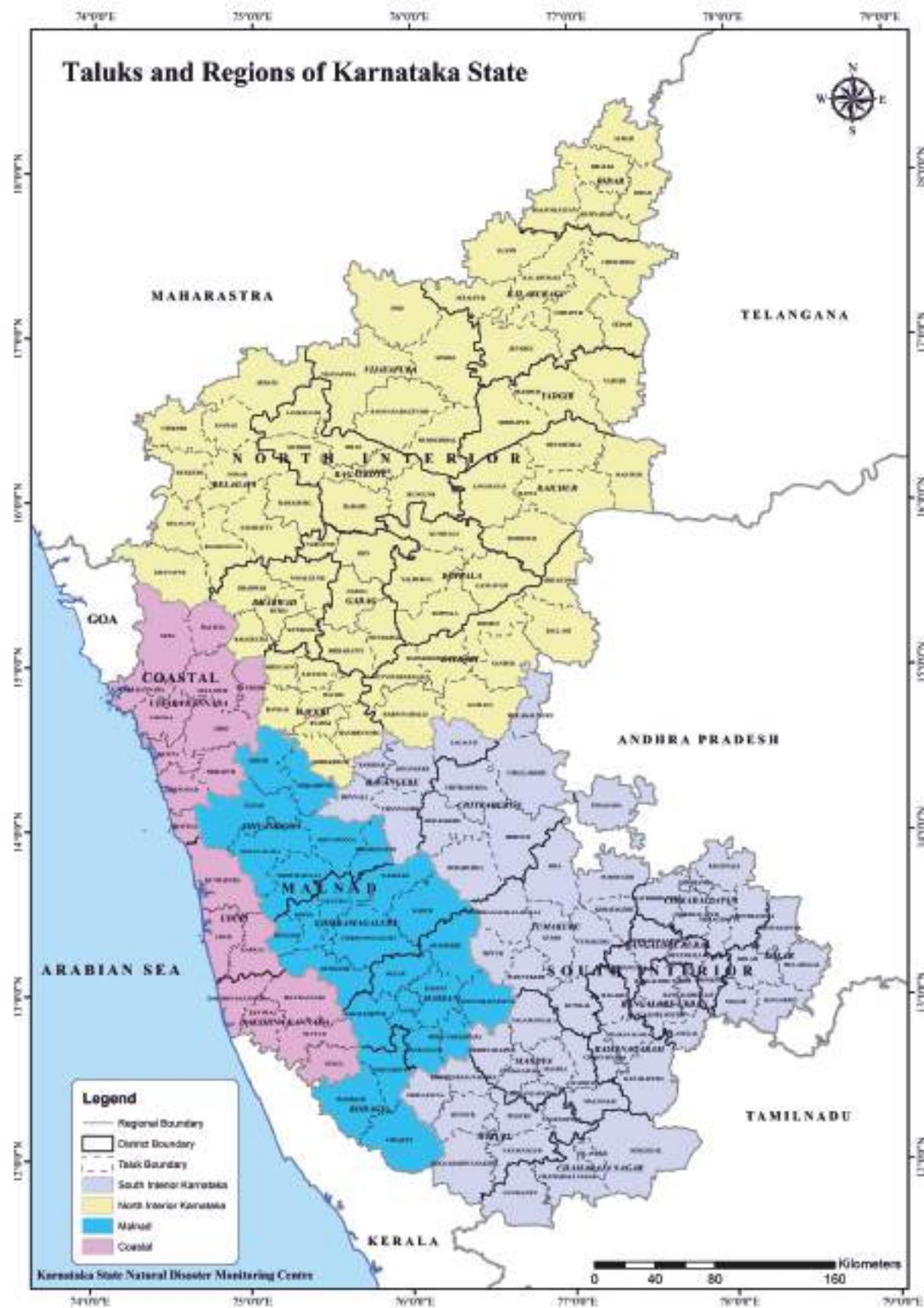
Southwest Monsoon contributes about 71 % to annual rainfall of the state. The spatial contribution to annual rainfall during monsoon season is 40 to 50% from South Interior Karnataka and it increases up to 70 % towards northern parts of the state. The contribution of coastal and part of Malnad region is in the range of 70 % to 90% of annual total rainfall.

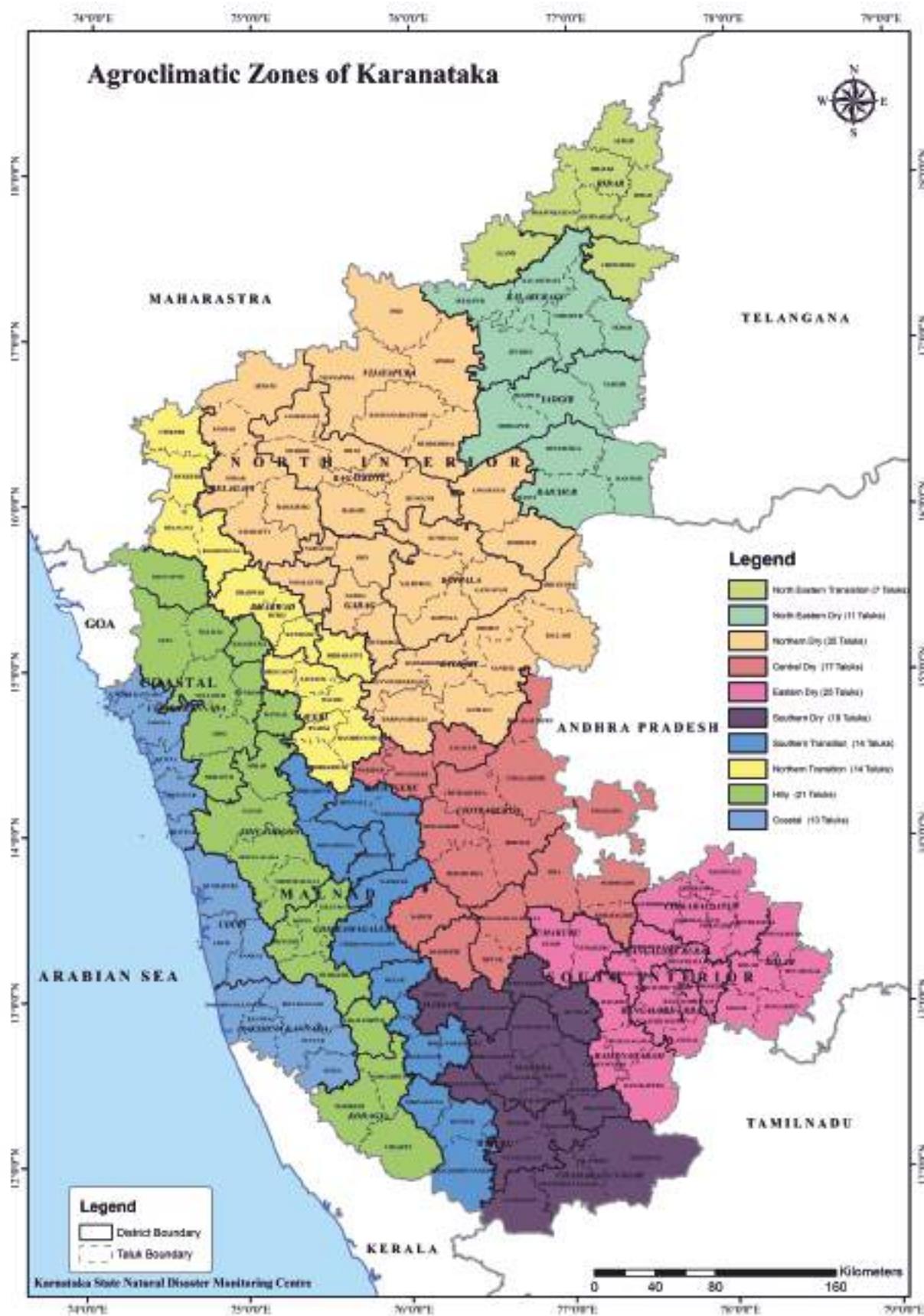
South-West Monsoon Seasonal rainy days contribution to the annual rainy days:

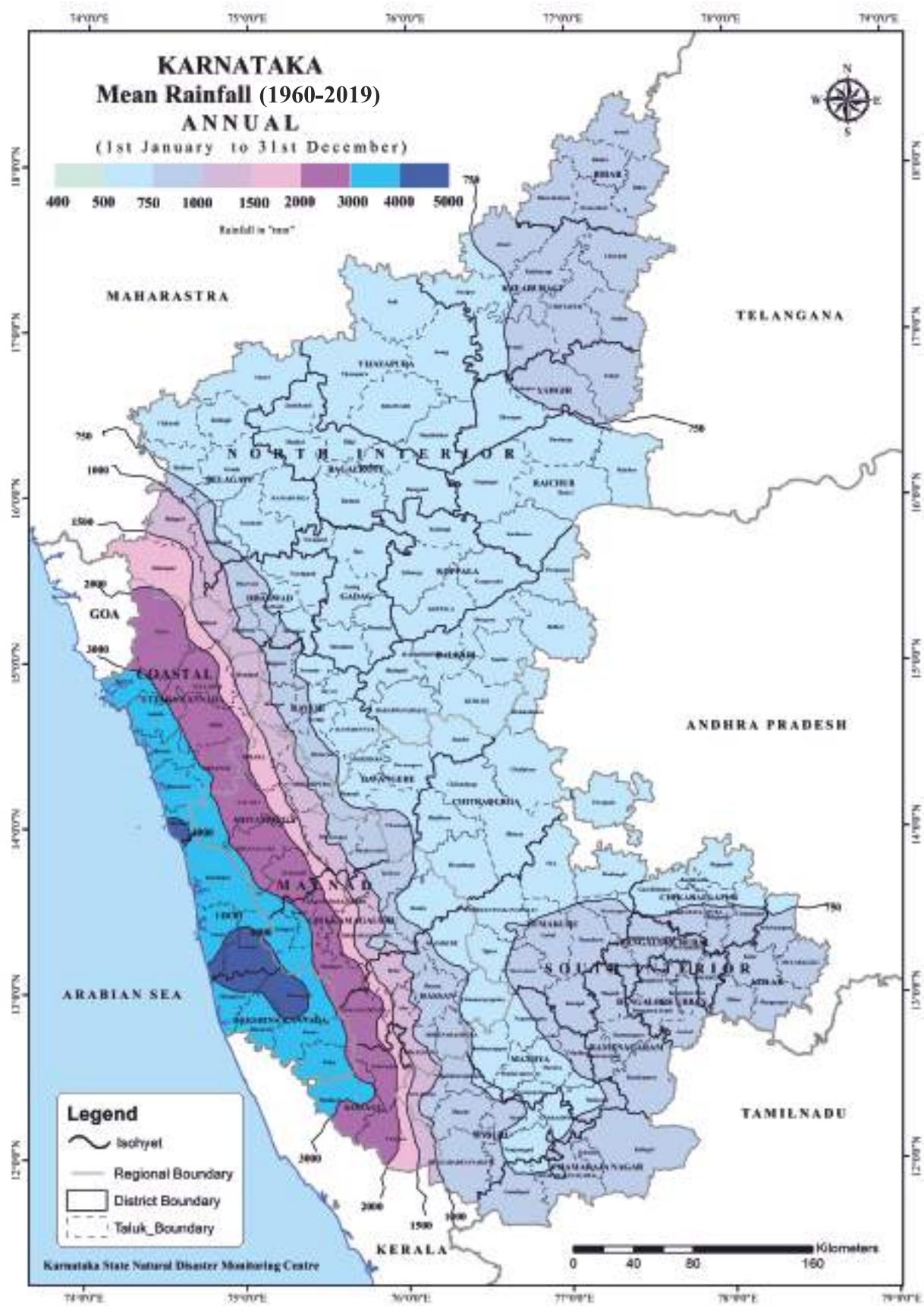
The contribution of rainy days to annual rainy days is maximum from coastal and Malnad region which is 70- 90%. The percentage of rainy days from southern part of South Interior Karnataka is the lowest which is less than 50 %. From rest of the state the percentage of rainy days are in the range 50 to 70 % of annual rainy days.

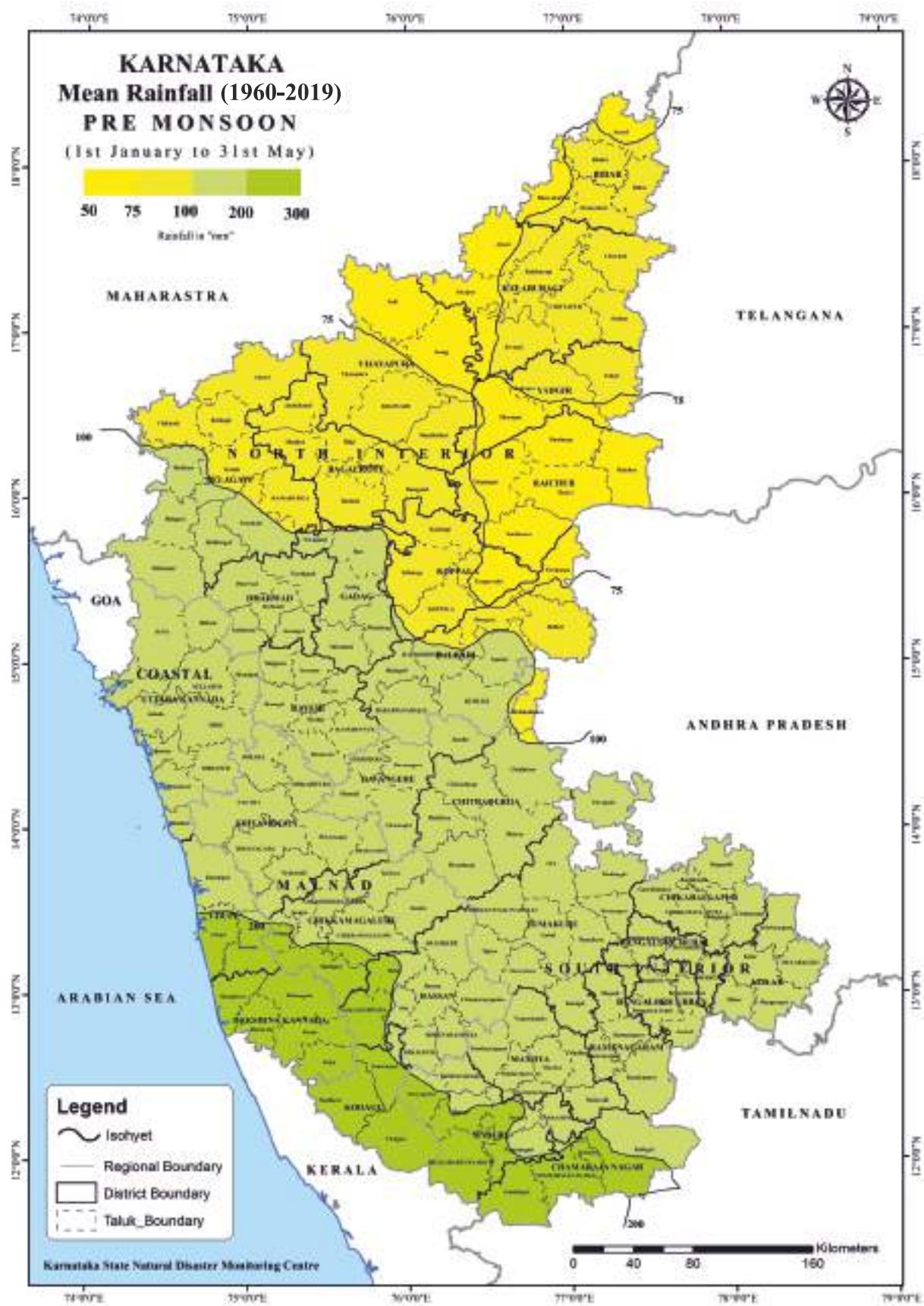
Heaviest one day rainfall:

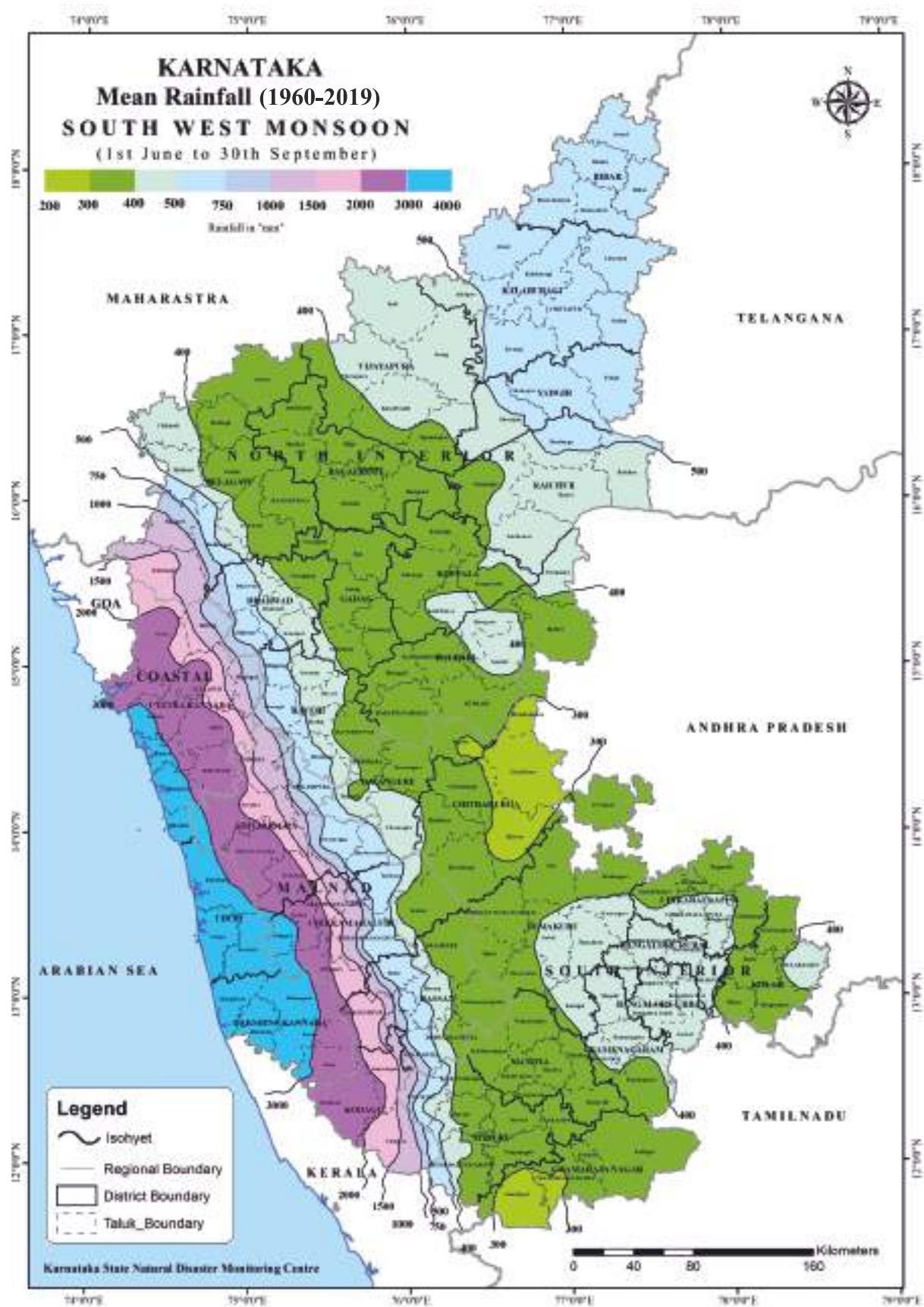
Heaviest one day rainfall recorded in Coastal parts of Udupi and Uttara Kannada districts varying 400 to 500mm and adjacent parts coastal and Malnad districts records 300 to 400mm. Northern and southern dry zones record heaviest one day rainfall generally ranging from 100 to 200mm.

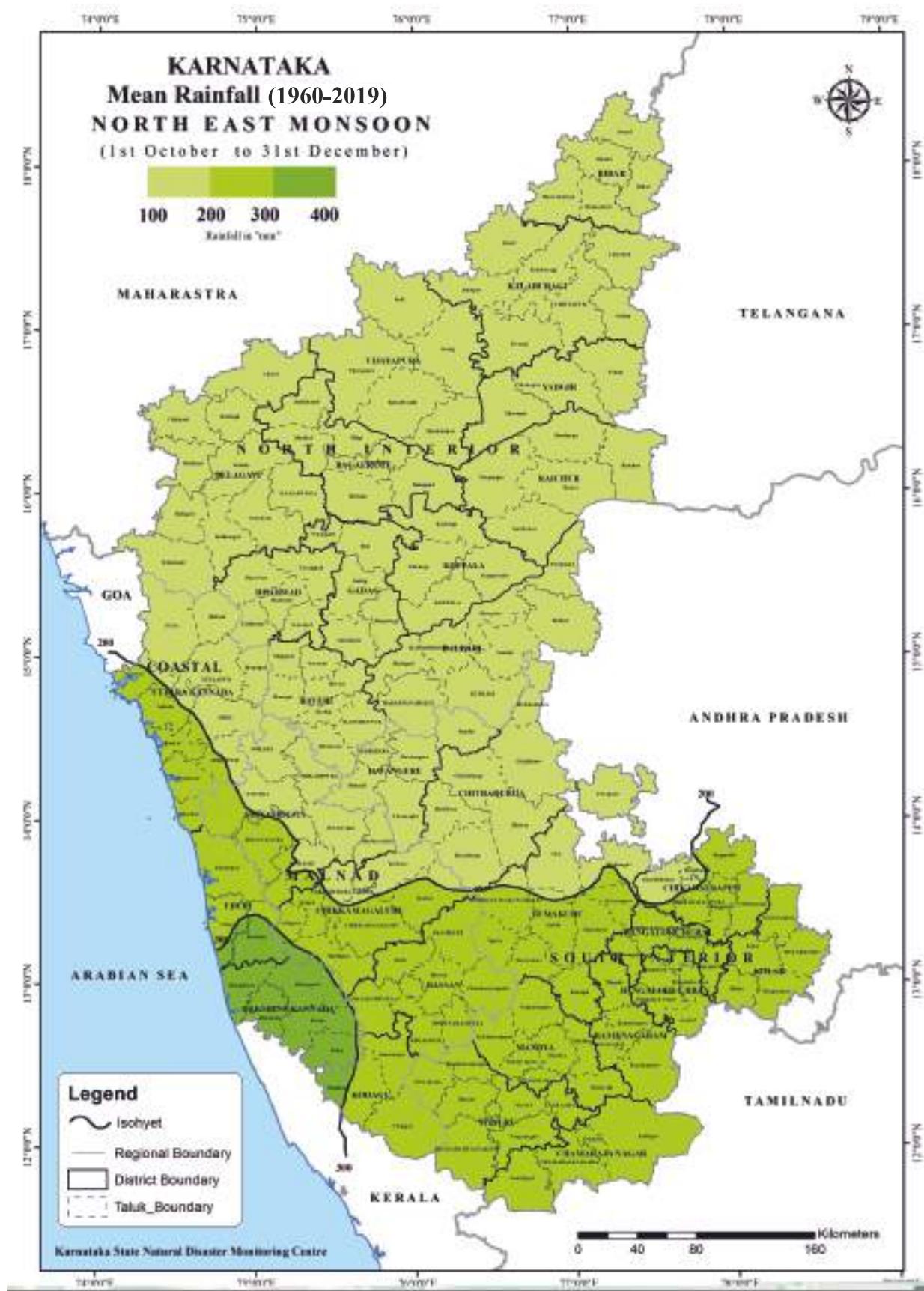


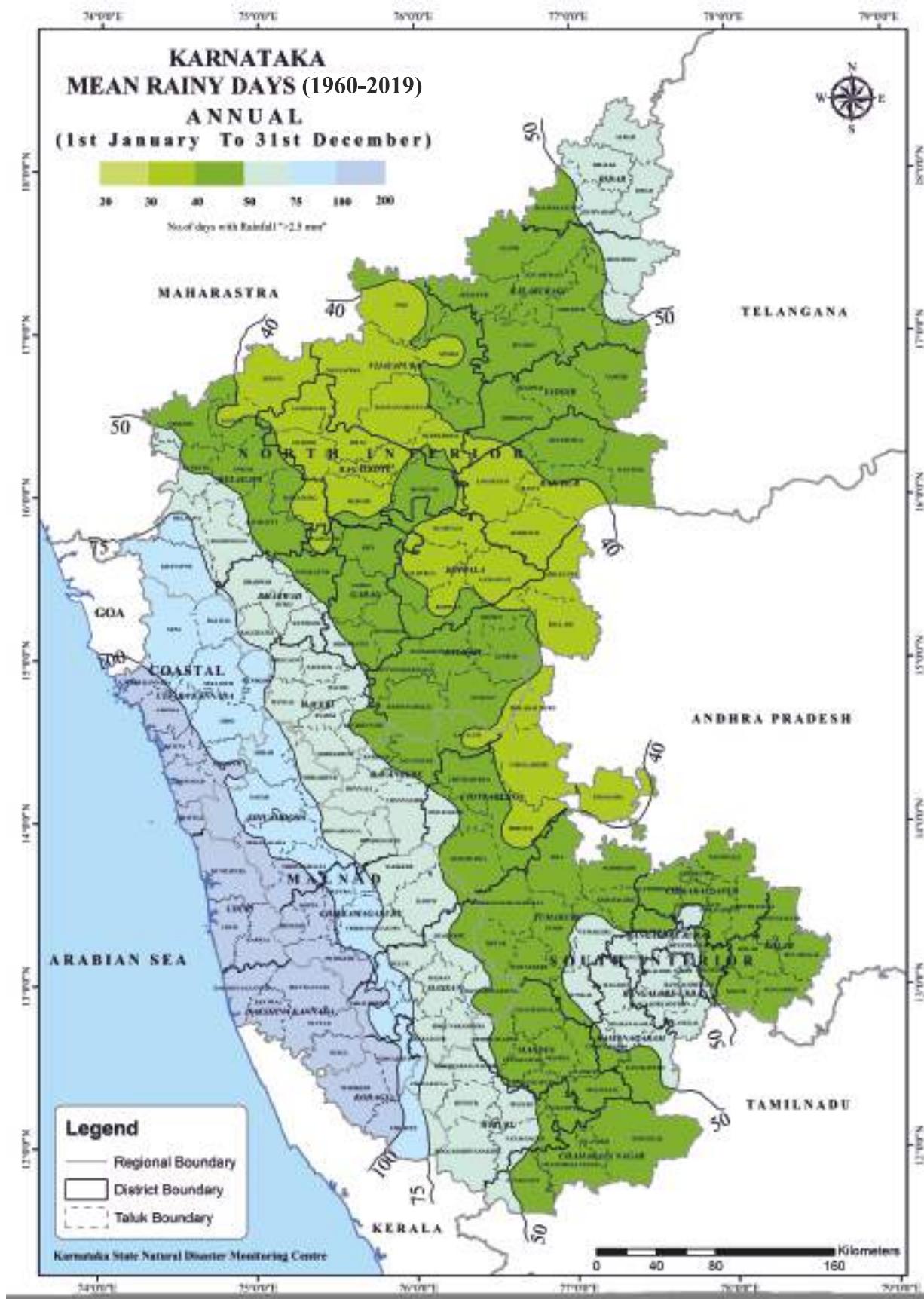


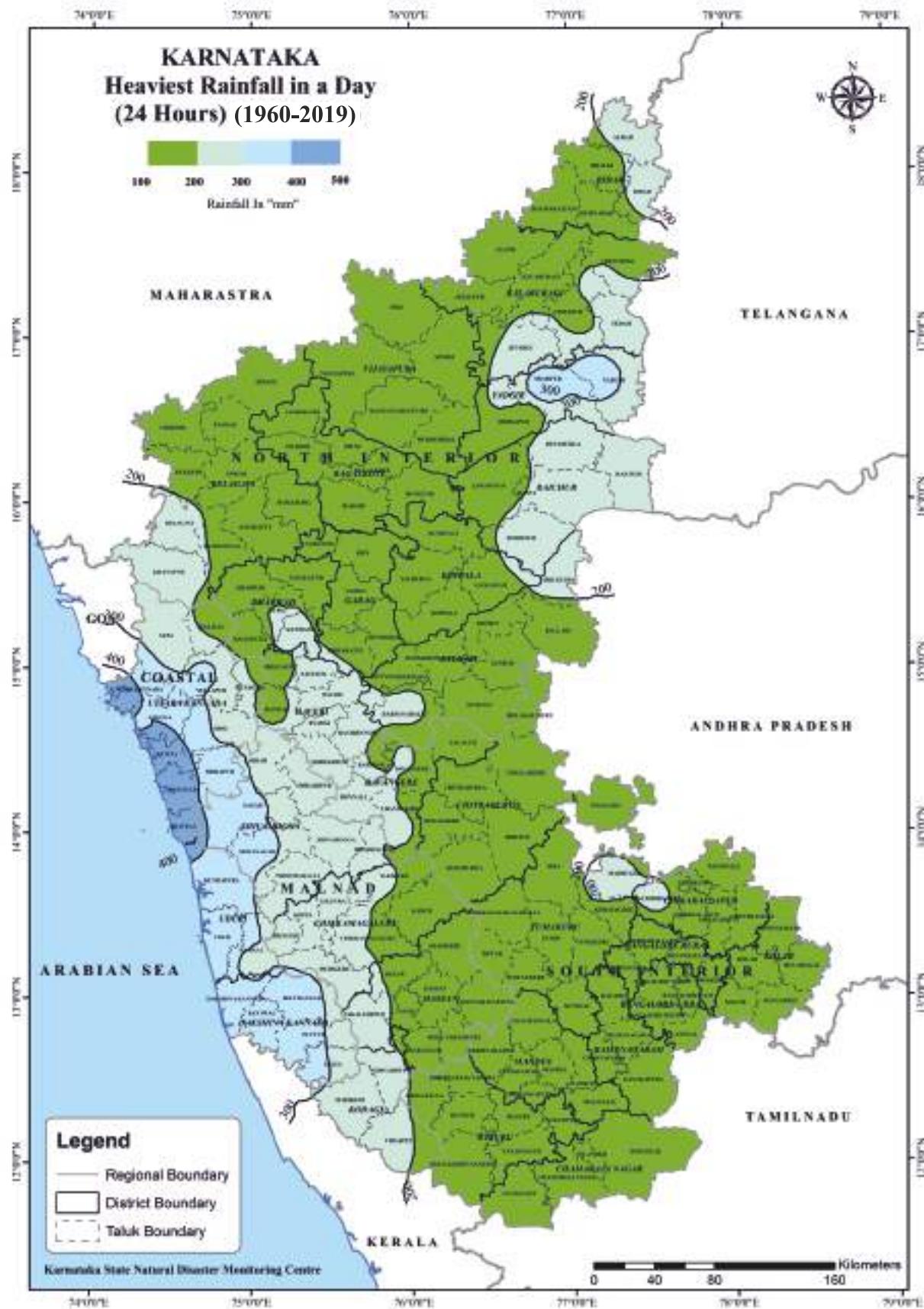


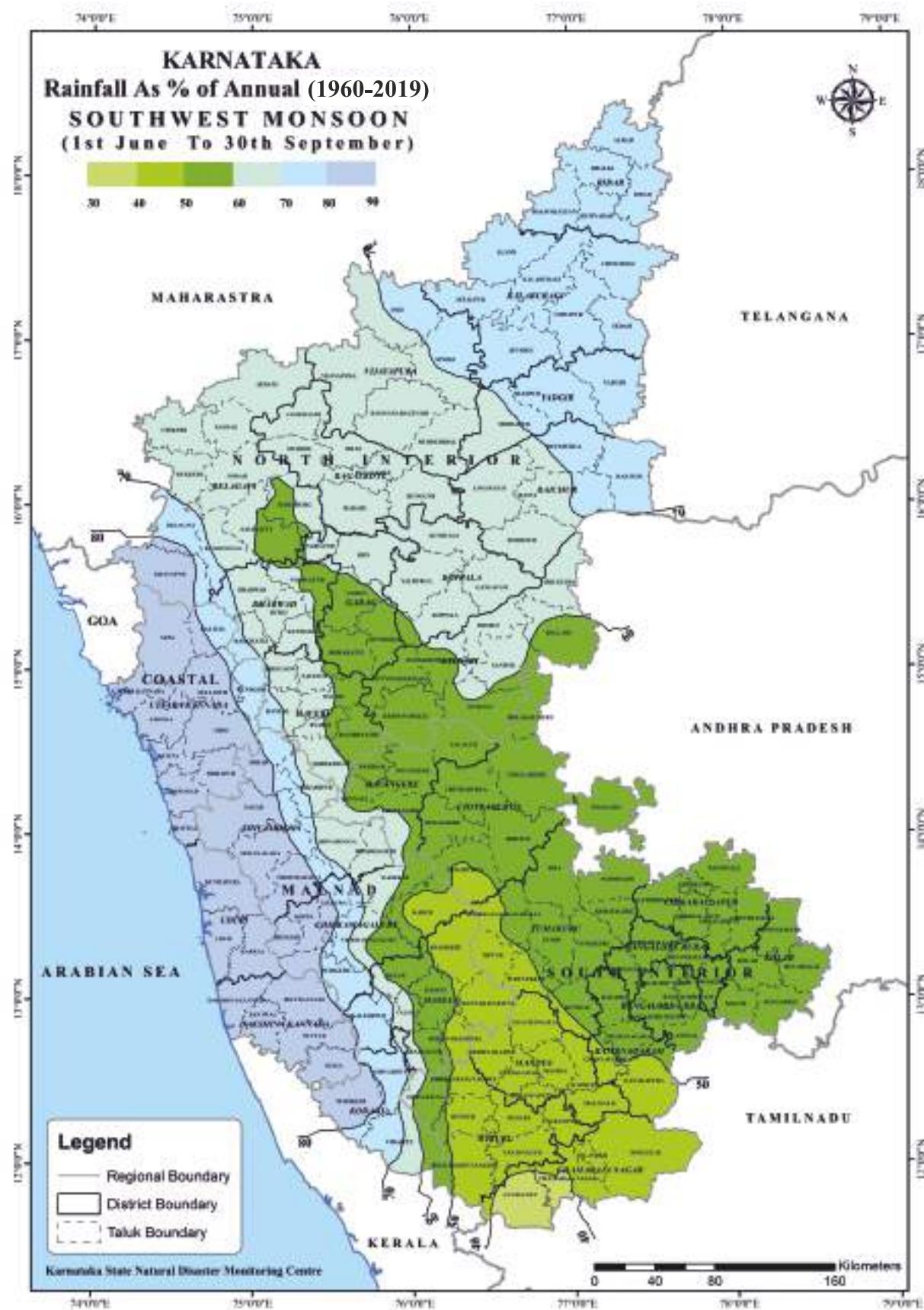












Demography

The state has a total land area of 1,91,791 sq.km, accounting for 5.83% of the total area of the country (32.88 lakh sq. km) and ranks eighth among major states in terms of size. As per 2011 Census, the State's population was 611 lakhs(approximately) with over 75% literate persons. There are 968 females per thousand population. Karnataka occupies Ninth place concerning population and the density of population as per 2011 Census was 319 persons per sq. km which was lower than the all-India density of 382. The coastline of about 322 km long with its silver sand beaches and blue lagoons hedged by miles and miles of tall, waving, palm groves against the backdrop of majestic mountain regions are strikingly beautiful. The Malnad stretches about 650 km from north to south with an undulating range of mountains. The majority of the populations are Hindus. About 83.8% of the population are Hindus, 12.23% are Muslim, 1.91% are Christians, 0.78% are Jains, 0.73% are Buddhist and the remaining belong to other religions.

PAST DISASTER EVENTS IN KARNATAKA

Year	Drought		Flood/Heavy Rainfall		Hailstorm		Earthquake		Landslide	
	Dist.	Taluk	Dist.	Taluk	Dist.	Taluk	Dist.	Taluk	Dist.	Taluk
2012	28	157	-	-						
2013	28	125	8	35						
2014	9	34	8	42	13					
2015	27	136	-	-						4
2016	30	164	6	24						
2017	Nil	Nil	-	-						
2018	30	164	7	25					04	07
2019	18	49	22	103	0	0	0	0	0	0

Source: KSNDMC

MAJOR DISASTER EVENTS IN KARNATAKA-2012-19

Sl. No.	Year	Major Disaster Events
1	2012	<ul style="list-style-type: none"> • 157 out of 176 taluks were drought-affected • 45.85 lakh hectare remained unsown • More than 3.0 lakh ha early sown crops completely lost • About 13.2 lakh ha rainfed crops with > 50% loss • Fire accidents, etc.
2	2013-14	<p>Loss and Damages caused due to hailstorms during 2013</p> <ul style="list-style-type: none"> • The incessant and very heavy Hailstorm caused the loss of human lives and livestock and losses/damages to crops and infrastructure. The damages/losses to high-value horticulture crops are significant. • 23 human lives lost During Hailstorm during Feb-March 2014. • 12 human Injuries have been reported where disability is 40 to 80% • 719 Cattle lost • 1627 houses damaged • 2,73,605-he Agriculture Crops damaged, Estimated Loss Rs. 366.68 Crores • 18,415-he horticulture crops damaged, Estimated Loss Rs. 506.12 Crores • Transformers and electrical supply lines damaged worth Rs.6.06 crores • The worst affected districts are Bijapur, Belgaum, Bellary, Yadgiri, Bidar, Bagalkot, Raichur, Gulbarga and Chitradurga.
3	2013-14	<p>Loss and Damages caused due to floods during 2013-14</p> <ul style="list-style-type: none"> • 7 districts affected by Heavy rain/Flood. • 118 hoblis falling in 64 taluks of 22 districts affected by drought. • 7.07 lakh ha affected by drought • 119 human lives lost During 2013 • 259 people lost their limbs or eyes with a disability of up to 80%, 301 people injured and hospitalized. • 286 cattle lost; Fodder has been damaged in 3804 Ha Estd Loss – 1200.80 Lakhs • 11,537 houses damaged • 1,33,572-hectare agriculture crops damaged • 1,16,024-hectare horticulture crops damaged • Roads Damaged (km): 5,764 • Bridges/ Culverts Damaged (nos): 1464 • Irrigation Tanks damaged (nos): 395 • 221 minor irrigation works damaged • 967 water supply schemes are damaged • Transformers and electrical supply lines damaged worth Rs.30.99crores. • Drought Losses and Damages • 28 districts and 125 taluks affected by Drought

Sl. No.	Year	Major Disaster Events
4	2014-15	<p>Flood Losses and Damages</p> <ul style="list-style-type: none"> • Loss of Human life – 218 • Loss of Domestic life – 330 • Damage to Houses – 27377 • Infrastructure Loss – Rs. 574.30 crores <p>Drought Loss and Damages</p> <ul style="list-style-type: none"> • 9 Districts and 35 taluks declared as drought-affected
5	2015-16	<p>Drought: 27 Districts and 137 taluks</p> <ul style="list-style-type: none"> • Loss due to hailstorms - 711 crores
6	2016-17	<p>Drought: 30 Districts and 164 taluks</p> <p>Floods/ Heavy Rainfall: 6 Districts and 24 taluks</p>
7	2017-18	<ul style="list-style-type: none"> • Bangalore Urban Floods 2017 • Mangalore Floods /Landslides 2017
8	2018-19	<p>Drought: 30 districts and 162 taluks</p> <p>Floods/ Heavy Rainfall: 7 Districts and 25 taluks</p> <p>Landslide: District: 04 and 07 taluks</p> <ul style="list-style-type: none"> • Kodagu Floods/Landslides -2018 • Bus falls into canal in Kanaganamaradi, Mandya District-2018 • Temple Prasad Poisoning in Sulvaadi, Kollegal, Chamaraja Nagar-2018
9	2019-20	<ul style="list-style-type: none"> • Flood in 103 Taluks of 22 districts. • Drought in 49 taluks. • Bengaluru Car Park Fire in Aero India event - 2019 • Bengaluru Air Crash in Aero India event -2019 • KFD (Kyasanur Forest Disease) -2019 • Dharwad Building Collapse- 2019 • Bandipur forest fire -2019 • Chamundi hill forest fire -2019 • COVID 19 Pandemic – 2020: 1, 12,504 people were diagnosed positive for the COVID 10 with 2147 deaths and large impact on socio-economic sector.

DISASTER SITUATION IN 2019

FLOOD

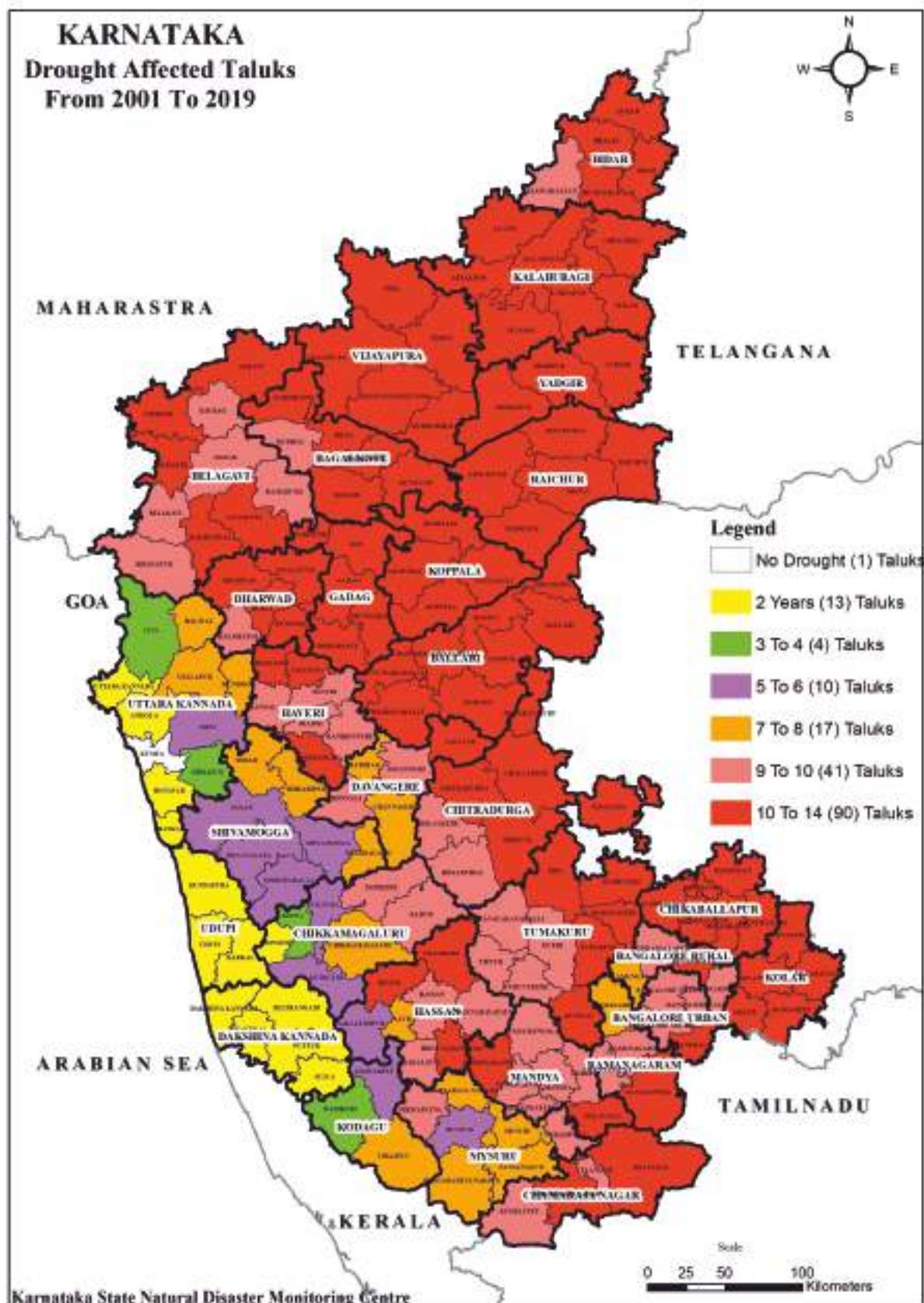
In 2019, State of Karnataka experienced severe drought situation as a result of deficit rainfall and prolonged dry spell during the pre-monsoon period (March-May) and South-West Monsoon (June-July). 13 districts were in deficit category and water in reservoirs was just 43% of the total capacity at end July.

During the period from 3rd to 10th August 2019, the State received 224 mm of rainfall with an overall departure of (+) 279 %, which is the highest for Karnataka in the last 118 years for the corresponding period. Some districts received rainfall more than 700% departure from normal during the period. The distribution of the rainfall has been skewed and the excessive rainfall has been confined to parts of North Interior Karnataka, Malnad and Coastal region. Such was the intensity of the rain that the State which was grappling with the drought situation was confronted with devastating floods in the space of just one week.

The situation was further compounded by record discharge of water of up to 9 lakh cusecs for many days from the dams in the Upper Krishna basin and Bhima Basin from Maharashtra. The Cumulative inflows and outflows of the major Reservoirs Viz., Almatti and Narayanapura in Krishna Basin and KRS and Kabini in Cauvery Basin were unprecedented for this period in the State. The outflow from Narayanpura dam was consistently more than 6.25 lakh cusecs for 7 to 8 days, which is highest since the construction of the dam. Bhima, a tributary of Krishna, also carried up to 3 lakh cusecs, which is a historic high. The cumulative effect of heavy rainfall and enormous outflow of water from the reservoirs caused a deluge in and around the downstream areas of these rivers. The reservoirs which were less than half their capacities at the end of July, attained full reservoir level with record outflows span of 10 days. The record rainfall coupled with high discharges from reservoirs has caused extreme flooding and landslides in 103 taluks of 22 districts.

DROUGHT

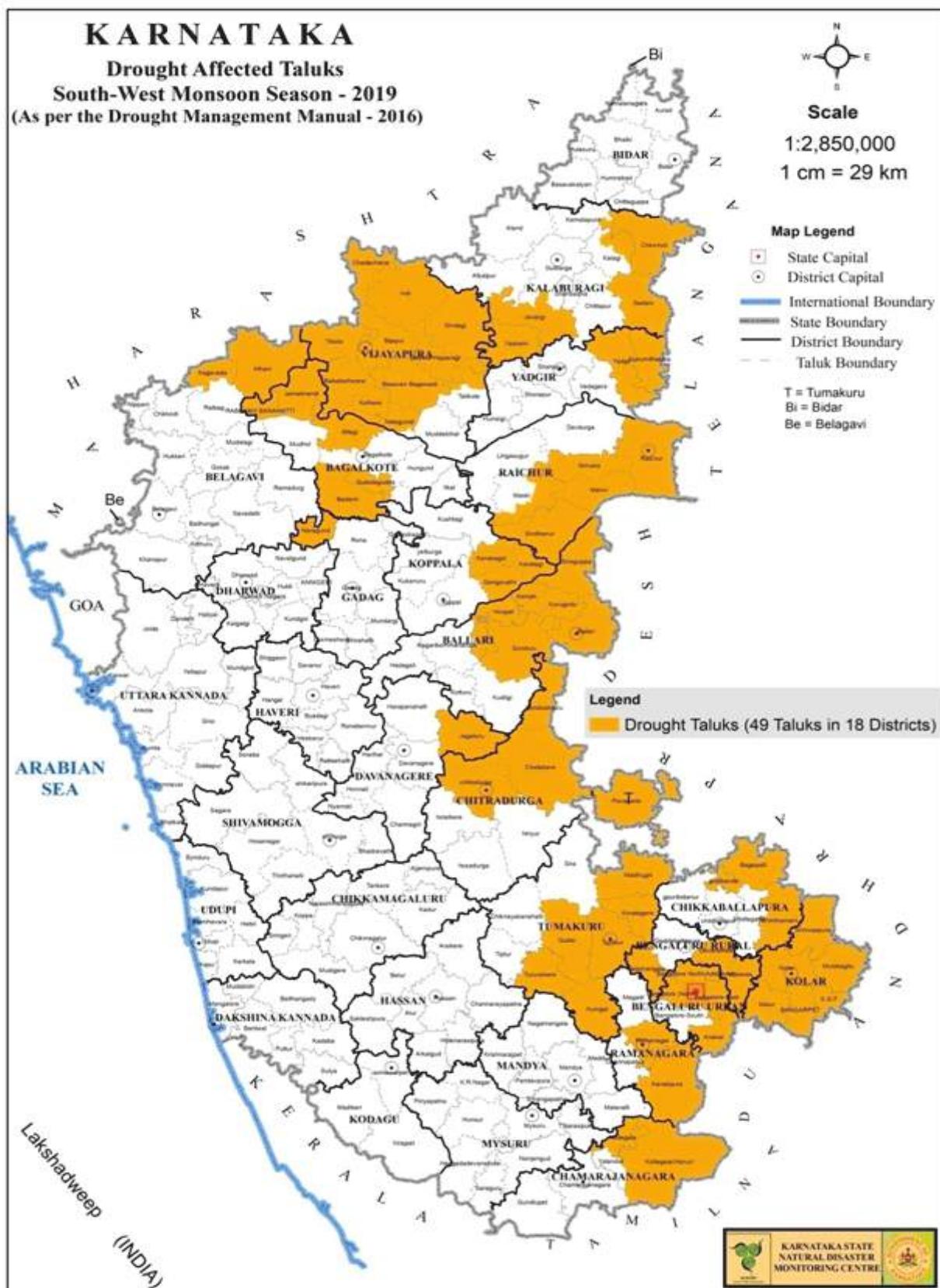
The WMO considers drought as a slow creeping natural hazard that occurs in part due to the natural climatic variability. In recent years, concern has grown world-wide that droughts may be increasing in frequency due to climate change. Responses to droughts in most parts of the world are generally reactive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



DROUGHT PROFILE OF KARNATAKA

Sl. No.	District Name	2015 Taluks	2016 Taluks	2017 Taluks	2018 Taluks	2019 Taluks
1	Bengaluru Urban	Nil	4	Nil	4	5
2	Bengaluru Rural	3	4	Nil	4	1
3	Ramanagara	1	4	Nil	4	2
4	Kolara	5	5	Nil	5	6
5	Chikkaballapura	6	6	Nil	6	0
6	Tumakuru	9	10	Nil	10	6
7	Chitradurga	5	6	Nil	6	5
8	Davanagere	5	6	Nil	6	0
9	Chamarajanagara	3	4	Nil	4	2
10	Mysuru	5	7	Nil	2	0
11	Mandyā	7	7	Nil	7	0
12	Ballari	7	7	Nil	7	0
13	Koppala	4	4	Nil	4	0
14	Raichur	5	5	Nil	5	3
15	Kalaburagi	7	7	Nil	7	2
16	Yadgir	3	3	Nil	3	0
17	Bidar	5	1	Nil	5	0
18	Belagavi	10	10	Nil	10	0
19	Bagalkote	6	6	Nil	6	2
20	Vijayapura	5	5	Nil	5	2
21	Gadag	5	5	Nil	5	1
22	Haveri	6	7	Nil	7	0
23	Dharwad	5	5	Nil	5	0
24	Shivamogga	1	7	Nil	7	0
25	Hassan	8	7	Nil	8	0
26	Chikkamagaluru	3	6	Nil	6	0
27	Kodagu	1	3	Nil	3	0
28	Dakshina Kannada	Nil	2	Nil	5	0
29	Udupi	Nil	3	Nil	3	0
30	Uttara Kannada	6	8	Nil	5	0
Total		136	164	0	164	49

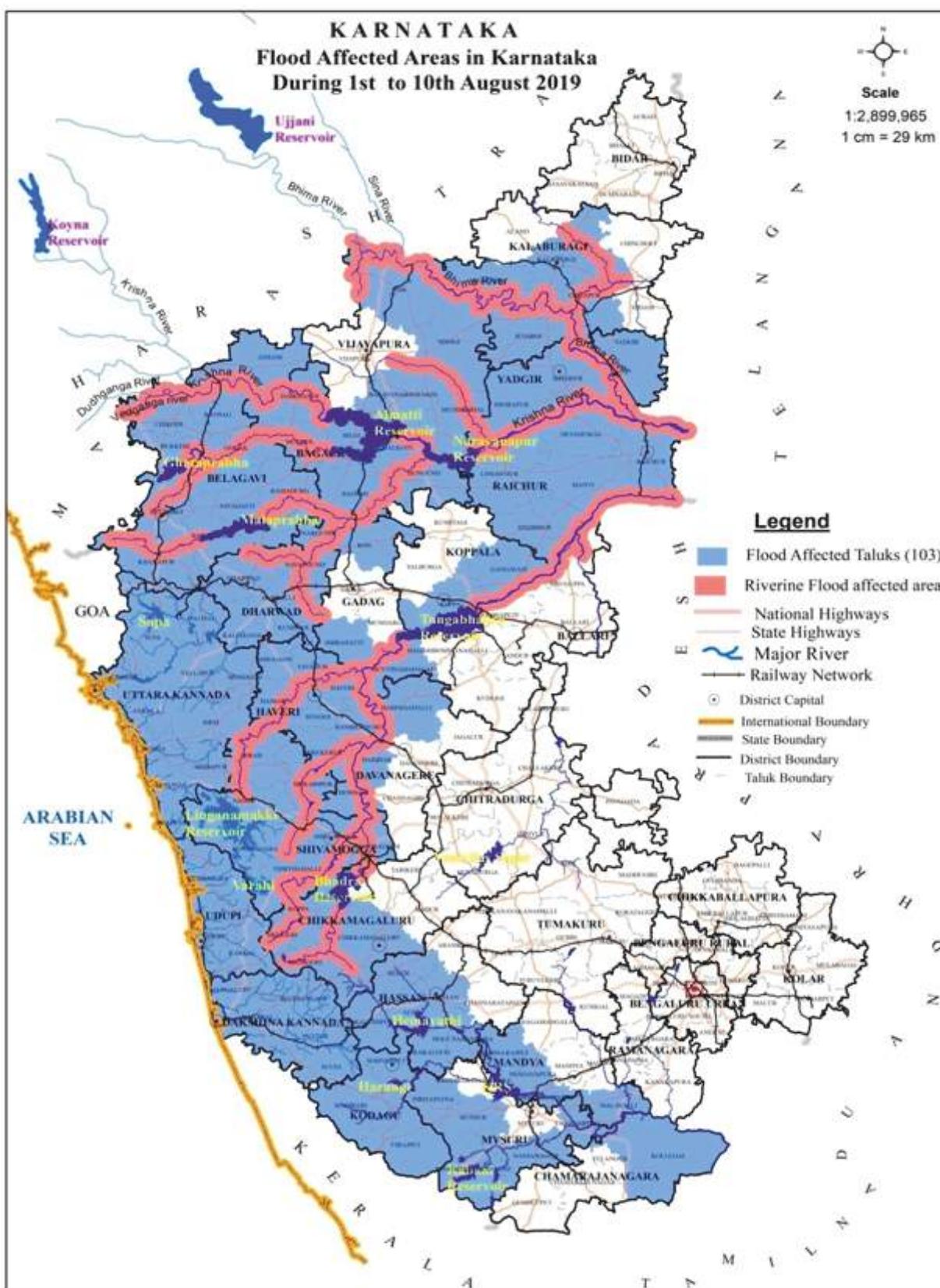
Source: KSNDMC



FLOODS IN KARNATAKA

Sl. No.	District Name	No. of. Taluks				
		2015	2016	2017	2018	2019
1	Bengaluru Urban	Nil	Nil	Nil	Nil	Nil
2	Bengaluru Rural	Nil	Nil	Nil	Nil	Nil
3	Ramanagara	Nil	Nil	Nil	Nil	Nil
4	Kolara	Nil	Nil	Nil	Nil	Nil
5	Chikkaballapura	Nil	Nil	Nil	Nil	Nil
6	Tumakuru	Nil	Nil	Nil	Nil	Nil
7	Chitradurga	Nil	Nil	Nil	Nil	Nil
8	Davanagere	Nil	Nil	Nil	Nil	2
9	Chamarajanagara	Nil	Nil	Nil	Nil	1
10	Mysuru	Nil	Nil	Nil	Nil	5
11	Mandya	Nil	Nil	Nil	Nil	4
12	Ballari	Nil	Nil	Nil	Nil	2
13	Koppala	Nil	Nil	Nil	Nil	2
14	Raichur	Nil	3	Nil	Nil	5
15	Kalaburagi	Nil	7	Nil	Nil	4
16	Yadgir	Nil	3	Nil	Nil	3
17	Bidar	Nil	5	Nil	Nil	Nil
18	Belagavi	Nil	5	Nil	Nil	10
19	Bagalkote	Nil	1	Nil	Nil	6
20	Vijayapura	Nil	Nil	Nil	Nil	4
21	Gadag	Nil	Nil	Nil	Nil	3
22	Haveri	Nil	Nil	Nil	Nil	7
23	Dharwad	Nil	Nil	Nil	Nil	5
24	Shivamogga	Nil	Nil	Nil	4	7
25	Hassan	Nil	Nil	Nil	1	6
26	Chikkamagaluru	Nil	Nil	Nil	4	5
27	Kodagu	Nil	Nil	Nil	3	3
28	Dakshina Kannada	Nil	Nil	Nil	5	5
29	Udupi	Nil	Nil	Nil	3	3
30	Uttara Kannada	Nil	Nil	Nil	5	6
Total		0	24	0	25	103

Source: KSNDMC



HAZARD RISKS AND VULNERABILITIES

MULTI-HAZARD VULNERABILITY

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

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

Besides with the natural factors discussed earlier, various human-induced activities like increasing demographic pressure, deteriorating environmental conditions, deforestation, unscientific development, faulty agricultural practices and grazing, unplanned urbanisation, construction of large dams on river channels etc. are also responsible for accelerated impact and increase in the frequency of disasters in the country.

Building Material and Technology Promotion Council (BMTPC) has come out with Vulnerability Atlas of India as a tool for formulating proactive policies, strategies, and programmes to face the threat caused due to natural hazards. The Annexure-II has the hazard maps of India for a) Earthquake b) Flood and c) Wind and cyclone.

NATURAL HAZARDS

CYCLONES, WINDS AND COASTAL EROSION

Karnataka state has been confronting various natural hazards. The coastal districts namely Dakshina Kannada, Udupi, Uttara Kannada with a coastal line of 322kms and coastal population of 43.64 Lakhs are under the direct threat of cyclones and severe cyclones originating in Arabian sea and indirect attack of cyclones originating along the eastern coastline. The high density of population along the coastline of Karnataka has made the population highly vulnerable to the storm surge and high-speed wind accompanied by cyclone. Any severe cyclone along the eastern coastline causes heavy rainfall in the interior Karnataka region resulting in damages to crops, buildings, infrastructure services such as roads and often the impact would be severe disruption in the socio-economic life in these regions. It is important to note that infrastructure such as rail and road networks which are adjacent to the seacoast are constantly threatened by the erosion caused by giant sea waves, particularly during storm surges and cyclones. The State has been placed under Category (II) A - Low Vulnerability along with other states of Maharashtra, Kerala and Tamil Nadu.

Out of the total geographical area of 190.238 Lakh ha, about 44.92 lakh ha area covering 15 districts and 50 taluks is affected by winds and cyclones which is falling under moderate risk zone ($V_s=39\text{m/s}$) and the remaining area falls under low damage risk zone (33m/s). The map below delineates the areas prone to moderate damage.

STORM SURGE

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

URBAN FLOODS

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

EARTHQUAKE

Nearly 59 per cent of India's territory is prone to moderate to severe earthquakes. The last three 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. Seven states in North East (Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), the Andaman and Nicobar Islands, parts of three states in the North/North-West (Jammu and Kashmir, Uttarakhand, Bihar, and Gujarat) are in Seismic Zone V i.e. highly prone. Wide-spread human and material losses, the collapse of infrastructure and services may be the major consequences of the earthquake. Hundreds of thousands may be displaced, often in remote mountainous areas in the North and North-East.

KARNATAKA EARTHQUAKE VULNERABILITY

As per the revised earthquake hazard mapping, 22.13% of the total geographical area is under moderate earthquake damage risk zone & remaining area of the state is under low damage risk zone. The state of Karnataka has reported more than 500 earthquake tremors in the last three decades with most of them having low magnitude. It is found that the weak zones around the northern Karnataka bordering Maharashtra could cause heavy damages in future. The areas of the southern part of Karnataka are also not free from frequent tremors. The Karnataka state is categorized as moderate to low seismic risk zone.

The following Districts are falling in Zone III (Moderate Damage Risk Zone (MSK VII)).

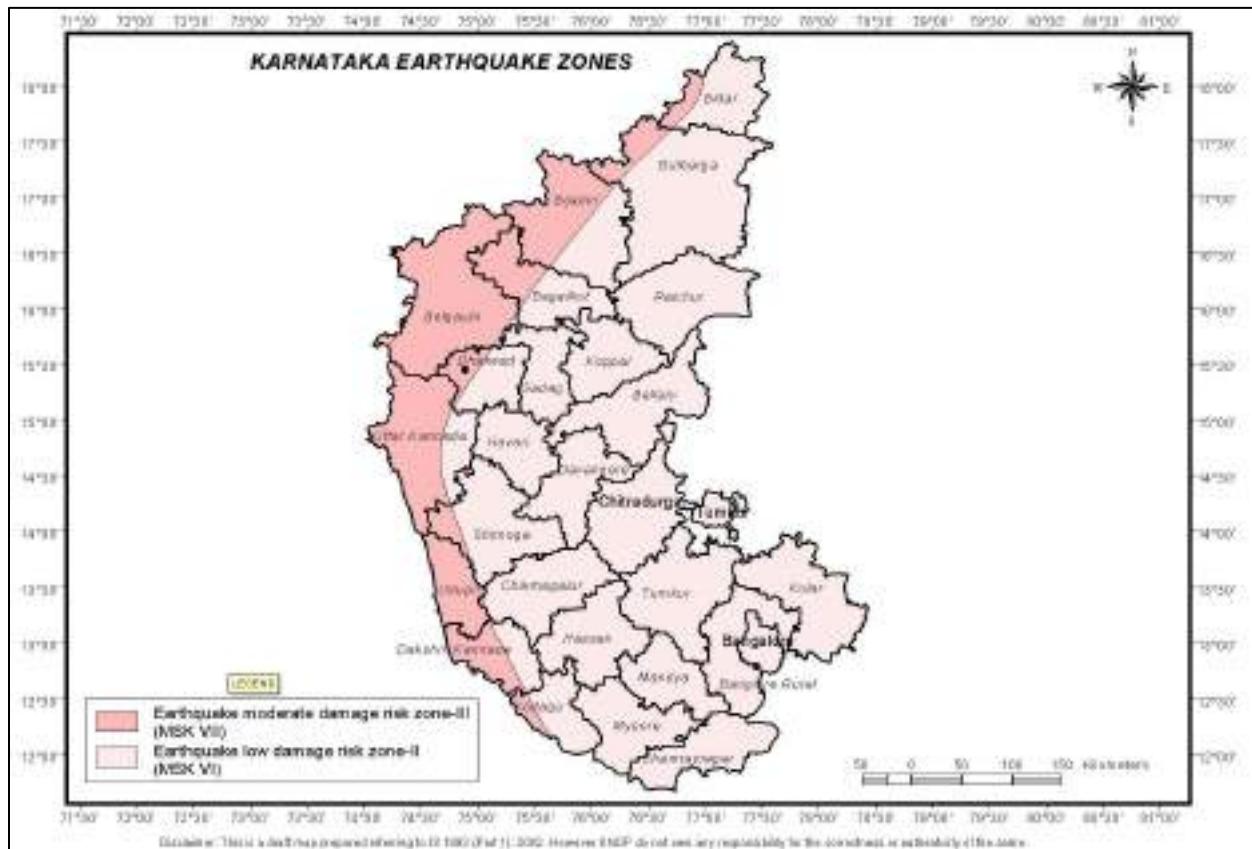
KSNDMC has established V-SAT enabled 14 Permanent Seismic Monitoring Stations Network (PSMS) for monitoring the seismic and tremor activity due to querying and mining activities around the network. There is a report from KSNDMC that in the recent years' signatures of quarry blast are recorded.

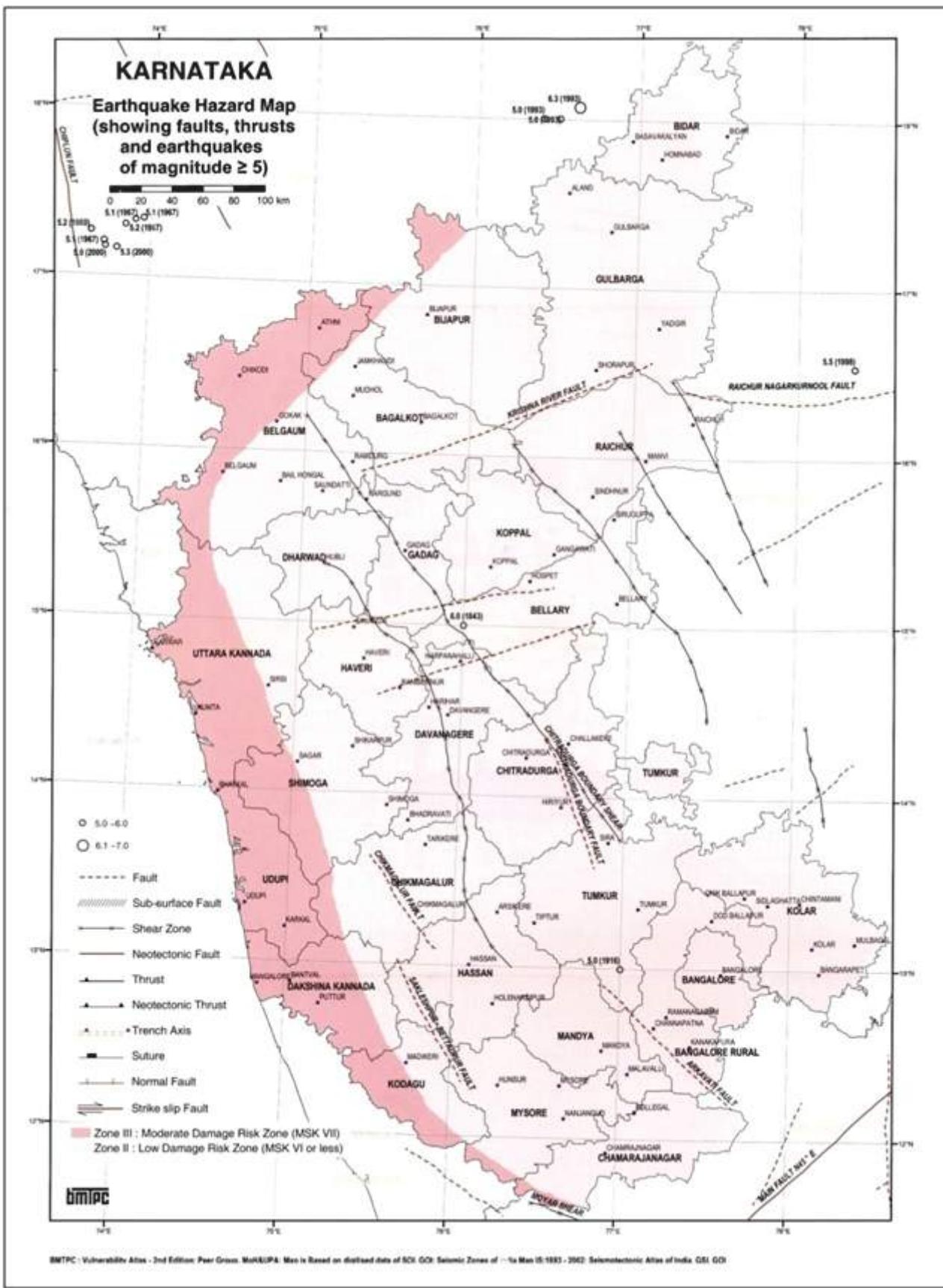
QUARRY RELATED BLAST INCIDENTS

Sl. No	Date	Place	Loss of life/ Reason
1	01-05-2018	Hassan	3 Peoples died because illegal explosives used during quarrying also due to thunderstorm
2	15-08-2018	Hassan	No loss of life
3	25-09-2018	K R S dam within 10.5 Km radius	No loss of life. 2 signatures are recorded

Source: Mines and Geology, Bengaluru

The districts of Bidar, Gulbarga, Vijayapura, Bagalkot, Belagavi, Dharwad, Uttar Kannada, Shivamogga, Udupi, Dakshina Kannada and Kodagu fall under Seismic Zone III (Moderate Damage Risk Zone MSK VII). All other Districts are falling under Seismic Zone II (Low Damage Risk Zone MSK VI). The chart shows the occurrence of earthquake activities in Karnataka.





TSUNAMI

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 tens of minutes of the triggering event. The earthquake and resulting tsunami in the Indian Ocean on 26 Dec 2004 had devastating effects on India. Many people died and millions were displaced. The hardest-hit areas were on Southern coast and the Andaman and Nicobar Island. Tsunamis have the potential of causing significant casualties, widespread property damage, massive infrastructure loss and long-term negative economic impacts. People caught in the path of a tsunami often have little chance of survival. People die from drowning or debris crushing them.

LANDSLIDES

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 per cent of the World's landslides occur in the Himalayan ranges. The Himalayan range, which constitutes the youngest and most dominating mountain system in the World, is not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3,400 kilometres. Landslides are also common in Western Ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about one hundred landslides which caused severe damage to communication lines, tea gardens and other cultivated crops. Scientific observations in north Sikkim and Garhwal regions in the Himalayas reveal that there is an average of two 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 tons per sq. km. Landslides have been a major and widely spread natural disaster that often affect life and property, leading to a major concern.

LANDSLIDE IN KARNATAKA

Very heavy slopes are covered by hilly regions of western Ghats spread in the districts of Kodagu, Chikkamagalur, Hassan, Shivamogga, Dakshina Kannada and Uttara Kannada which record a very high normal rainfall of 2000mm to 4000mm. Landslides are common in these districts. During the rainy periods, these hilly regions regularly experience displacement of rocks and soils causing widespread damage to property, infrastructure such as rails, roads and loss of human life. The map below shows the sloping pattern of the state.

LANDSLIDE PROFILE OF WESTERN GHAT IN KARNATAKA

Landslides recorded along NH-69 and SH-50 between Jog fall and Honavar: 37 Landslides

- 37 landslides are recorded in this ghat section in between nearly 60 km stretch.
- The majority of the slides were found to be debris slides
- The slides are shallow with less than 2m depth.
- The general slope angle varies from 25° to 35°
- The slopes are moderately vegetated.
- The overburden thickness varies from 1-5m and consists of soil and weathered rock.
- The cut slope angle is 70° to 80° with the height varying from 2-15m.
- The cut slopes have failed due to heavy rain in the Ghat section during monsoon.
- Geologically the area comprises of weathered granite, gneisses and laterite.
- One rockslide with planner failure is observed in this section.

Landslides recorded along Shiradi Ghat, NH-75 landslides

- The majority of the slides were found to be debris slides
- The slides are shallow with less than 2m depth.
- The general slope angle varies from 25° to 35°
- The slopes are moderately vegetated.
- The overburden thickness varies from 1-5m and consists of soil and weathered rock.
- The cut slope angle is 70° to 80° with the height varying from 2-15m.
- The cut slopes have failed due to heavy rain in the Ghat section during monsoon.
- Geologically the area comprises of weathered gneisses and granulites.
- One rock slide with wedge failure is observed in this section

Landslides along with SH 88-Madikere Mangaluru Road-24 Slides

- The majority of the slides were found to be debris slides
- The slides are shallow with less than 2m depth.
- The general slope angle varies from 25° to 30°
- The slopes are thickly vegetated.
- The overburden thickness varies from 1-5m and consists of soil and weathered rock.
- The cut slope angle is vertical with the height varying from 2-15m.
- The cut slopes have failed due to heavy rain in the Ghat section during monsoon.
- Geologically the area comprises of weathered granite.
- Few rock slides with planner and wedge failures are observed in this section.

Landslides along SH 89-Madikere- Siddapura Road-5 Slides

- All are debris slides
- Triggered by heavy rainfall. The vertical cut slopes have failed due to toe cutting.

Landslides along SH 95-Karwar-Kumbarwada Road (Ansi Ghat)-14 Slides

- All are debris slides
- Triggered by heavy rainfall. The vertical cut slopes have failed due to toe Cutting.

THUNDERSTORM & LIGHTNING, SQUALL, DUST STORM, AND STRONG WIND

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

THUNDERSTORMS

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

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

LIGHTNING

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

CLOUDBURST AND HAILSTORMS

CLOUDBURST

A cloudburst is an extreme amount of precipitation in a short period, sometimes accompanied by hail and thunder that can create flood conditions. It is not, as is sometimes understood, the breaking open of a cloud resulting in the release of huge amounts of water. According to the IMD, if rainfall of about 100 mm or above per hour is recorded over a place that is roughly less than 100 sq.km area, it is classified as a cloudburst event. By this definition, 50 mm rainfall in half an hour would also be classified as a cloudburst. To put this in perspective, India, in a normal year, gets about 1160 mm annual rainfall. A cloudburst would,, account for 10-12 per cent of the annual rainfall of that area in just an hour. At times, a large amount of runoff from higher elevations is mistakenly conflated with a cloudburst. They are difficult to forecast because they occur over a very small area. Forecasts for a very small area are difficult to predict. However, using Doppler radars it is possible to forecast the possibility of cloudbursts about six hours and sometimes 12-14 hours in advance.

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

HAILSTORM

The hailstorm activity that occurs usually in the months of April and May occurred during February-March in 2014. About 25% of the total occurrence in the past recorded hailstones of 3-cm or more diameter. The hailstorms are mainly observed in the winter and pre-monsoon seasons with virtually no events after the onset of the southwest monsoon. Hail is a solid, frozen form of precipitation that causes

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

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

As a thunderstorm moves along, it may deposit its hail in a long narrow band (often several kilometres wide and about 10 kilometres long) known as a hail-streak or hail-swath. If the storm should remain almost stationary for some time, substantial accumulation of hail is possible. Its size and shape depend on how fast the storm is moving and how strong the updrafts are inside the storm. A typical hail-streak is about 1.5 km wide and 8 km in length. However, these may vary from a few acres to large belts, about 16 km wide and 160 km long. The volume of hail reaching the ground falls at a speed of about 40 m/sec and is usually less than one-tenth the volume of rain produced by a thunderstorm.

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

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

HEAT WAVE

Heat-wave is a period of abnormally high temperatures that leads to physiological stress, which sometimes can claim human life. The World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius. Different countries define heat wave differently in context of their local conditions. Heat Waves typically occur between March and June, and in some rare cases even extend until July. Heat waves are more frequent over the Indo-Gangetic plains of India. On an average, 5-6 heat wave events occur every year over the northern parts of the country. In the northern plains of the country, dust in suspension occurs in many years for several days, bringing minimum temperature much higher than normal¹¹ and keeping the maximum temperature around or slightly above normal.

Heat wave and Hot Day are area specific phenomena and may be ascribed for a Met Sub-division or a part thereof, when at least two stations satisfy the criteria. According to revised terminology of the IMD applicable from January 2016, in India, it will be considered as heat wave if the maximum temperature of a met-sub-station reaches at least 40°C or more in the plains, 37°C or more in coastal areas and at least 30°C or more for hilly regions. IMD defines heat wave based on departure from Normal is 4.5°C to 6.4°C and **Severe Heat Wave** departure from normal is >6.4°C, similarly heat wave considered for plain areas when actual maximum temperature $\geq 45^{\circ}\text{C}$ and **severe heat wave** when actual maximum temperature $\geq 47^{\circ}\text{C}$. To declare a heat wave, should be met at least at two stations in a Meteorological sub-division for at least two consecutive days. A heat wave will be declared on the second day.

HEAT WAVE IN KARNATAKA

As many as 12 districts — Belagavi, Vijayapura, Bidar, Bagalkot, Dharwad, Gadag, Kalaburagi, Yadgir, Ballari, Haveri, Koppal and Raichur — fall under north interior are vulnerable heat wave like condition in Karnataka. According to the India Meteorological Department, maximum temperatures were markedly above normal (1.6 to 3 degrees) not only at most places in north interior Karnataka but also coastal Karnataka and south interior Karnataka. Kalaburagi witnessed temperatures over 43 degrees Celsius, followed by Raichur (42), and Vijayapura, Bagalkot and Koppal in 2019.

HUMAN-INDUCED HAZARDS

CHEMICAL (INDUSTRIAL) DISASTERS

All factories having manufacturing processes mentioned in the first schedule appended to the factories act, 1948 are termed as hazardous process factories. There are about 735 hazardous process factories in the state. All Factories having the chemicals stored, used and manufactured in excess of the threshold quantities specified under the CIMA Rules, 1994 are categorised as Major Accident Hazard units (MAH). 59 MAH units are identified in the state, which are located in 17 districts. For all these 17 districts as per the said rules, District Crisis Groups have been constituted with the respective Deputy Commissioner of the district as the chairman and the representative of the Department of Factories and Boilers as the member Secretary. These groups also consist of district level officers from the departments viz., police, fire force, pollution control board, agriculture, health, education, transport, PWD and experts in the field of health and safety. The main function of the District Crisis Group is to oversee the safety systems in the MAH units located in the districts including the preparedness procedure in tackling the possible emergencies arising out of chemical accidents in addition to assisting the Deputy Commissioner in preparing a comprehensive off site emergency plan for the district obtaining information from the MAH units.

HAZARDOUS MATERIAL STORED, USED AND HANDLED IN THE STATE

Sl. No.	Particulars	Quantity	Main Hazard
1	LPG	52100 MT	Fire / Explosion
2	Petroleum Products	1109937 MT	Fire
3	Chlorine	1205 MT	Toxic and Corrosive
4	Liquid Oxygen	4591 MT	Cold burns, oxidizing
5	Carbon Di sulphide	200 MT	Toxic
6	Ammonia	10053 MT	Toxic and Corrosive
7	Liquid Nitrogen	720 MT	Cold burns
8	Corex Gas	³ 100000nm	Toxic, Fire & Explosion
9	Hydrochloric acid	1185 MT	Corrosive
10	Sulphuric acid	3039 MT	Corrosive
11	Phosphoric acid	21000 MT	Corrosive
12	Blast furnace gas, producer gas	³ 120000 nm	Toxic, Fire and Explosion
13	Other chemicals like Naptha, Solvent, Ethyl Mercaptan, Sulphur dioxide, Sodium Hydroxide, etc.	5402 MT	Toxic, Fire & Explosion

STEPS TAKEN BY THE STATE GOVERNMENT

1. Before setting any factory, the clearance from the Department of Forest, Ecology, and Environment is essential.
2. Relevant information in detail about the process, chemicals used, hazards identified and also measures to overcome hazards shall be informed to the authorities, workers and the general public.
3. Safety and health policy shall be evolved prior to the commencement of the activities.
4. On site emergency plan/disaster management plan shall be prepared and submitted for approval.
5. Safety manual shall be prepared and issued to all the workmen.
6. Subject all the workmen for pre-employment and periodical medical examination and maintain relevant records.
7. Ensure that the toxic chemicals and substances used in the factory are within the permissible threshold limits at the work environment committee comprising of workers representatives and the management shall be constituted and the same should function as per rules.
8. Provisions envisaged under the Control of Industrial Major Accident Hazard (Karnataka) Rules, 1994 shall be complied with.
9. Mock rehearsals in respect of handling the emergencies shall be conducted periodically.
10. Workers shall be trained and educated about the hazards, use of personal protective equipment, safety and health awareness and emergency preparedness.
11. Assist the district crisis group in evolving off site emergency plan, if the unit is coming under the MAH category.
12. Maintain occupational health Centre with all the facilities and required antidotes.
13. The factory should extend co-ordination and mutual aid to the neighbouring factories in case of exigencies.

As envisaged under the Environment (Protection) Act, 1986 and the Factories Act, 1948, every industry involved in hazardous process is required to draw up an on-site emergency plan detailing how emergencies are tackled in respective industries.

NUCLEAR AND RADIOPHYSICAL EMERGENCIES (NRE)

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

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

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

- 1) An accident taking place in any nuclear facility of the nuclear fuel cycle including the nuclear reactor, or in a facility using radioactive sources, leading to a large-scale release of radioactivity in the environment
- 2) A 'criticality' accident in a nuclear fuel cycle facility where an uncontrolled nuclear chain reaction takes place inadvertently leading to bursts of neutrons and gamma radiation

- 3) An accident involving radioactive material package during its transportation
- 4) The malevolent use of RDD or IND by terrorists
- 5) A large-scale nuclear disaster resulting from a nuclear weapon attack, which would lead to mass casualties and destruction of large areas and properties. Unlike a nuclear emergency, the impact of a nuclear disaster is beyond the coping capability of local authorities and calls for handling at the national level

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

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

- a) A nuclear emergency refers to a situation in which there is, or is presumed to be, a hazard due to the release of energy along with radiation from a nuclear chain reaction (or from the decay of the products of a chain reaction). These covers accidents in nuclear reactors, ‘criticality’ situations in fuel cycle facilities, nuclear explosions, etc.
- b) All other emergency situations which have the potential hazard of radiation exposure due to decay of radioisotopes are classified as radiological emergencies.

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

- 1) Accidents in Nuclear Power Plants (NPP) and other facilities in the Nuclear Fuel Cycle (NFC)
- 2) ‘Criticality’ Accidents
- 3) Accidents during transportation of radioactive materials
- 4) Accidents at facilities using radioactive sources
- 5) Disintegration of satellites during re-entry
- 6) Nuclear/Radiological terrorism and sabotage at nuclear facilities
- 7) State-sponsored nuclear terrorism
- 8) Explosion of nuclear weapons.

BIOLOGICAL EMERGENCIES INCLUDING PEST ATTACKS

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

Despite overall improvements in health indicators, inter-district and regional disparities continue. The five districts of Gulbarga Division (Bidar, Koppal, Gulbarga, Raichur, Bellary), with Vijayapura and Bagalkot districts of Belagavi division, continue to lag behind. Under-nutrition in under-five children and anemia in women continue to remain unacceptably high. Women's health, mental health and disability care are still relatively neglected. Certain preventable health problems remain more prevalent in geographical regions or among particular population groups. Structural reforms as suggested by the task force on Health have to be made and more effective management practices imbued with accountability have to be introduced to ensure swift and effective local responses to Health problems. The relatively low level of public confidence in public sector health services, particularly at primary health centers, is recognized. Lack of credibility of services adversely affects the functioning of all programs. Underlying reasons for implementation gaps need to be understood and addressed.

In 2009 - 10, Karnataka had a major communicable H1N1 pandemic outbreak, there were 4351 people had been treated with H1N1 and 255 people had succumbed to it. In addition, vector-borne disease outbreaks such as Malaria, Chickun Gunya, Dengue, Chickun Gunya, Japanese Encephalitis are common state anomalies. In 2019 Karnataka reported 3499 cases of malaria, 16851 cases of dengue, 3568 cases of chickun gunya and 33 cases of Japanese Encephalitis. Gastroenteritis, Typhoid, Cholera, Viral Hepatitis, Kyasanur Forest Disease (KFD) are the other seasonal disease outbreaks in Karnataka. The Novel Corona Virus infection, which has caused a pandemic resulting in catastrophic health implication and human miseries throughout the globe, was detected on 08.03.2020. Till date (29.07.20) 1, 12,504 people were diagnosed positive for the COVID 19 with 2147 deaths leading to large impact on socio-

economic sector. To combat the infection DM act 2005 and Epidemic act of 1987 were enforced. The Government of Karnataka striving its level best to fight against the disease by adopting the inter-department and interdisciplinary coordination mechanism. Also, the advisories, guidelines issued by the union government are indigenized into the Karnataka state and executed in the field to minimize the direct and indirect loss and to contain the human miseries due to a pandemic COVID 19. The government of Karnataka formulated the task force and expert committee to chalk out the strategy in combating the pandemic. The 5 Ts strategy had adopted to contain the infection and several social welfare schemes had been announced as relief measures by the Government of Karnataka to boot out the loss at all stages.

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

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

The growth of human society has rested largely on the cultivation of crops and domestication of animals. As crops and animals became necessary to sustain a divergent social structure, the depletion of these resources had far-reaching consequences. Along with the growth of societies, crop and animal diseases acquired more and more importance. Infectious agents are constantly evolving, often acquiring enhanced virulence or epidemic potential. As large number of people now travels within and across national boundaries, the likelihood of fast global spread of epidemics has increased dramatically making

localised outbreaks into national epidemics and global pandemics. As our society is in a state of flux, novel pathogens emerge to pose challenges not only at the point of primary contact but also in far removed locations. The increased interaction between humans and animals has increased the possibilities of zoonotic diseases emerging in epidemic form. The Biological DRR covers the legal frameworks and institutional aspects needed for addressing safety and security of microbial agents, managing epidemics, containing biological terrorism (BT), managing threats to livestock, and all forms of agriculture.

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

To effectively tackle the issue of livestock health, the Department is supplementing the activities of the State Governments / Union Territories by way of providing assistance through 'Livestock Health & Disease Control Scheme (LH&DC). During 2015-16, the scheme has been categorized under State plan with change funding pattern. Now, the scheme has been clubbed under umbrella scheme " White Revolution - Rastriya Pashudhan Vikas Yojana" as "Veterinary Services" and funding pattern has been changed to 60:40 between Centre and State (90:10 for the 8 North Eastern and 3 Himalayan State and UT's 100%). The scheme has following components:

- 1) Assistance to States for Control of Animal Diseases (ASCAD)
- 2) Professional Efficiency Development (PED) – The objective of the Scheme is to regulate veterinary practice, the maintenance of Register of veterinary practitioners
- 3) National Project on Rinderpest Surveillance and Monitoring (NPRSM)
- 4) Foot and Mouth Disease Control Programme (FMD-CP)
- 5) National Animal Disease Reporting System (NADRS)
- 6) Peste des Petits Ruminants Control Programme (PPR-CP)
- 7) Brucellosis Control Programme (Brucellosis-CP)
- 8) Establishment and Strengthening of existing Veterinary Hospitals and Dispensaries(ESVHD).
- 9) Classical Swine Fever Control Programme (CSF-CP).

ACCIDENTS – RAIL, AIR, ROAD AND WATER

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

ROAD ACCIDENTS

The state has a whole reported an average of 45000 cases of road accidents killing over 9-10 thousand and injuring about 50-60 thousand persons every year from 2009 to 2014. Bengaluru city accounts for over 3000 accidents. The statistics reveal a 2.2 per cent rise in road fatalities in the country in 2011, compared to 2010. Of these, 30,624 were riding two-wheelers, 26,061 were occupants of trucks/lorries, 13,380 were travelling in cars and 12,501 in buses. The number of pedestrians killed on the road by vehicles too was 12,501. Karnataka and Bangalore both stand third among the States and 53 megacities respectively in the country with regard to road deaths during 2011.

TABLE: 3.3 ROAD ACCIDENTS IN KARNATAKA FROM 2015 TO 2019

Year	Cases Reported	Persons Killed	Persons Injured	Vehicles Involved
2011	44731	8971	59591	49284
2012	44448	9448	58659	53955
2013	44020	10046	56781	50586
2014	43713	10452	56831	61560
2015	44011	10856	56971	54909
2016	44403	11133	54556	NA
2017	45542	10609	52961	NA
2018	41707	10990	51562	NA
2019 (Upto March)	10741	2703	13381	NA

SOURCE: STATE CRIME RECORD BUREAU

EMERGENCIES ASSOCIATED WITH MASS GATHERINGS

Throughout the country, frequently, there are various kinds of events that attract crowds large and small, at varying types and styles of venue. The degree and quality of preparedness to cope with expected or unforeseen emergencies arising from such events vary greatly. Inadequate planning can increase risks associated with insufficient or ineffective spectator management or service provision. The evidence lies in the large number of public events where multiple injuries, illness and deaths have occurred. Emergencies and disastrous incidents associated with mass gatherings is a world-wide phenomenon.

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

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

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

event planning phase may contribute to a safer, and therefore more successful, event.

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

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

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

FIRE RISK

FIRE IN BUILT ENVIRONMENT

Fires can start due to human activities or from natural causes. Forest fires can start from either natural causes or human activity or from a combination of both. The most common fires are the residential and non-residential structural fires caused usually by human activities. Most industrial and chemical fires are triggered by human activity. They are sometimes caused by human errors, faulty designs, or mechanical failures. Fire can also be the secondary effect of a disaster like earthquake. Secondary fires after a disaster like earthquakes constitute a substantial and heavy risk. Damage to natural gas systems during an

earthquake can lead to major fires and explosions. Damages to electrical systems during a disaster can ignite major fires. The growth of fire-services in the country has been on an ad-hoc basis and needs to be professionalized. Varying risk scenarios need different types of equipment. The risk varies with geographical location such as hilly area, coastal-area, desert-area, and with different types of residential (medium/low-rise/high-rise) buildings, industrial, commercial area or a combination of these. There is considerable need for skill upgrade of the staff and modernization of the entire fire service system. The NDMA guideline on fire services notes that the Standing Fire and Advisory Council (SFAC) has stressed the urgent need to strengthen the Fire and Emergency Services (F&ES) and overcome major shortcomings in the response and its capabilities (SFAC 2016).

FIRE ACCIDENTS IN KARNATAKA STATE

The number of fire accidents managed by the State Fire and Emergency Services (KSFES) depicting lives and value of property lost and saved from 2011 to 2019 are given in the table below. The fire incidents of Mangaluru air crash, Carlton tower and many small to severe fire incidents have exposed the vulnerability of the state to more such events in future. The KSFES must ensure availability of adequate state of art equipment's and technology including skilled human resource to counter the fire accidents taking place both in rural and urban areas.

TABLE: FIRE INCIDENTS IN KARNATAKA (2011 TO 2019)

Year	Total Fire calls	Rescue Calls	No. of lives saved in Fire	No. of lives lost in Fire	No. of lives rescued in Fire	Value of property involved (Cr. Rs.)	Value of property saved (Cr. Rs.)	No. of Persons Injured	Mock Drills conducted
2011	1295	19220	1394	977	651	1660	874	626	964
2012	616	18464	1436	615	634	1340	1135	737	362
2013	15925	1521	673	380	291	797	576	746	44
2014	16441	1862	434	461	232	1067	833	840	100
2015	15308	1728	398	309	270	833	667	475	8
2016	18525	1924	295	113	2244	1447	916	212	955
2017	13427	2400	154	80	2545	627	408	497	606
2018	18693	2491	178	109	2729	587	401	172	1420
2019	12615	779	164	54	988	6517	420	103	684

Source: KSF&ES

FOREST FIRE RISK

India is one of the richest areas of bio-diversity in the world having nearly seven lakhs (692,027) square kilometres of forest cover. Increasing human interference is a major cause for the incidents of the forest fires. Despite its natural and essential roles, fire has negative consequences when it conflicts with the public interest. Examples of negative impacts include loss of homes, property and critical infrastructure, damage to domestic watersheds and destruction of commercially valuable timber. Smoke from wildland fires can also interfere with road and air transportation, inhibit tourism, and cause serious public health problems. It is also a threat to human settlements dwelling within or adjacent to the forests.

Forest fires in India are generally ground fires. As per Forest Survey of India (FSI), which has been conducting field investigations since 1965, human activities trigger nearly 95 percent of the forest fires in India. Forest fire is a major cause of injury and loss to forests. Area affected by forest fire annually is nearly 35 million hectares. In general, all over the world the main causes of forest fires are anthropogenic. The data on forest fires in India is very weak and needs to be improved. FSI's 1995 data considers nearly 50 percent of the forest areas as fire prone with 43 percent having occasional fire incidents. According to this assessment, very high, high, and frequent forest fires occur in 0.84 percent, 0.14 percent and 5.16 percent of the forest areas respectively. The states with frequent occurrence of forest fires are: 1) Andhra Pradesh 2) Himachal Pradesh 3) Karnataka 4) Manipur 5) Madhya Pradesh 6) Nagaland 7) Orissa 8) Rajasthan 9) Telangana 10) Uttar Pradesh and 11) Uttarakhand.

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

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

making area vulnerable to erosion. It has wide-ranging adverse ecological, economic and social implications.

FOREST FIRE IN KARNATAKA

Forest fires are increasing every year in the state due to summer heat, dried grass, attitude of revenge, negligent throwing of cigarettes. Forest department in coordination with Police, Fire Services, Home guards, Civil Defense, Volunteers, NGOs and local community have been taking preventive measures.

A massive forest fire broke out in Bandipur National Park. It was estimated by ISRO and NRSC through their satellite imageries that an area of 10,920 acres was destroyed between 21-25 February 2019.

Forest fire incidents from 2015- 2019 are given in the table

Incidents	2015	2016	2017	2018	2019
Number of Forest Fires	589	913	925	985	Bandipur national park
Area Affected by Forest Fires (Hectares)	168.67	278.68	6976.85	-	3160.00 Ha

Source: Forest Department, GoK.

REGIONS/AREAS INVOLVING STATE REQUIRING SPECIAL ATTENTION

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

Six special categories of region need specialized approach:

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

COASTAL AREAS

Karnataka coastline extends over a length of 320 kilometers with numerous river mouths, lagoon, bays, creeks, cliffs, sand dunes and long beaches. Karnataka has no major delta formations. The shelf off Karnataka has an average width of 80 kilometers and the depth of shelf break is between 90 and 120 meters. There are 26 estuaries with more than 70000 ha water spread area and 8000 ha of brackish water area, making the 3 coastal districts of Karnataka very rich in marine, estuarine and riverine biodiversity. 14 rivers which originate in Western ghats run westwards and join the Arabian sea. Karnataka Costal soil is a mixture of laterite rock and clay.

RIVERINE REGIONS

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

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

ARID/SEMI-ARID AND DROUGHT-PRONE REGIONS

A long stretch of land situated to the south of Tropic of Cancer and east of the Western Ghats and the Cardamom Hills experiences Tropical semi-arid climate. It includes Karnataka, interior and western Tamil

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

CLIMATE CHANGE

CLIMATE AND HUMAN-INDUCED CLIMATE CHANGE

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

Anthropogenic drivers for climate change is now widely recognised among the scientific community as playing the major role in magnifying the disaster risks globally. The knowledge and understanding on climate change holds key to the unprecedented changes in the disaster risk scenarios facing the world today. A changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events. Extreme and non-extreme weather or climate events affect vulnerability to future extreme events by modifying resilience, coping capacity, and adaptive capacity.

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

IPCC FIFTH ASSESSMENT REPORT

According to IPCC's Fifth Assessment Report (AR5) based on many independent scientific analyses, new evidence, theoretical studies and computer simulations, there is greater certainty that the build-up of Greenhouse Gas in Earth's atmosphere is changing the world's climate and creating increasingly extreme and unpredictable weather. Because of these changes, the probability of extreme weather events is increasing. According to AR5, the computed linear trend of the globally averaged combined land and ocean surface temperature data show 0.85°C [0.65°C to 1.06°C]²⁵ warming over the period 1880 to 2012, when multiple independently produced datasets exist. In the period 1901-2012, climate has shown a warming of 0.89°C [0.69°C to 1.08°C], which is mainly attributed to anthropogenic activities (IPCC 2013). Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the case of India, increasing temperature trends of the order of 0.60°C during last 112 years (IMD 2012) and increase in heavy rainfall events and decrease in low and medium rainfall events (Goswami et al. 2006) have been observed.

A world with 4°C rise in temperature would be one of unprecedented heat waves, severe drought, and major floods in many regions, with serious impacts on ecosystems and associated services. Deltaic

regions and coastal cities are particularly exposed to compounding climate risks resulting from the interacting effects of increased temperature, growing risks of river flooding, rising sea-level and increasingly intense tropical cyclones, posing a high risk to areas with the largest shares of poor populations. As per India's National Action Plan on Climate Change, parts of western Rajasthan, southern Gujarat, Madhya Pradesh, Maharashtra, Northern Karnataka, Northern Andhra Pradesh, and Southern Bihar are likely to be more vulnerable in times of extreme events (MOEF 2014).

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

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

INDIA AND CLIMATE CHANGE

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

Reports of Official Studies on Climate Change

- a) *India's submission of NDC to the UNFCCC as per Paris Agreement, 2015 (MoEFCC2015)*
- b) *India's Progress in Combating Climate Change - Briefing Paper for UNFCCC COP 20 Lima, PERU (MoEFCC 2014)*
- c) *IMD Report of 2013 (ESSO/IMD/EMRC/02/2013) - State level climate change trends in India. (IMD 2013)*
- d) *INCCA Report #2 – Climate Change and India: A 4x4 Assessment - A Sectoral and Regional Analysis for 2030s (MoEFCC 2010)*

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

The sub-continent is expected to see relatively larger rise in sea levels than higher latitudes and India being close to the equator this has ramifications for the coastal regions of India. Sea-level rise and storm

surges would lead to saltwater intrusion in the coastal areas, impacting agriculture, degrading groundwater quality, contaminating drinking water, and possibly causing a rise in diarrhea cases and cholera outbreaks, as the cholera bacterium survives longer in saline water. Seasonal water scarcity, rising temperatures, and intrusion of sea water would threaten crop yields, jeopardizing the country's food security.

TEMPERATURE

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

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

State wise averaged annual mean maximum temperature time series has shown increasing trends over many states of India except Bihar, Chhattisgarh, Delhi, Haryana, Jammu and Kashmir, Meghalaya, Punjab, Tripura and Uttar Pradesh (Rathore et al, 2013). The increasing trends were significant over Andaman and Nicobar, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Orissa, Rajasthan, Sikkim, Tamil Nadu and Uttarakhand.

IMPACT ON INDIAN MONSOON

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

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

State averaged annual rainfall trends have increased over Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu and Kashmir, Jharkhand, Lakshadweep, Manipur, Meghalaya, Mizoram, Orissa, Rajasthan, Tamil Nadu, Tripura and West Bengal during 1951-2010 (Rathore et al, 2013). However, annual rainfall has decreased over Andaman and Nicobar, Arunachal Pradesh, Assam, Chhattisgarh, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Punjab, Sikkim and Uttar Pradesh. The highest increase and decrease in annual rainfall were observed over Meghalaya (+14.68 mm/year) and Andaman and Nicobar (-7.77 mm/year) respectively (Table 6). However, annual rainfall trends have been significantly increasing over West Bengal (+3.63 mm/year) and significantly decreasing over Andaman and Nicobar (-7.77 mm/year) and Uttar Pradesh (-4.42 mm/year).

STORM AND CYCLONES

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

SEA-LEVEL RISE

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

COASTAL INUNDATION DUE TO SEA LEVEL RISE

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

INTEGRATING DRR AND CLIMATE CHANGE ADAPTATION (CCA)

DRR focusing on adaptation and CCA focusing on risk reduction is pertinent for effective and sustainable DRR as well as CCA. The paradigm shift in DRR towards disaster preparedness and mitigation requires futuristic planning. The SFDRR targets on reducing disaster “mortality”, “affected people”, “economic

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

LIVESTOCK – DRM CHALLENGES

BACKGROUND

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

The total livestock population consisting of cattle, buffalo, sheep, goat, pig, horses & ponies, mules, donkeys, camels, mithun and yak in the country is 512.05 million as per the 19th (latest) livestock census of 2012. The total bovine population (cattle, buffalo, mithun and yak) is nearly 300 million of which the milch animals (cows and buffaloes) is 118.6 million. The total sheep was 65.1 million and goats 135.2 million. Besides, there are 0.63 million horses and ponies, 0.2 million mules, 0.32 million donkeys, 0.4 million camels, 10.3 million pigs, 11.7 million dogs and over 729 million poultry. The provisional figure of

disaster loss in 2016-17 (by end of 2016) was 42 thousand cattle and 2.6 million ha of cropped area²⁷. The cattle losses, thus, works out to be nearly 14 per 100,000. In 2006-07, the cattle loss was very high, about 0.46 million. Given the very large number of livestock, the DRM for livestock is a huge challenge, although the losses seem very low at the national level.

GLOBAL APPROACHES IN LIVESTOCK EMERGENCIES

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

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

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

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

The approach places emphasis on three livelihoods objectives:

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

KEY INTERVENTIONS

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

- Destocking is a measure resorted to particularly in case of creeping disasters like droughts, usually involve the sale of livestock in anticipation of or during emergency well before the animals are affected by the disaster, which helps improve liquidity needed to support livelihoods all through the crisis.
- Animal rescue involves making all possible efforts to save animals and treat the injured, where possible
- Veterinary support to prevent sickness and death and help maintain the value of the surviving animals
- Provision of feed and water for the animals in the affected area, to the extent possible
- Livestock shelters – may be required in many situations for the protection from extreme weather, predation, and/or theft, depending on the local conditions
- Additional sanitation and other measures to prevent epidemics
- Safe removal and disposal of carcasses of animals killed in the disaster
- Provision of livestock or financial support for restocking to households to replace, subject to conditions, usually partially, animals lost in a disaster with the objective of helping to rebuild livelihoods

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

RISK MANAGEMENT AND INSURANCE

Recognising the need for risk management, the Government of India had initiated a centrally sponsored scheme for livestock insurance which was implemented initially on pilot basis during the tenth five-year plan (2002-07). From 2008-09 onwards, the scheme became a regular scheme. National Livestock

Mission (NLM) has been launched during Twelfth Five Year Plan (2007-12). The goal of NLM is sustainable livestock and poultry for nutritional security and economic prosperity. One of its sub-missions is on ‘Risk Management and Insurance’ (NLM-RMI). The objective of the NLM-RMI is to address the challenges of managing uncertainties and risks by promoting protection mechanisms against likely loss of animals through livestock insurance schemes. The NLM-RMI is applicable across the country and the implementation began from May 2014 covering all animals. The benefit of subsidy has been enhanced and is restricted to five cattle unit per beneficiary per household, in case of goat, sheep, pigs and rabbit one cattle unit is equal to ten animals instead of two milch animals per household earlier. By the middle of 2017, the insurance scheme covers over 3.6 million animals.

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

ENVIRONMENT AND WILDLIFE CONSERVATION

BACKGROUND

Sound environmental management is proven to be integral to disaster risk reduction. Healthy ecosystems not only play an important role in supporting recovery and reconstruction after a disaster, but in reducing future disaster risk. Yet the same time, disasters also pose significant risks to the ecosystems and could pose threat to the populations of endangered species, disrupt wildlife conservation or ecologically important habitats. The agreements on Sendai Framework, SDG and the COP21 Climate Change bring disaster risk management and environmental professionals closer. It is important to also pay some attention to environment, ecologically important areas and wildlife conservation areas/protected areas even though the approach to DRM will have to quite different. The Sendai framework states that strengthening of environmental resilience is one of the strategies required for preventing the creation of risks and notes the importance of preserving ecosystem functions that help to reduce risks while promoting the mainstreaming of DRR.

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

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

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

management for disaster risk reduction are:

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

ENVIRONMENTAL MONITORING AND ASSESSMENT

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

PROTECTED AREAS, ECOSYSTEM REHABILITATION

Environmental conditions not only modify the frequency of hazard events, but ecosystems also serve as natural barriers that can moderate the effects of a hazard and protect communities. According to the Millennium Ecosystem Assessment (MA 2005), an ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit, which could range from relatively undisturbed areas such as natural forests, landscapes with mixed land-use patterns, to areas intensively managed by humans, such as agricultural land and urban areas. Ecosystems are socio-ecological systems and managing ecosystem services is highly relevant for the purposes of disaster risk reduction. Biodiversity including rare wildlife and their habitats are included in these. Global climate change awareness has spurred a new drive to better manage protected areas and reduce deforestation. Protecting and preserving the natural position and trajectory of wetlands and other water resources has received increasing support, given the risks from their alteration, elimination or loss for developmental purposes.

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

STATE AND BIODIVERSITY CONSERVATION

Karnataka, one of the Southern states of India has 3.83 Million ha of recorded forest area which is around 20 percent of its geographical area. Karnataka is endowed with most magnificent forests in the country ranging from majestic evergreen forests of the Western Ghats to the scrub jungles of the plains. The Western Ghats of Karnataka are one of the 25 global priority hotspots for conservation and one of the two on the Indian subcontinent. Several economically important species such as Sandalwood, Rosewood, Teak, White cedar grow naturally in these forests. Karnataka forest is endowed with rich wildlife, harbors 25 percent of the elephant population of India, 10% of the Tiger population. The state has 5 National parks and 21 sanctuaries comprising about 17.3% of total forest area as protected area for wildlife and biodiversity. The state ranks 4th among all the state and union territories in respect of area under tree cover.

The State of Karnataka is a part of highly biodiversity rich regions of India. The western Ghats of Karnataka is one of the mega bio-diversities of the world. The State is endowed with great diversity of climate, topography and soil. Karnataka has great diversity of species, including the human being which has coevolved since centuries. Geographically the State can be divided into three major zones. With the Western Ghats (Sahyadri) forming a major water divide, there are short and swift flowing rivers in the west draining into the Arabian sea. Notable among them are Sharavati, Kali, Netravati, Bedthi /

Gangavalli, Aghanashini, Varahi and Chakra. To the east of the major divide, flow the river Krishna and Cauvery. A major part of the upstream of river Krishna and its tributaries Tungabhadra, Ghataprabha, Malaprabha, Bhima and Vedavati flow through northern Karnataka, pass through Andhra Pradesh before joining the Bay of Bengal. The Cauvery river in the south flows down the eastern slopes of the ghats, passes through TamilNadu before joining the Bay of Bengal. The main tributaries are Hemavathi, Kabini, Arkavati, Shimsha, Palar, Uttaraand Dakshina Pinakini, Manjira and Karanja are the only tributaries of river Godavary found with in the State boundary.

Biodiversity of Karnataka

Number of Species.....	1.2 lakhs
Flowering plants.....	4500 species
Birds.....	508 species
Mammals.....	150 species
Reptiles.....	156 species
Amphibians.....	135 species
Fishes (marine & brackish water)	.405 species
Fishes (fresh water).....	289 species
Butterflies.....	330 species
Medicinal plants.....	1493 species which Includes 300 species in commercial use

Source: Karnataka Biodiversity Board

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

DRM AND CLIMATE CHANGE IN WILDLIFE ACTION PLAN

The Third National Wildlife Action Plan (2017-2031) is based on the premise that essential ecological processes that are governed, supported or strongly moderated by ecosystems, are essential for food production, health and other aspects of human survival and sustainable development. And maintenance of these ecosystems which can be termed as 'Life Support Systems' is vital for all societies regardless of their stage of development. It also emphasizes on other two aspects of living

resource conservation viz. preservation of genetic diversity and sustainable utilization of species and ecosystems which has direct bearing on our scientific advancements and support to millions of rural communities.

The Third Wildlife Action Plan (WAP-3) has adopted a landscape approach in conservation of all uncultivated flora and undomesticated fauna that has ecological value to mankind irrespective of where they occur. It accords special emphasis to rehabilitation of threatened species of wildlife while conserving their habitats which include inland aquatic, coastal and marine eco-systems. It also takes note of concerns relating to climate change on wildlife by integrating it in to wildlife management Planning. It underlines the fact that the national development policies need to take serious note of adverse ecological consequences of reduction and degradation of wilderness areas from the pressures of population, commercialization and development projects. Accordingly, the plan draws attention to the alarming erosion of India's natural heritage comprising of rivers, forests, grasslands, mountains, wetlands, coastal and marine habitats arid lands and deserts.

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

- The EIA process needs to integrate the issues concerning CCA and DRR
- Improving collection and collation of data on hazards
- Sound integration of DRR, relief, rehabilitation with CCA
- Integrating CCA and DRR with shared responsibility into all PA plans taking account PA- specific data

- Integrate CCA and DRR with shared responsibility in all sectors into the action plans
- Involving local communities respecting their knowledge and capacities
- Suitably integrate CCA and DRR into management plans for Coastal and Marine Protected Areas (CMPA)
- Develop synergy between CCA and DRR in the state coastal zone management plan (SCZMP) prepared under CRZ provisions, with participation of all stakeholders
- Develop knowledge base and expertise in addressing wildlife conservation challenges in the context of climate change and projected increase in extreme weather events as well as natural disasters
- Upgrade syllabi of various wildlife degree and training programmes (diploma, under graduate and post-graduate) to cover conservation of the full range of biodiversity.

CHAPTER 3

COHERENCE AND MUTUAL REINFORCEMENT FOR DRR OF POST- 2015 GLOBAL FRAMEWORKS – SENDAI, SDG AND COP21

BACKGROUND

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

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

SENDAI FRAMEWORK FOR DRR

NEW EMPHASIS ON DISASTER RISK MANAGEMENT AND OTHER DEPARTURES

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

The Sendai Framework for DRR (SFDRR or Sendai Framework), the first international agreement adopted within the context of the post-2015 development agenda, marks a definitive shift globally towards comprehensive disaster risk management aimed at disaster risk reduction and increasing disaster resilience going far beyond disaster management. This approach calls for setting the overall goal as that of preventing new and reducing existing disaster risk through the implementation of integrated measures. The goal now is on DRR as the expected outcome, setting goals on preventing the creation of new risks, reducing the existing ones, and strengthening overall disaster resilience. In addition, the scope of DRR has been broadened significantly to focus on both natural and human- induced hazards including various related environmental, technological and biological hazards and risks. The Sendai Framework acknowledges the inter-linkages between climate change and disaster risks. Disasters that tend to be exacerbated by climate change are increasing in frequency and intensity.

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

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

- For the first time the goals are defined in terms of outcome-based targets instead of focusing on sets of activities and actions.
- It places governments at the center of disaster risk reduction with the framework emphasizing the need to strengthen the disaster risk governance.
- There is significant shift from earlier emphasis on disaster management to addressing disaster risk management itself by focusing on the underlying drivers of risk.
- It places almost equal importance on all kinds of disasters and not only on those arising from natural hazards.

- In addition to social vulnerability, it pays considerable attention to environmental aspects through a strong recognition that the implementation of integrated environmental and natural resource management approaches is needed for disaster reduction
- Disaster risk reduction, more than before, is seen as a policy concern that cuts across many sectors, including health and education

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

FOUR PRIORITIES; SEVEN TARGETS

The four priorities for action under the Sendai Framework are:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

India is a signatory to the Sendai Framework for a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. State will make its contribution in achieving the seven global targets set by the Sendai Framework

(Fig 3-1):

- Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rates in the decade 2020–2030 compared to the period 2005– 2015;
- Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;
- Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services,

among them health and educational facilities, including through developing their resilience by 2030;

- Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
- Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.



Figure 3.1 Sendai Framework for Disaster Risk Reduction – 7 Global Targets

On 2 February 2017, the United Nations General Assembly endorsed the Report of the Open-ended Intergovernmental Expert Working Group (OIEWG) on Indicators and Terminology Related to Disaster Risk Reduction and the recommendations for indicators and terminology relating to disaster risk reduction (UNISDR 2017). The report of OIEWG is meant to help countries operationalise the global indicators for measuring the progress towards realising global targets for DRR along with targets of other major Post-2015 global frameworks.

SUSTAINABLE DEVELOPMENT GOALS (SDG) AND DISASTER RESILIENCE

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

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



Figure 3.2 Seventeen Sustainable Development Goals

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

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

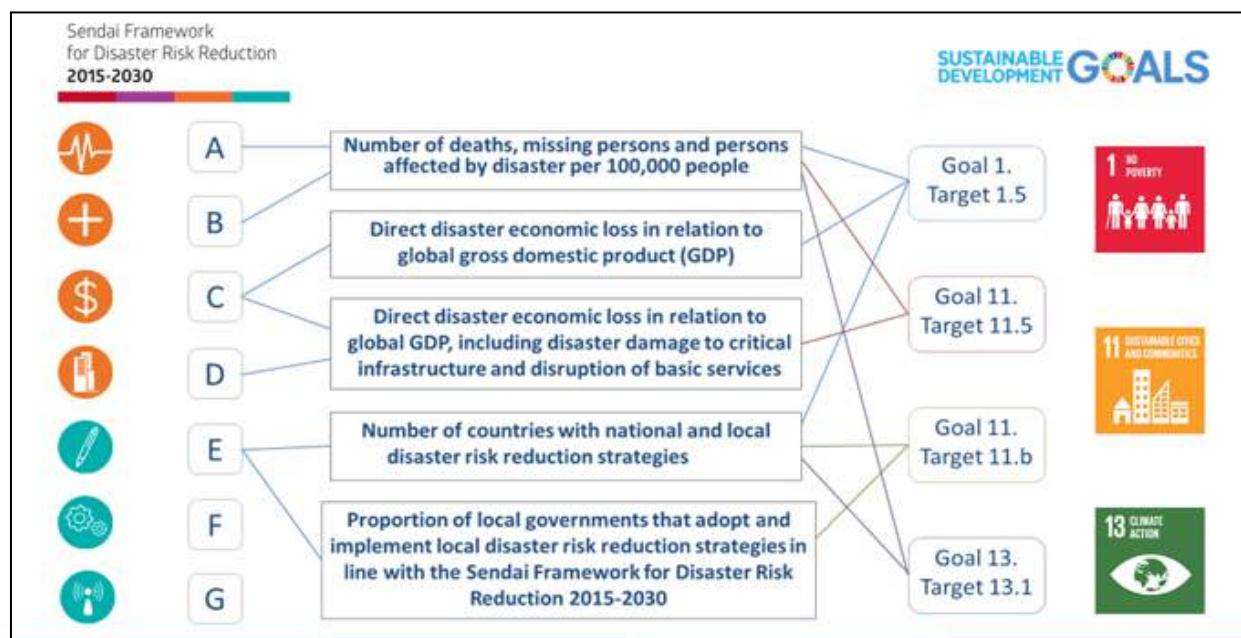


Figure 3.3 Coherence and mutual reinforcement of SDGs and Sendai Framework

COP21 AGREEMENT, PARIS, ON CLIMATE CHANGE ACTION AND DISASTER RISK

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

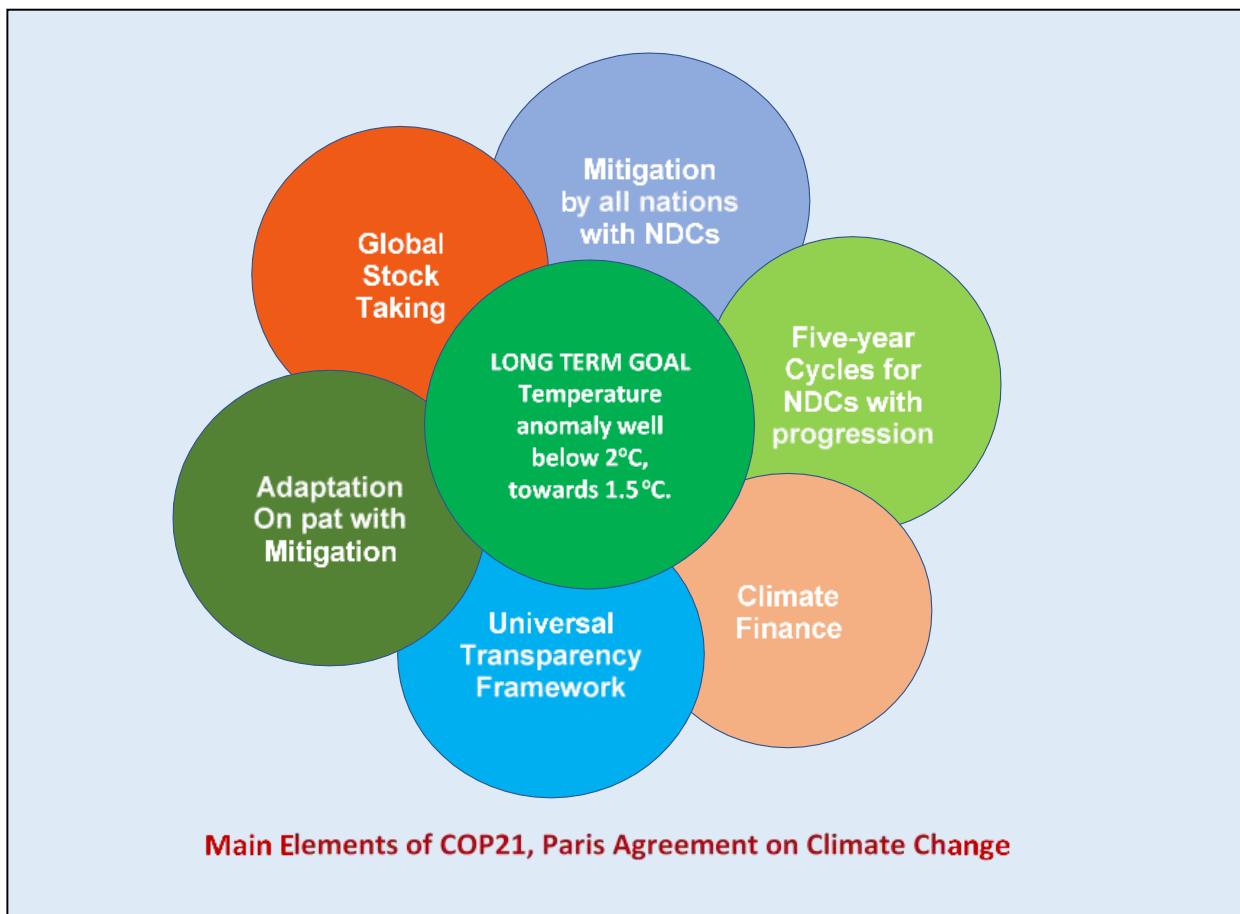


Figure 3.4 Main elements of the COP21, Paris Agreement on Climate Change

THE MAJOR GOALS ADOPTED IN THE AGREEMENT ARE:

- A consensus on adopting the long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels
- Aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change
- Accepting the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and
- To undertake rapid reductions of emissions in accordance with the best available science adaptation seek to address (Fig. 3-5). The regions already exposed to climate-related hazards and effects will be at greater risk due to a projected increase in the frequency and/or intensity of those hazards and effects because of global climate change.

There is significant convergence between the problems that disaster risk reduction and climate change

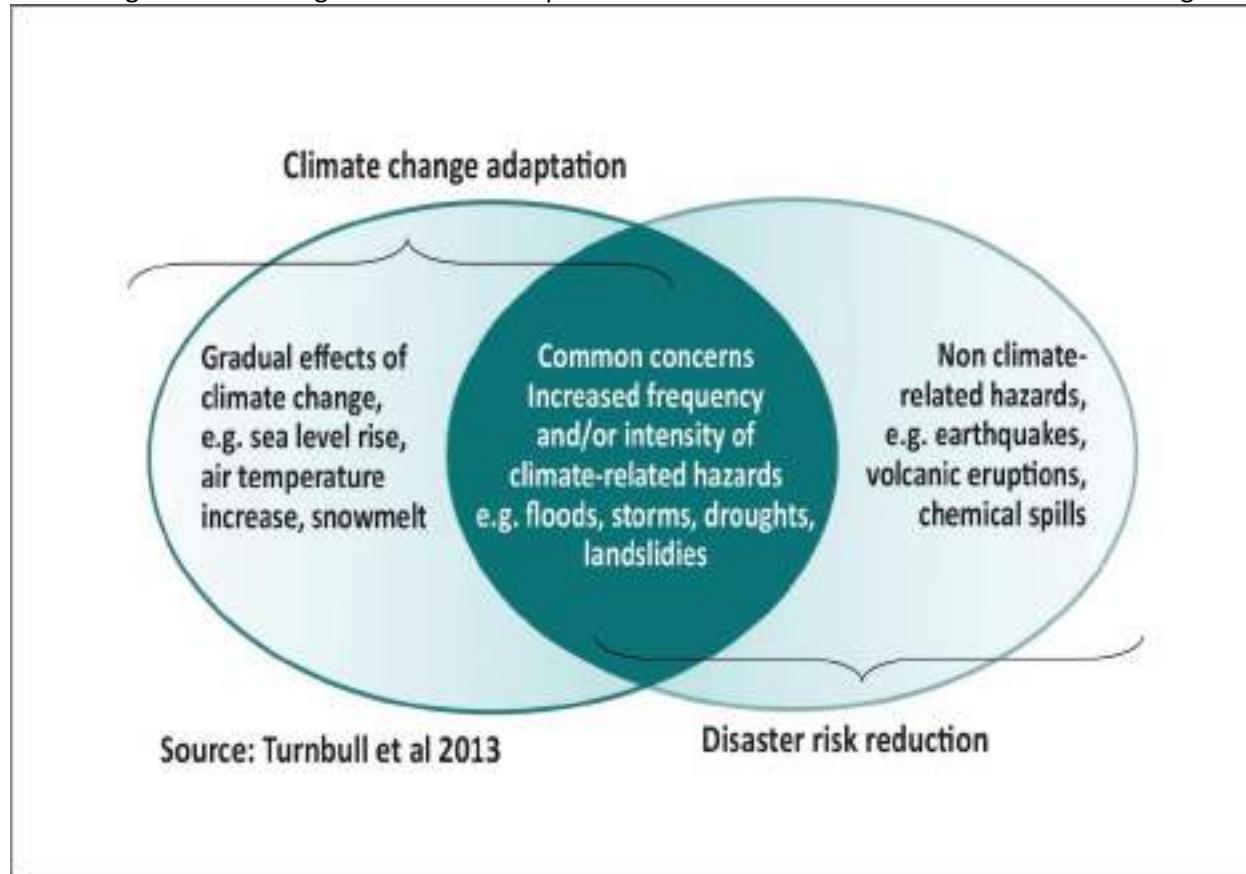


Figure 3.5 Common concerns of climate change adaptation and disaster risk reduction

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

all signatories to make the best efforts through “Nationally Determined Contributions” (NDC) and to strengthen these efforts in the years ahead.

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

COHERENCE AND MUTUAL REINFORCEMENT FOR DRR

APPROACH TO COHERENCE AND MUTUAL REINFORCEMENT

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

Effective reduction of losses and risks from natural hazards and climate extremes requires integrated actions at different levels of governance. One of the greatest challenges is of creating institutional convergence that integrates global goals emanating from these agreements. Disaster risk reduction (DRR) and Climate Change Adaptation (CCA) are part of key agendas being considered in all these recent global

agreements. All three agreements share a common aim of making development sustainable. Strong commitment to ambitious goals and accelerated implementation of these international agreements must be a global priority. Given the complementarities between the post- 2015 agendas, leveraging the total impact of these instruments creates shared value. Efforts must be deployed to ensure that each of them do not build in “policy risks” or, contradictory policies, that generate more - rather than less - risk in development. Taken together, the different priorities, targets and actions in the three frameworks constitute a more comprehensive resilience agenda than when implemented independently without mutual reinforcement because building resilience requires action that spans the multiple domains of development, humanitarian initiatives, responding to climate change and disaster risk reduction.

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

The SDMP has tried to envisage coherence across the state efforts for sustainable development, DRR and the actions in response to climate change (mitigation and adaptation). The SDMP identifies mutually reinforcing measures in these three domains. The mainstreaming of DRR can be synchronized with the initiatives for sustainable development and the steps taken to addresses climate change impacts as an inherent part of the development agenda. Many of the additional challenges emerging from climate change impacts that act as hazard risk multipliers and must be integrated into the implementation of the SDMP.

Ideas on ensuring coherence and mutual reinforcement across the global frameworks on development, disasters and responding to climate change covering almost every aspect of society and all sectors of economy are at an early and incipient phase. Enhancing resilience is the overarching theme as far as disaster risk reduction is concerned. All these discussions make it quite clear that these tasks cannot be

separated from the mainstreaming of risk reduction although it is an idea that predates the concepts of coherence and mutual reinforcement across the global frameworks. The ideas of coherence and reinforcement across frameworks expands the scope of mainstreaming beyond how it was envisaged earlier (Fig. 3-6). The ways in which coherence and mutual reinforcement are envisaged for SDGs and Sendai Framework is depicted in Fig. 3-7. Similarly, that for SDGs and COP21 Paris Agreement on climate change actions is depicted in Fig. 3-8. The measures envisaged for ensuring coherence and reinforcement will be discussed in the chapter on mainstreaming. The India's national initiatives relevant for DRR across the three Global Frameworks are summarised in Table

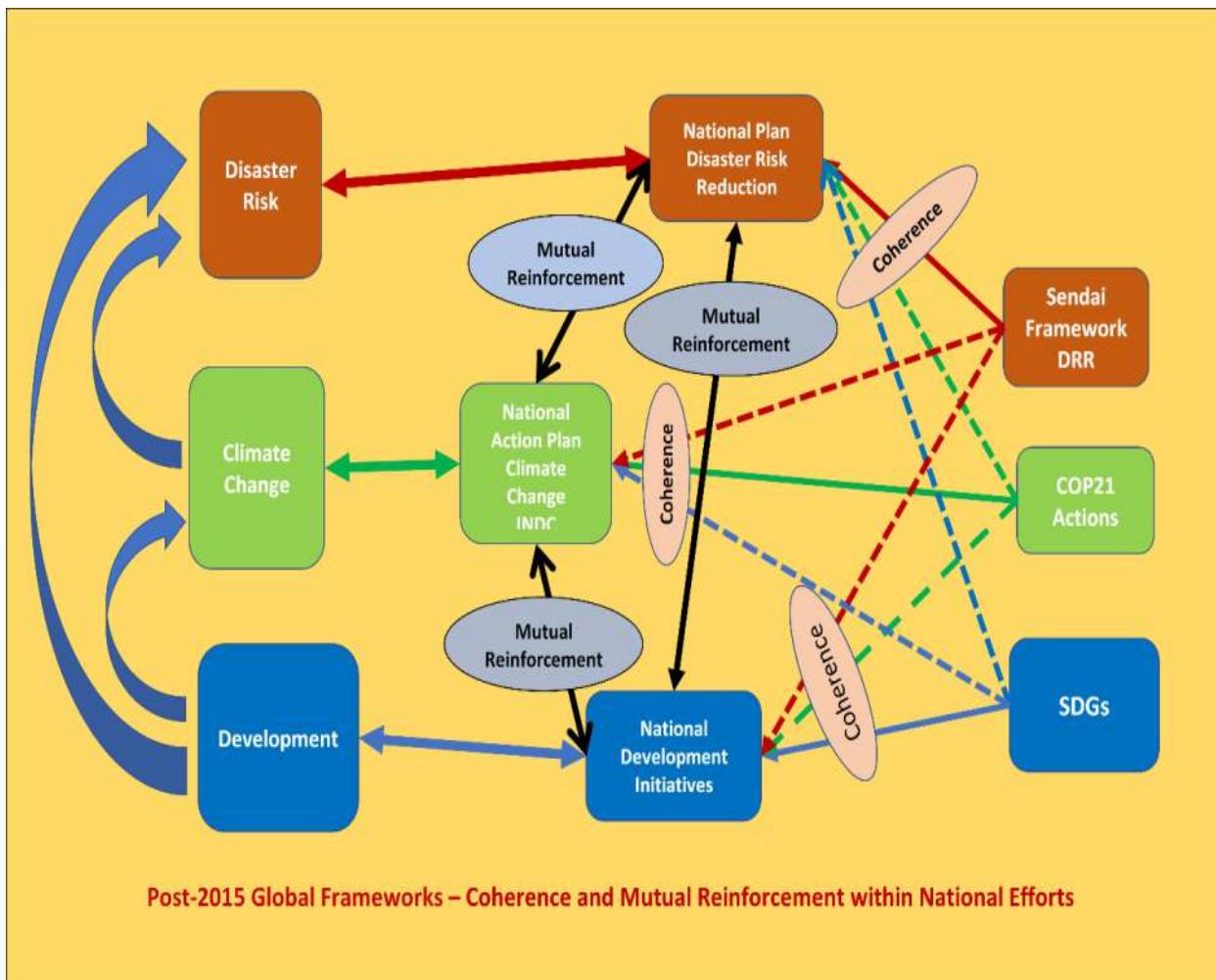


Figure 3-6 Challenges of ensuring coherence and mutual reinforcement of three global frameworks within national initiatives



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



TABLE 3-1: INDIA'S NATIONAL INITIATIVES RELEVANT FOR DRR ACROSS THE THREE GLOBAL FRAMEWORKS

Sl. No.	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	States Initiatives Relevant to DRR
1	Substantially reduce global disaster mortality by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 2, 11, 13	<ul style="list-style-type: none"> Changes in the pattern of extreme events require enhanced disaster resilience and adaptation Addressing GACC risks is crucial for eliminating poverty and reducing economic losses from disasters 	<ul style="list-style-type: none"> Multiple schemes and initiatives for DRR, economic development, GACC mitigation and adaptation.
2	Substantially reduce the number of disaster-affected people by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 11, 13	<ul style="list-style-type: none"> Stresses the need for accelerated action to build resilience through risk-sensitive planning and implementation of DRR 	<ul style="list-style-type: none"> Allocation of resources and funds for disaster prevention and to develop capacities for DRR Strengthening of the DRM at all levels Promoting disaster-resilient development Mainstreaming DRM and adaptation to GACC in development
3	Substantially reduce direct disaster economic loss	SDG 1, 11	The Paris Agreement aims to hold global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C, recognizing that this would significantly reduce the risks and impacts of climate change	<ul style="list-style-type: none"> State commitment to DRM evident from the PM Ten Point Agenda for DRR State commitments for mitigation of and adaptation to GACC as per Intended Nationally Determined Contributions (INDC)
4	Substantially reduce damage to critical infrastructure and disruption of basic services (health, education, etc.)	SDG 1, 4, 9, 11,	Global adaptation goals for enhancing adaptive capacity, strengthening resilience and reducing vulnerability to ensure adequate adaptation response in the context of the global temperature goal	<ul style="list-style-type: none"> Enhance the resilience of State health systems by integrating DRM into primary, secondary and tertiary health care, and by promoting and enhancing training capacities in the field of disaster medicine. The substantial reduction

Sl. No.	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	States Initiatives Relevant to DRR
				of disaster damage to critical infrastructure and disruption of basic services is essential to ensure healthy lives and promote well-being.
5	Substantially increase disaster risk reduction strategies	SDG 1, 3, 6, 11, 13,	Addressing GACC risks that are crucial for reducing economic losses from disasters along with a well-integrated approach to adaptation, sustainable development, environmental management and disaster risk reduction	<ul style="list-style-type: none"> • a) NAPCC for mitigation of and adaptation to GACC b) National Mission on Sustainable Agriculture (NMSA) c) National Initiative on Climate Resilient Agriculture (NICRA)
6	Substantially increase international cooperation to complement national actions	Close international cooperation to achieve SDGs	Firm commitments by countries to the global response to GACC based on INDCs and international cooperation for achieving the COP21 goals	<ul style="list-style-type: none"> • State as a pro-active member in the implementation of the Post-2015 and other global frameworks
7	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments	SDG 3, 13	Emphasis on improving early warning systems, risk assessment and management	<ul style="list-style-type: none"> • States investments to improve the early warning and information systems in different sectors and for multi-hazards.

CHAPTER 4

SOCIAL INCLUSION

BACKGROUND

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

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

There are numerous definitions and concepts of social inclusion, and despite many debates, there is no consensus on a definition. The World Summit for Social Development, Copenhagen held in 1995 defines an inclusive society as a society for all, in which every individual, each with rights and responsibilities,

has an active role to play. An inclusive society is based on the fundamental values of equity, equality, social justice, human dignity, human rights and freedoms, as well as on the principles of embracing diversity. Social inclusion reflects, on the one hand, an individual's experience of and possibilities for self-actualization, and on the other hand, societal capacities to eliminate causes of exclusion and ensure equal opportunities for all (UNDESA, 2008).

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

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

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

GENDER PERSPECTIVE AND DRM

GENDER-BASED VULNERABILITIES

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

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

A gender perspective to DRR helps to focus attention on the distinct gender-specific capacities and vulnerabilities to prevent, prepare, confront, and recover from disasters (WCDRR 2015). Post-disaster reconstruction programs could render women more vulnerable when compared to the pre-disaster situation, defeating the very objective of building back better. An increase in violence against women, domestic violence and divorce rates have been reported in the aftermath of disasters (Fothergill 1998). They become more vulnerable to abuse in disaster situations. They face difficulty in accessing sanitation facilities. There is a lack of privacy and increased risk of sexual assault. In some situations, there is a risk of girls and young women being ensnared by traffickers or an increase in early marriages. There is a tendency to leave out women from accessing relief and recovery as they do not have control over resources and institutions (Parkinson 2011). Women headed households, single women, and widows

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

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

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

Post-disaster reconstruction is expected to "present opportunities for new and more progressive gender roles and relationships to emerge and provide opportunities to rebuild in a way that is inclusive of women and girls and provide opportunities for women to assume leadership roles and better influence the direction of development patterns" (UNISDR 2015). A gender perspective to DRR helps to focus attention on the distinct gender-specific capacities and vulnerabilities to prevent, prepare, confront, and recover

from disasters (WCDRR 2015). Disaster impacts are not gender-neutral, hence adequate attention must be paid to promote gender justice and equity in post-disaster recovery programs.

In disaster situations, women need to be centrally involved in the planning and implementation process with the key principle of active contributors in building resilience. The Sendai Framework emphasizes the need not only to address the issues related to women in post-disaster reconstruction but also envisages a lead role for women in post-disaster reconstruction: Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases (UNISDR 2015b).

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

SEXUAL AND GENDER MINORITIES

To be truly gender-sensitive, 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 are subjected to, deprive them of many disaster mitigation/response programmes, hampering their ability to overcome the negative effects of a disaster. The approaches to disaster risk management, however, tend to overlook the needs and place of sexual and gender minorities. The institutional and legal frameworks geared towards reducing the risk of disasters are usually silent on such sections. It is only recently that a handful of case studies have highlighted the fate of sexual and gender minorities in disaster. Most of the research on disaster-related vulnerabilities faced by the sexual and gender minorities concur that they are often more severely affected by disasters because they face barriers or lack of access to the means of protection available to others. The highly marginalized conditions of sexual and gender minorities in everyday life thus places them at higher risk

when confronted with disaster situations. Their vulnerabilities will be aggravated if DRM policies and practices remain blind to the social realities. There is a greater likelihood of addressing the concerns of a marginalized group like transgenders in disaster situations when they are specifically accounted for during implementation. For example, the need for ensuring the inclusion of all such sections could be emphasized in the different phases of DRM.

SCHEDULED CASTES AND SCHEDULED TRIBES

Certain castes and tribes – the scheduled castes and tribes – are recognized in the Indian Constitution as historically disadvantaged people and listed in two Schedules of the constitution for affirmative policies and actions. As per 2001 Census, the total population of Karnataka State is 5.29 crores, of which SC and ST constitute about 86 lakhs and 35 lakhs respectively. The percentage of SC and ST population of the State is 16.20% and 6.6% respectively. The literacy rate among SC is 52.90% and ST is 48.31% as against the general literacy of 67.04%

In acknowledgement of the marginality of tribal communities, several Committees and Commissions have been constituted over the years by the government to examine the problems faced by these communities, apart from numerous other bodies which have examined the status of tribes as part of broader thematic investigations. The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989 and the related rules notified in 1995 has been amended to make them more effective. The amended Prevention of Atrocities (POA) Act, 2015 has brought in clarity on some sections, clearly defined certain offences, fixed roles and responsibilities of the authorities and has clear timelines regarding the investigation and judicial handling of atrocity cases.

SCHEDULED CASTES

Caste-based discrimination is a historical legacy. In the hierarchical caste society, the Schedule Castes often face social exclusion, untouchability and many forms of overt as well as covert discrimination. Recognizing this, the Constitution of India, under Article 15, provides for ‘prohibition of discrimination on the grounds of religion, race, caste, sex or place; and under Article 17 provides for ‘abolition of untouchability’, making it a punishable offence. Acknowledging the marginalization of Schedule Caste communities, the National Commission for Scheduled Caste has been constituted to safeguard the provisions under the constitution and inquire into specific complaints. The Scheduled Caste and Scheduled Tribe POA Act 1995 and subsequent amendment in 2015 is legal protection to prevent

atrocities and discrimination. Efforts must be made to ensure there are no discriminatory practices in any DRM activities or while providing humanitarian assistance. The DRM efforts should also specifically recognize caste-related challenges and should not adopt caste-blind approaches.

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

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

SCHEDULED TRIBES

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

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

PROVISIONS FOR WOMEN AND CHILDREN DURING DISASTERS:

To increase the coping capacity of vulnerable sections of the community, viz., women, adolescent girl, girl child, Department of Women and Child Development is implementing various schemes, programmes. These initiatives envisage encouraging Women Empowerment, gender equality, promoting their participation and leadership among others. To achieve these objectives, various programs are in place, for instance:

1. Subsidy on the loans – to encourage entrepreneurship among the women and also form Self Help Groups, the formation of Sree Shakthi Groups
2. Education, Training – Schemes to assist in taking up job oriented courses to upgrade the skill sets of women
3. Financial assistance/Cash – to become self-employed and also tide over difficult circumstances
4. Scholarship – to encourage meritorious students to pursue higher education
5. Nutrition Supplements– to ensure better health
6. Rehabilitation programs - Santhwana Scheme, Scheme of financial assistance for remarriage of destitute widows and Marriage of Devadasis

These initiatives aim to address the needs of Girl Child, pregnant women, mothers, Anganwadi Workers, Women Health Volunteers, the women living in the rural and tribal areas, ex-servicemen, physically handicapped, nursing women, Lactating mother, widows/destitute, Old age women, women self-help group (SHG), Women Entrepreneurs and Adolescent Girls. Special assistance is also given to the women and child belonging to Scheduled Caste (SC) and Scheduled Tribe (ST), Other Backward Classes (OBC), Socially and Educationally Backward Classes (SEBC) Minority Category and below poverty line (BPL).

In the event of pre and/or post-disaster scenario, schemes that focus on women and child development need to be activated as the recovery and coping mechanism phase. During pre and post-disaster phases, throughout the state, these schemes should be mandated and implemented by Women and Child Development, in association KSDMA and respective line department at the district level. The respective Departments should priorities those schemes that help in building resilience among the vulnerable sections. Line Departments should implement these measures at the district level in association with DDMA and Department of Women and Child Development.

SCHEMES FOR GIRL CHILD

Department of Women and Child Development has been implementing schemes for developing and empowering the girl children who are socially and economically vulnerable.

Bhagyalakshmi: A flagship programme implemented by the Government of Karnataka aimed at improving the sex ratio in the State by encouraging the birth of girl child in the Below Poverty Level (BPL) families.

Prohibition of Child Marriage: During pre and post-disaster phase, with the assistance of District Administration and Civil Society Organization, the DWCD should maintain an effective vigil to ensure compliance with prohibition of child marriage and ensure effective implementation of girl child empowerment schemes such as Kishori Shakti Yojana at district level.

- **Sabala:** With the objective of empowering adolescent girls in the age group of 11-18 years, Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG) - SABALA is implemented by DWCD. The scheme, in addition to improving nutritional and health status, aim to upgrade various skills like home skills, life skills and vocational skills of adolescent girls. During pre and post disaster phases, DWCD should encourage formation of SABALA groups to empower girl child in association with professional bodies and academic institutions at district level.
- **Kishori Shakthi Yojana (KSY):** Under KSY, 180 adolescent girls in each project are given 5 days residential training every year and supplementary nutrition is being provided to 2 adolescent girls in each anganwadi centre.
- **Balasanjivini:** To focus on rehabilitation and treatment of severely malnourished children Balasanjivini scheme introduced. An amount of Rs.750 is being given to meet therapeutic and medical needs of malnourished children.

- **Indira Gandhi MatruTwa SahayogaYojana (IGMSY):** To improve the health and nutrition status of pregnant and lactating women and their young infants, IGMSY a Centrally Sponsored Scheme has been introduced
- **"Beti Bachao Beti Padhao (BBBP)"** To control the decline of child sex ratio, this initiative has been launched by the Government. The scheme aims around the strategies to be implemented for balancing the CSR (Child Sex Ratio). For an effective launch of the scheme, three types of districts were identified. These include the districts with a low CSR rate, the districts that have maintained CSR from a long time and others where the CSR keeps on fluctuating. DWCD in association with concerned departments should implement its Plan of Action right from Village level to better CSR
- **Namma Magalu Namma Shakthi for Girls:** This scheme envisages a) To Discourage early marriages and b) To Enhance the value of a daughter within a family, through insurance facility. DWCD in association with concerned departments at district levels, should ensure enrolment of all beneficiaries.
- Under **Kshera Bhagya** scheme 6 months – 6 yrs children are provided 150 ml milk for 3 days a week (15 gms skimmed powder and 10 gms sugar) Severely malnourished children are provided egg for 3 days and 200 ml milk for 3 days, children who do not consume egg are provided 6 days milk. Moderately malnourished children of 5 backward districts viz., Bidar, Gulbarga, Raichur, Koppal and Yadgir are provided egg for 3 days and 200 ml milk for 3 days, children who do not consume egg are provided 6 days milk.
- **"Multi-Sectoral Nutrition programme** to address the maternal and child malnutrition in selected High burden districts. The main aim of the scheme is to ensuring strong nutritional focus through Institutional and programmatic convergence and empowering families and communities for improved care behaviors.
- **"Bala Snehi Programme"** has been announced to make 10000 anganwadi centers child friendly so as to attract children to anganwadi centers, wall paintings relating to pre-school education . For this Rs.10.00 crores has been released to districts under head of account:2235-02-102-0-04(051)(general expenses). Rs.998.80 lakhs has been drawn till March 2017.

CHILD CENTRED DISASTER RISK REDUCTION

It is the children and young people who are severely affected and during the disaster period, they are not able to get sufficient nutrition, access to learning and health care; but also suffer from emotional trauma. Hence, this chapter is incorporated into SDMP. Focus of this chapter is to focus primarily on 6 key thematic

areas that are relevant for child survival, development and protection. Child population from 0 to 14 years age groups contribute to 26.5% and population above 65 years constitute about 6% of total population, indicating the significance of having child centered disaster risk reduction programmes in the state.

The basic understanding that stakeholder need to have about children and their vulnerability are:

- Children require special protection, especially nursing babies, infants and under-fives.
- Adolescent girls and women, and pregnant women in particular, bear an additional burden of vulnerability based on gender.
- Socio-economic status and minority group membership increase vulnerability.
- The family remains the chief source of protection for children. Separation of children from their families increases their vulnerability.
- Children are often overlooked in disasters and often their needs (food rations, medications, latrines, clothes and distances) are not taken into consideration.
- Children in shelters are potential victims (violence and sexual abuse).
- Children are subject to intra-family violence, especially in unfamiliar, stressful situations.
- Separated children require identification, tracing and reunification; new orphans require foster care.
- Children with disabilities need special consideration in disasters.
- The right to play, learn and care pertains, especially in the shelter context

The Non-negotiables for Child centered DRR

- 1. Schools must be safe and education must not be interrupted**
- 2. Child protection must be a priority before, during and after a disaster**
- 3. Children have the right to participate and to access the relevant information**
- 4. Community infrastructure must be safe, and relief and reconstruction must help reduce future risk**
- 5. Disaster Risk Reduction must reach the most vulnerable**

The Karnataka State Disaster Management Plan will further ensure implementation of following programs to demonstrate the importance of ensuring Resilience of the State for Disasters, especially for protection of children and adolescents in the age group of 0-18 years constituting about 11% of State population

ELDERLY

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

SIZE OF ELDERLY POPULATION (AGED 60+) AND THEIR SHARE IN TOTAL POPULATION

Percentage of elderly people in total population of Karnataka	Number (in thousands) of persons aged 60 & above for different sub-population in the State				
	Total			Rural Urban	Rural Urban
	Persons	Females	Males		
7.7	579100	3044	2747	3897	1894

Source: 'Elderly in India' (CSO 2016)

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

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

- In need: Older people have specific requirements which must be understood and responded to within all DRR activities.

- Invisible: Older people's vulnerabilities and capacities are often overlooked; the collection of data on people's age and sex is essential to ensure older people and other people at risk are visible and supported in DRR.
- Invaluable: Older people have years of knowledge, skills and wisdom which are invaluable assets in DRR and must be acknowledged, valued and engaged by supporting older people to participate in DRR.

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

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

KARNATAKA STATE POLICY FOR SENIOR CITIZENS

The Karnataka State Policy for Senior Citizens has come into force on 5-9-2003 as per Govt. order No. WCD/314/SJD/2003.

The goal of the State Policy is to maintain the well being of the older persons. The policy envisages the following sectors.

1. Health
2. Welfare
3. Financial Security
4. Housing and Shelter
5. Protection of life and property
6. Other areas of action
7. Implementation.

A task force committee headed by Chief Minister is formed to implement the policy.

PERSONS WITH DISABILITIES (PWD)

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

As per 2001 census Karnataka has a disabled population of 9,40,643 out of which 6,61,139 persons live in villages and 2,79,904 in urban areas. The literate differently abled population is 4,73,844, which constitutes 51.40% of the total differently abled population. Most of the families with disabled persons live below poverty line. Lack of facilities and opportunities prevent disabled persons from gaining suitable.

It has been observed that persons with disabilities (PWD) are often overlooked and thus not only excluded in risk reduction and disaster response measures but are also subject to higher risk than others. Neglected throughout the DRM cycle, concerns about inclusion relate to limited social participation in DRR activities, poor access to information and services, poverty, invisibility during relief operations,

response to basic needs not adapted and specific needs ignored. The most common priority identified by PWDs in the UNISDR survey of 2013 for improving inclusiveness of PWD in disaster risk reduction is for the involvement of PWD in DRR-related activities. The survey also emphasized the need for supportive policies, laws and promotion of support systems involving neighbors and local community.

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

KARNATAKA STATE POLICY OF DISABILITY

In Karnataka it is estimated grant is nearly 5 to 6% of the population comprises persons with disabilities Under PWD Act 1995 the state is required to provide for rehabilitation, education economic opportunities, barrier free environment and other supporting services so as to facilitate the integration of persons with disabilities in the mainstream of society.

The Karnataka State Policy of Disability respects the objectives enshrined in the PWD Act 1995 and involved to create synergy amongst all stakeholders, Dept. and agencies in implementing the provision of Act in letter and spirit.

The Women and Child Development Dept. will be the nodal dept. and the office of Commissioner for Persons with Disabilities will coordinate and monitor the programmes and schemes for persons with

disabilities and take steps to safeguard the rights of persons with disabilities. The Object of the State Policy is to ensure implementation of the legislations related to persons with disabilities.

MAKING DISASTER RISK MANAGEMENT INCLUSIVE

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

Article 1 of the Universal Declaration of Human Rights

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

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

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

RESPONSIBILITY FRAMEWORK – SOCIAL INCLUSION: APPLICABLE TO STATE

GOVERNMENT DEPARTMENTS AND DISTRICT

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

Sl. No.	Sub- Thematic	State Agencies, District Administration and their Responsibilities			
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts
1	Gender	<p>Lead Agencies:</p> <p>Department of Social Welfare, Department of Women & Child Development</p> <p>Agencies with major roles:</p> <p>SDMA</p> <p>Supporting Agencies:</p> <p>All Agencies Associated with DRM directly or indirectly</p>	<ul style="list-style-type: none"> Ensure special efforts are made to make DRM gender inclusive and participation of women. Ensure there are no discriminatory practices that marginalise sexual and gender minorities. Recognise the additional vulnerabilities of sexual & gender minorities. HRVA to take care of women & transgender. Use of Information and Data Management to support gender sensitive approach. Convergence of concerned departments to ensure gender sensitive DRR Shelters/ Temp Shelters/ Relief Camps - provision for specific needs Inclusion of gender concerns of DRR in curriculum development Guidance on preventing, checking and investigating discriminatory practices, violence and abuse Inter-agency support to prevent and stop trafficking Support from central institutions for gender-sensitive psycho-social support, post-disaster rehabilitation (economic, social, ...) 	<p>Lead Agencies:</p> <p>Department of Social Welfare, Department of Women and Child Development at district level</p> <p>Agencies with major roles:</p> <p>DDMA</p> <p>Supporting Agencies:</p> <p>All Agencies Associated with DRM directly or indirectly</p>	<ul style="list-style-type: none"> Ensure that special efforts are made to make DRM gender inclusive and to ensure participation of women Ensure that there are no discriminatory practices that marginalise sexual and gender minorities at any stage of DRM, Recognise the additional vulnerabilities of sexual and gender minorities such as transgender HRVA - Risk Assessment to take care of women and transgender vulnerabilities Use of Information and Data Management to support gender sensitive approach - DDMA Convergence of concerned departments to ensure gender sensitive DRR Shelters/ Temp Shelters/ Relief Camps - provision for specific needs Enabling Environment Review and changes in existing regulations, norms and directives⁴¹ to make them gender sensitive Training, Awareness, Mock drills, Vocational Training / Skill development Empowering, especially leadership in DRR Gender sensitive Curriculum

Sl. No.	Sub-Thematic	State Agencies, District Administration and their Responsibilities				
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts	Responsibility - District
						<p>Development</p> <ul style="list-style-type: none"> • Promoting insurance • Gender audit of DRM measures with the assistance of the State Women's Commission • Ensure joint ownership in the name of husband & wife of houses reconstructed and assets provided
2	Scheduled Casts (SC) & Tribes (ST)	<p>Lead Agencies: Department of Social Welfare, State commission for SC/ST</p> <p>Agencies with major roles: SDMA, Slum Development Board, Dept. of tribal Welfare</p> <p>Supporting Agencies: <i>All Agencies Associated with DRM directly or indirectly</i></p>	<ul style="list-style-type: none"> • Guidance and support • Promote studies and research on DRM challenges for SC communities • Promote studies and research on disaster response and mitigation strategies appropriate and acceptable to the tribal communities • Review and amendment of existing regulations, norms and directives to make them consistent with needs of DRM • Promote insurance/risk transfer • Guidelines, IEC, mass media campaigns • Capacity development guidelines Inclusion of the concerns of SC/ST about DRR in curriculum development 	<p>Lead Agencies: Department of Social Welfare, State commission for SC/ST at district</p> <p>Agencies with major roles: DDMA, Department of Social Welfare, State commission for SC/ST, Slum Development Board, Dept. of tribal Welfare at district level</p> <p>Supporting Agencies: <i>All Agencies Associated with DRM directly or indirectly</i></p>	<ul style="list-style-type: none"> • HRVA Assessment to specifically include SC/ST vulnerabilities • Protecting the tribal identity, traditions and customs in post-disaster situations in different phases of DRM • Ensure steps taken for DRM do not cause irreversible damage to the community's culture, tradition, habitat and ecosystem • Use of Information and Data Management to support relevant issues - DDMA and District level departments • Convergence between concerned departments in schemes meant for SC/ST for DRR • Shelters/ Temp Shelters/ Relief Camps – non-discriminatory • Ensuring enabling environment for participation • Review and amendment of existing regulations, norms and directives to address requirements of implementing DRR in SC/ST settlements • Training, Awareness, Mock drills, Vocational Training / Skill development • Empowering, especially leadership in DRR • Curriculum development 	

Sl. No.	Sub- Thematic	State Agencies, District Administration and their Responsibilities				
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts	Responsibility - District
						<p>with focus on issues of SC/ST communities</p> <ul style="list-style-type: none"> • Promoting insurance products/ campaigns • Include non-discriminatory implementation of DRM in Social audit.
3	Children	Lead Agencies: Department of Women & Child Development Agencies with major roles: Education Department, Child Welfare Committee KSCCW SDMA, SCPS Supporting Agencies: All Agencies Associated with DRM directly or indirectly	<ul style="list-style-type: none"> • Guidance and support for various DRM initiatives for children • Review regulatory and institutional needs for the protection and safety of children • Supervision and monitoring of DRM initiatives for children – pre-school, school-going and children not in school • Support for implementing measures for proper protection and care of disaster affected children • Mobilizing support to disaster-affected children from national and international agencies working for children's welfare • Guidance and support from NCPCR for care and protection of children immediately after a disaster and during PDR 	Lead Agencies: Department of Women & Child Development at district level at district level Agencies with major roles: Education Department, Child Welfare Committee KSCCW SDMA, SCPS Supporting Agencies: All Agencies Associated with DRM directly or indirectly	<ul style="list-style-type: none"> • Make special arrangements for disaster preparedness and safety of various children's institutions • Regulatory measures for ensuring school safety and disaster preparedness in schools • Regular mock drills and other preparedness measures in all schools and children's institutions • Pay special attention to children's institutions after early warning and post-disaster • Ensure that in post disaster situations children do not face isolation, anxiety, trauma, separated from their families or parent(s) • Take adequate measures to prevent and stop child abuse and maintain strict vigil against child trafficking • Take measures to prevent and stop child labour in post disaster situation • Sensitize all agencies and key personnel 	

Sl. No.	Sub-Thematic	State Agencies, District Administration and their Responsibilities			
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts
					<p>associated with protection of child rights and safety, including those connected with juvenile justice such as police, CWC.</p> <ul style="list-style-type: none"> Promote community-based care and protection of the affected children. KSCCW should initiate steps to monitor post-disaster threats to children and take counter measures along with the nodal agency at the state for child rights and protection
4	Elderly	<p>Lead Agencies: Department for the Empowerment of Differently Abled and Senior Citizens</p> <p>Agencies with major roles: SDMA, Health and Family Welfare Department</p> <p>Supporting Agencies: All Agencies Associated with DRM directly or indirectly</p>	<ul style="list-style-type: none"> Guidance and support to address DRM needs of the elderly Promoting awareness of the challenges faced by the elderly in disasters Promoting agencies and organisations working for the welfare of the elderly to develop expertise for supporting DRM efforts for the elderly Mobilizing support to the elderly in disaster-affected areas from national and international agencies working for the wellbeing of the elderly 	<p>Lead Agencies: Department for the Empowerment of Differently Abled and Senior Citizens at district level</p> <p>Agencies with major roles: SDMA, Health and Family Welfare Department</p> <p>Supporting Agencies: All Agencies Associated with DRM directly or indirectly</p>	<ul style="list-style-type: none"> Sensitizing local communities about additional vulnerabilities of the elderly persons in the communities and promote neighborhood groups or responsible individuals to assist the elderly Make special arrangements for disaster preparedness and safety of various institutions for the elderly such as old age homes, retirement homes and shelter homes for the elderly Linking organisations working for the welfare of elderly with community initiatives for DRM Preparing lists of all the elderly persons living without adequate

Sl. No.	Sub- Thematic	State Agencies, District Administration and their Responsibilities			
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts
					<p>support, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support</p> <ul style="list-style-type: none"> In the risk season or after early warnings, take measures to ensure that the elderly is informed and prepared Involve elderly in disaster preparedness and planning to the extent they can contribute Assess medical and health support needs of the elderly in each area and maintain stocks of crucial items Special attention to the protection of property and assets of the elderly after evacuation or post disaster situations
5	Persons with Disabilities (PWD)	Lead Agencies: Department for the Empowerment of Differently Abled and Senior Citizens Agencies with major roles: SDMA, Health and Family Welfare Department , Commissioner for Persons with Disability	<ul style="list-style-type: none"> Guidance and support to address DRM needs of PWDs a per global best practices Promoting awareness of the DRM challenges for PWDs Promoting agencies and organisations working for the welfare of PWDs to develop expertise in DRM Mobilizing support to the PWDs in 	Lead Agencies: Department for the Empowerment of Differently Abled and Senior Citizens At district level Agencies with major roles: SDMA, Health and Family Welfare Department , Commissioner for Persons	<ul style="list-style-type: none"> Sensitizing local communities about the PWD living in the community and their special needs particularly during disasters Promote neighbourhood groups assist PWD or ensure a Personal Support Network consisting of at least three persons who are trusted for each PWD Make special arrangements for

Sl. No.	Sub- Thematic	State Agencies, District Administration and their Responsibilities			
		Area for Action	State (Lead Agencies)	Responsibility - State	Districts
	Supporting Agencies: <i>All Agencies Associated with DRM directly or indirectly</i>	disaster-affected areas from national and international agencies working for the wellbeing of the PWDs <ul style="list-style-type: none">• Encourage technological support and innovations for the benefit of the PWDs in DRM	with Disability Supporting Agencies: <i>All Agencies Associated with DRM directly or indirectly</i>		disaster preparedness and safety of various institutions for the PWD such as school for the blind, hostels for PWD and any facilities dedicated to PWD <ul style="list-style-type: none">• Linking organisations working for the welfare of PWD with community initiatives for DRM• Preparing lists of all PWD, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support• In anticipation of a hazard or after early warnings, take measures to ensure that all PWDs are properly informed and prepared• Involve PWDs in disaster preparedness and planning as equal participants• Special attention to the protection of property and assets of the PWDs after evacuation or post disaster situations

CHAPTER 5

MAINSTREAMING DISASTER RISK REDUCTION

BACKGROUND

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

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

Development without adequate incorporation of DRR could worsen existing risks and has the likelihood of introducing new risks, increasing the negative impact of potential disasters. Extensive and sound integration of DRR into development can enhance disaster resilience, reduce losses and hasten the progress towards development goals. Thus, it is desirable that the development initiatives and DRR are dealt with concurrently in a seamless manner into all the relevant policies, planning and implementation. The climate change impacts act as risk multipliers worsening uncertainties associated with almost every hydro-meteorological hazard. Therefore, all development initiatives must factor in the likelihood of greater risks and increase in climate change-induced vulnerabilities. This requires incorporation of risk

management and climate adaptation as an intrinsic feature of all developmental efforts, especially in the areas where hazards are known to be high. Such an approach, which internalises DRR within development in a closely integrated manner is called mainstreaming DRM. It means radically expanding and enhancing DRM so that it becomes a normal practice, fully institutionalised within each agency's regular planning and programmes in addition to the preparedness for disaster response.

For over two decades, there has been increasing attention on the need to 'mainstream' disaster risk reduction into development. This prompted many nations address risks from natural hazards within their development frameworks in various ways and at different levels - spanning the legislative, institutional, sectoral strategies and financial planning (Benson and Twigg, 2007). Developments do not necessarily reduce disaster risk. It can unwittingly create new risks or exacerbate the existing ones, with disasters likely to be both a cause and a product of development. The experiences from across the world have highlighted the crucial importance of social inclusion in DRM. Social exclusion adversely affects both development and the capacity to cope with disasters. In addition to the special emphasis on making DRM socially inclusive, the mainstreaming of DRR must also make social inclusion one of the intrinsic features. The Oslo Policy Forum (2008) concluded that rather than reduce disaster risk, development processes are in many cases giving rise to new forms of vulnerability impeding efforts to reduce poverty and promote growth. 'Win-win' solutions for securing sustainable development, reducing poverty and strengthening hazard resilience therefore need to be explicitly and actively sought, particularly as climate change is likely to increase the extreme weather events (Benson and Twigg, 2007). This process should take account of the impact of climate change on the intensity and frequency of hydro-meteorological events in the future, as well as historical hazard records. The recognition of close linkages between development, disaster risk reduction and global climate change have resulted in all the major global frameworks having a shared emphasis on building resilience. The concept of coherence and mutual reinforcement of the diverse initiatives to achieve the national goals and those of the major global frameworks has also emerged. Given the highly cross-sectoral nature of these challenges, it is evident that they are naturally inseparable and almost indistinguishable from mainstreaming.

KEY THEMATIC AREAS FOR MAINSTREAMING

The strategic objective of mainstreaming is of ensuring that DRR within the ongoing development initiatives lead to integration of DRR into poverty reduction efforts and sustainable socio-economic development by covering all aspects – institutional, legislative, judicial and development policies.

The key thematic areas for mainstreaming DRR.

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

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

IMPROVING THE AWARENESS AND UNDERSTANDING OF RISK

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

LEGAL SUPPORT AND DISASTER GOVERNANCE

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

EFFECTIVE DISASTER RISK MANAGEMENT STRATEGY

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

ENSURING SOCIAL INCLUSIVENESS IN DISASTER RISK MANAGEMENT

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

ENABLING COHERENCE AND MUTUAL REINFORCEMENT OF INITIATIVES UNDER THE MAJOR GLOBAL FRAMEWORKS FOR ENHANCING DISASTER RESILIENCE

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

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

INSTITUTIONAL ARRANGEMENTS AND CAPACITY FOR DISASTER RISK MANAGEMENT

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

INTRA-GOVERNMENT COORDINATION AND INTEGRATION

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

BUDGET ALLOCATIONS

Integration of disaster risk concerns into government budgets should be tackled from two angles, ensuring that levels of public expenditure on risk reduction are sufficient and that there are adequate financial arrangements to manage the residual risk. The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socio-economic policies such as safety nets and risk transfer mechanisms, as part of a holistic approach. While there are certain budgetary allocations to partially address requirements of relief (e.g., National Disaster Response Fund, State Disaster Response Fund), the mainstreaming of DRR requires each ministry, department, state and districts to make adequate provision for DRR as an integral part of the main budget by ensuring that all the major activities have incorporated DRR.

CHANGES IN PROJECT APPRAISAL

DRR consideration must become part of the appraisal processes of various development projects to ensure that development gains are sustainable and to ensure that DRR components and development

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

SETTING TARGETS, TIMEFRAMES AND INDICATORS

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

IMPLEMENTATION

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

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

CHAPTER 6

BUILDING DISASTER RESILIENCE – AN OVERVIEW

INTRODUCTION

This chapter is essentially a prelude to the detailed responsibility framework for realizing DRR and building resilience presented in the next chapter. This task includes almost all aspects of pre-disaster risk management. The complex and extensive nature of the tasks is summarized in this chapter and the detailed responsibility framework is described in the next chapter. The planning framework is provided in the form of responsibility matrix has a brief description of the actions, the list of key agencies responsible from the state, districts and the time frames.

FOUR CATEGORIES OF TIME FRAMES ARE:

- *Recurring/ Regular (day-to-day)*
- *Short Term (2020 to 2022)*
- *Medium Term (2020 to 2027)*
- *Long Term (2020 to 2030)*

It must always be understood that the time frames T1, T2, and T3 run concurrently in most cases and not necessarily sequentially. Of course, there will be some tasks which can begin only when certain prerequisites are satisfied or can be implemented sequentially in phases, while there are some which must be started at the earliest for it to be completed within the time frame. The goal is to implement as many as by 2030.

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

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

- ***Conforming to the national legal mandates – the DM Act 2005 and the NPDM 2009***
- ***Leading the global efforts in DRM to mutually reinforce and achieve coherence of the three major Post-2015 global agreements – Sendai, SDG and COP21 (Paris Agreement)***
- ***Prime Minister's Ten Point Agenda for DRR articulating contemporary national priorities***
- ***Social inclusion as a ubiquitous and cross-cutting principle***
- ***Mainstreaming DRR as an integral feature***

This chapter describes various Thematic Areas (TA) for DRM, the related Sub-Thematic Areas (sub-TA) for DRM and the responsibility framework envisaged for implementation. A major component of DRM, undoubtedly, is various types of mitigation measures. The DM Act 2005 defines "Mitigation" as measures aimed at reducing the risk, impact, or effects of a disaster or threatening disaster situation." Goal of mitigation is to minimize risks from multiple hazards and the threats from individual hazards need not always occur in isolation. At times, a hazardous event can trigger secondary events. For example, an earthquake can produce a tsunami or may create flooding or landslides. Similarly, cyclones often lead to flooding and various other cascading events spread over an area wider than the primary event. In addition, demographics, nature of human settlements, and effects of global climate change can magnify the vulnerability of the communities at risk. The DM Plan focuses on enhancing the mitigation capabilities for multiple hazards, their likely cascading effects. The plan also various other 'indirect' mitigation measures which must become part of the overall developmental initiatives, plans and programmes.

THEMATIC AREAS FOR DISASTER RISK MANAGEMENT (TA FOR DRM)

The DMP, incorporates key principles enunciated in the DM Act, National Policy, the three major post-2015 global frameworks, the PM's Ten Point Agenda, a special focus on social inclusion and an emphasis on mainstreaming. The guiding principles of Sendai Framework states that disaster risk reduction requires responsibilities to be shared by different divisions of governments and various agencies. The effectiveness in disaster risk reduction will depend on coordination mechanisms within and across sectors and with relevant stakeholders at all levels. For each hazard, the approach used in this state plan

incorporates into the planning framework the key themes enunciated in the Sendai Framework and additional ones based on a broader approach to DRM elaborated earlier.

Six Thematic Areas for DRM:

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

Three additional Thematic Areas for DRM have been discussed in three separate chapters.

UNDERSTANDING RISK

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

INTER-AGENCY COORDINATION

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

INVESTING IN DRR – STRUCTURAL MEASURES

Undertaking necessary structural measures is one of the thematic areas for DRM and enhancing resilience. These consist of various physical infrastructure and facilities required to help communities cope with disasters. The implementation of these measures is essential to enhance disaster

preparedness, a component of Priority-4 of the Sendai Framework. It is also an important component of investing in disaster risk reduction for resilience, which is Priority-3 of Sendai Framework.

INVESTING IN DRR – NON-STRUCTURAL MEASURES

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

CAPACITY DEVELOPMENT

Capacity development is a recurring theme in all DRM efforts. The Sendai Priority-2 (Strengthening DRR governance to manage DR) and Priority-3 (Investing in DRR for resilience) are central to capacity development. The capacity development includes training programs, curriculum development, large-scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises. The capabilities to implement, enforce, and monitor various disaster mitigation measures must be improved at all levels from the local to the higher levels of governance. It is also strengthening the DRR governance at all levels to better manage risk and to make the governance systems more responsive.

CLIMATE CHANGE RISK MANAGEMENT

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

CHAPTER 7

RECOVERY AND BUILDING BACK BETTER

SCOPE

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

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

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of betterment reconstruction. While disasters result in considerable disruption of normal life, enormous suffering, loss of lives and property, global efforts consider the recovery, rehabilitation and reconstruction phase as an opportunity to “Build Back Better” (BBB) integrating disaster risk reduction into development measures and making communities resilient to disasters.

The Sendai Framework expects that after a disaster, the stakeholders will be prepared for BBB. Existing mechanisms may require strengthening to provide effective support and achieve better implementation. Disaster recovery tends to be very difficult and long-drawn out. The reconstruction will vary depend on the actual disaster, location, pre-disaster conditions, and the potentialities that emerge at that point of

time. The SDMP provides a generalized framework for recovery since it is not possible to anticipate every likely element of betterment reconstruction.

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

APPROACH

The approach to re-construction and recovery is guided by the SDMP-2019 aligned with NDMP-2019 also NPDM-2009. Its salient clauses/ sections are given below:

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

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

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

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

Para 9.3.2 of NPDM states that plans for reconstruction in highly disaster-prone areas need to be drawn out during the period of normalcy, which may include architectural and structural designs in consultation with the various stakeholders.

Para 9.5.1 of NPDM suggest that state governments should give emphasis to restoration of permanent livelihood of those affected by disasters and to pay special attention to the needs of women-headed households, artisans, farmers and people belonging to marginalized and vulnerable sections.

RECOVERY PROCESS

Effective post-disaster recovery usually has the following three broad aspects:

- Physical aspects of recovery, i.e. restoration and reconstruction of damaged community infrastructure, critical infrastructure, private houses and cultural heritage buildings
- Economic aspects of recovery, i.e. livelihoods, productive activities and market services
- Social recovery, i.e. social and psychological aspects of personal, family and community functioning and wellbeing

The key interventions under recovery programs can be classified under four broad heads:

- Physical
- Economic
- Social
- Cross Cutting Sectors

After a disaster, a Post-Disaster Needs Assessment (PDNA) must be undertaken, which will be a government-led exercise. Depending on the disaster, this may be undertaken by the state government and through joint efforts of the central and state governments including local authorities. The PDNA will also provide a platform for the international community to assist in recovery and reconstruction, where such assistance is required. A systematic PDNA will provide a credible basis for recovery and reconstruction planning that incorporates risk reduction measures.

Typically, the PDNA comprises of a ‘Damage and Loss Assessment’ (DALA), a ‘Human Recovery Needs Assessment’ (HRNA) and a ‘Recovery Framework’. The DALA is quantitative in nature that can be used to value damages arising from a hazardous event, and the subsequent economic losses caused by the event.

The DALA highlights the possible consequences on the growth of the economy, the external sector and the fiscal balances, as well as the impact due to decline of income and livelihoods of households or individuals. The HRNA focuses on the social impact of disasters, 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 plans for financing the BBB.

The UNISDR consultative document on building back better (UNISDR 2017) in support of the Sendai Framework, states the following:

Recovery is the most complex of the disaster management functions, involving the greatest number and variety of stakeholders and affecting the greatest long-term impact on a community's social and economic success. There are numerous relationships that must be formed and dependencies that must be fostered, many of which are wholly unfamiliar to the recovery stakeholders that typically operate outside of the post-disaster context. An inclusive and comprehensive disaster recovery framework serves as an agreed way forward to simplify the recovery process thereby maintaining or even improving development trajectories while ensuring adherence to Build Back Better principles. Recovery is most successful when the wide-ranging needs of communities, organizations, and individuals are addressed in the coordinated manner that recovery frameworks enable.

Disaster recovery process is rarely a set of orderly actions. It will consist of several related activities such as:

- Damage and needs assessments (PDNA, DALA, HRNA)
- Developing a recovery framework including institutional arrangements and financing plan
- Measures to ensure socially inclusive recovery
- Focus on sustainable development and climate change adaptation
- Demolition of damaged structures, debris clearance, removal and its environmentally safe disposal
- Restoration and even upgrading utilities including communication networks
- Re-establishment of major transport linkages
- Temporary housing and detailed building inspections
- Redevelopment planning
- Environmental assessments
- Reconstruction
- Integrating DRR into various development initiatives
- Financial management
- Economic impact analyses

The major steps of the recovery and the processes involved are summarized in Table 9-1:

Table 9-1: Major steps of the recovery process and the key processes involved

Sl. No.	Major steps	Process
1	Post-Disaster Needs Assessment and Credible Damage Assessment	<ul style="list-style-type: none"> • Preliminary assessment reports • Compilation and transmittal of damage and loss data • Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment • Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts • Results monitoring and evaluation plan for recovery program • Select the most appropriate and achievable processes and methodology for conducting early and credible damage and needs assessments
2	Developing a vision for Build-Back Better (BBB)	<ul style="list-style-type: none"> • High level meetings as well as broad-based, wider consultations with experts, civil society, and key stakeholders • Build consensus among the range of stakeholders within and outside government
3	Ensure coherence of BBB with the development programs and goals	<ul style="list-style-type: none"> • Discussions at top level to align the recovery vision with the government's broader, longer term development goals and growth and poverty reduction strategies
4	Incorporating resilience and BBB in recovery vision	<ul style="list-style-type: none"> • Consultations and background studies on: • Disaster resistant physical recovery • Options for fast economic recovery • Gender and equity concerns • Vulnerability reduction • Natural resource conservation and environmental protection • Social recovery
5	Balancing recovery across sectors	<ul style="list-style-type: none"> • Balance public and private sectors BBB programs • Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities. • Prioritize infrastructure reconstruction. • Address the recovery of the lives and livelihoods of disaster-affected communities. • Show sensitivity to the needs of the affected population with regard to public expectations from recovery.
6	Prioritising sectors for recovery	<ul style="list-style-type: none"> • Determine relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications infrastructure, environment, livelihoods, tourism, social protection, health, and education.

EARLY, MID AND LONG-TERM RECOVERY

The UNISDR notes that recovery programs, coupled with the heightened public awareness and engagement after a disaster, provide a valuable opportunity to develop and implement disaster risk reduction measures and to apply the BBB principle. It is an important component of risk reduction strategy and if implemented systematically, the recovery process prevents the affected community from sliding into further poverty and deprivation. While the DM Act 2005 mandates the government to carry out rehabilitation and reconstruction activities, it does not explicitly refer to ‘recovery’ as a component to be used as a part of disaster management strategy. However, the NPDM 2009 recognizes ‘recovery’ as one of the six elements within the disaster management continuum where it is linked to physical, social and economic assets within the overall context of ‘safe development’. The disaster recovery programs usually proceed in three distinct stages to facilitate a sequenced, prioritized, and flexible multi-sectoral approach. Three recovery stages, in which appropriate policies and programs tend to be planned and implemented are: a) Early, b) Mid-Term, and c) Long-Term, which are described briefly in Table 9-2.

The salient provisions of the recovery framework include the following:

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

Table 9-2 Recovery Stages

Recovery Stage	Duration	Brief Description
Early	3 – 18 Months	Cash for work, resumption of markets, commerce and trade, restoration of social services, transitional and temporary shelters, critical infrastructure.
Mid-Term	Up to 5 Years (concurrent with early recovery)	Recovery plans for assets and livelihoods, reconstruction plans for housing, infrastructure, public buildings and cultural heritage buildings

Recovery Stage	Duration	Brief Description
Long-Term	Within 10 Years	Implemented along with developmental plans: infrastructure strengthening, environmental, urban and regional planning

RECONSTRUCTION

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

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

CO-ORDINATION OF RECONSTRUCTION

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

STATE GOVERNMENT

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

- Lead and support the need and damage assessment operations.
- Provide relevant data on the severity of the disaster and individual needs.
- Participate and support public information and education programs regarding recovery efforts and available Government assistance.

- Coordinate with the Central Government and other stakeholders for reconstruction process.

PRIVATE SECTOR

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

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

VOLUNTARY ORGANIZATIONS AND INTERNATIONAL AID AGENCIES

They may participate in the following activities:

1. Joint need and damage assessment
2. Support government effort in reconstruction process especially in so far as the mandate requires them.
3. Provide technical support to reconstruction and recovery efforts.
4. Assist the government in disseminating public information regarding reconstruction and rehabilitation plan.
5. Training and capacity development of local communities.

REHABILITATION

BACKGROUND

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

- Physical
- Social
- Economic and
- Psychological

PHYSICAL REHABILITATION

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

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

RELOCATION

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

- Avoid secondary displacement as far as possible.
- Ensure that relocation when it is unavoidable is undertaken in a socially inclusive manner taking the marginalized communities belonging to SC and ST into confidence.
- Making the processes as gender-sensitive as possible and giving due consideration to the needs of sexual and gender minorities.
- Gain consent of the affected communities.
- Clearly define land acquisition and allocation process ensuring transparency and providing adequate grievance redressal as well as negotiation mechanisms.
- Take into consideration urban/ rural land use planning before moving ahead.
- Provide customized relocation packages.
- Decentralize powers for undertaking the relocation process.
- As far as possible, ensure relocation site is near to their agricultural lands and/or sources of livelihood, as applicable.
- Ensure provision of livelihood rehabilitation measures for relocated communities, wherever necessary, to the extent possible.

SOCIAL REHABILITATION

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

REVIVAL OF EDUCATIONAL ACTIVITIES

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

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

REHABILITATION OF THE ELDERLY, WOMEN AND CHILDREN

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

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

ECONOMIC REHABILITATION

The major components of economic rehabilitation are livelihood restoration and ensuring the continuity of businesses, trade, and commerce. Restoring employment and income generating opportunities to

disaster affected communities is a vital component of post-disaster reconstruction. Livelihood opportunities are severely disrupted by the destruction or loss of essential assets; with the result that people are unable to engage in normal income generating activities; become demoralized and dependent on humanitarian aid. Economic recovery should be based on:

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

As per the para 9.5.1 of NPDM, the state governments must give due importance to the restoration of permanent livelihood of those affected by disasters and special attention to the needs of women-headed households, artisans, farmers and people belonging to marginalized and vulnerable sections.

PSYCHOLOGICAL REHABILITATION

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

Efforts should be made to focus more on:

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

FUND MOBILIZATION

BACKGROUND

Reconstruction and rehabilitation projects after a major disaster are usually highly resource intensive. Such projects are typically financed through the State exchequer. Recently, large funds have been raised from multilateral/ bilateral funding agencies/ international agencies in close coordination with the national Governments. The State Government, through the relevant ministry of the Central Government,

shall finalize the fund mobilization strategy, incorporating appropriate conditions governing flow of funds, its disbursement, and usage as per norms decided by the Central Government. This will include:

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

MOBILIZING, DISBURSEMENT AND MONITORING

The domestic or internal sources of on-budget government funds usually consist of the following:

- Government operational and capital budgets.
- Reallocation among the budget items to disaster-hit sectors.
- Special levies or taxes; additional taxes or surcharge for recovery.
- Contingency financing arrangements.
- Issuing sovereign reconstruction or development bonds.
- Introducing policy incentives for the private sector to share recovery costs.
- Voluntary contributions from civil society and private philanthropies.
- Insurance/ risk transfer mechanisms.

External resources for post-disaster reconstruction can be sourced from multilateral development banks, regional development banks, bilateral development partners, international NGOs, private philanthropies and charities, and remittances. The possible multilateral financing resources for post- disaster recovery and reconstruction consist mostly of the following types:

- Credits or loans from multilateral development banks.
- Reallocation of existing portfolio of international development institutions.
- Multi-donor Trust Funds.
- Debt relief.
- Ex-ante contingent component of standard investment operations.
- Risk Insurance.
- Standby financing.
- Catastrophic development Deferred Drawdown Option (DDO).

Some of the important aspects of mobilizing and managing the funds of a large recovery program consist of the following and are summarised in Table 9-3:

1. Review of the Damage and Loss Assessment (DALA).
2. Developing a vision and specific time-bound goals for BBB.
3. Estimate financial requirements of the recovery program.
4. Identify likely sources of funds and examine various options.
5. Defining and enforcing robust financial norms for the financial management.

Table 9-3: Important aspects in mobilizing and managing the funds of a recovery program

Sl. No.	Major Step	Description
1	Review of the Damage & Loss Assessment	Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts
2	Developing a vision and specific time-bound goals for BBB	<ul style="list-style-type: none"> • Develop the scope and goals of BBB • Disaster resilient physical recovery • Options for fast economic recovery • Set phase-wise betterment targets
3	Estimate financial requirements of the recovery program	<ul style="list-style-type: none"> • Prepare sector-wise and phase-wise financial estimates • Consultations and evaluation of various options • Finalization of financial estimates
4	Identify likely sources of funds and examine various options	<ul style="list-style-type: none"> • Domestic resources: <ul style="list-style-type: none"> • From the state (on budget) and additional fund-raising options (off budget) • Central grants and other options – on and off the budget • International including borrowing from International Financial Institutions (IFI) – facilitated by the central govt. • Other Sources: <ul style="list-style-type: none"> • Donors • Community contribution • Private sector CSR, PPP
5	Defining and enforcing robust financial norms for the financial management	<ul style="list-style-type: none"> • Setting norms and rules to allocate funds for new development, retrofitting, owner-driven reconstruction (mainly homes), • Defining norms efficient disbursement along with the degree of flexibility needed in recovery programs • Implementing mechanisms for monitoring proper utilization including an Management Information System (MIS)

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

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

RECOVERY OF RECONSTRUCTION COSTS

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

1. Imposing special tax/surcharge
2. Imposing local taxes
3. Issuing tax free Government bonds

CHAPTER 8

CAPACITY DEVELOPMENT – AN OVERVIEW

BACKGROUND

This chapter provides an overview of the capacity development measures described in appropriate contexts in the previous chapters presenting both a summary and a perspective to the capacity building aspects of the plan. The chapter six to nine contain references to specific aspects of capacity development in respective responsibility frameworks and discussion. The list given in this chapter is not exhaustive but indicative and illustrative supplementing the details present in the previous chapters. While the themes included are broadly in consonance with national, regional, and global practices, inevitably there will be changes that must be incorporated in the periodic revisions of the plan and during its implementation. The effort will be to follow the emerging best practices.

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

"Capacity development is the process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals. It is a concept that extends the term of capacity-building to encompass all aspects of creating and sustaining capacity growth over time. It involves learning and various types of training, but also continuous efforts to develop institutions, political awareness, financial resources, technology systems and the wider enabling environment." (UNISDR, 2016, revised terminology).

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

Investing in capacity development for DRR is a continuing process of enhancing the capability of individuals, agencies, and communities to improve the performance of their DM functions. The process of capacity building will include elements of human resource development, i.e., individual training, organizational development such as improving the functioning of groups, and the strengthening of organizations, regulations, and institutions. Involving stakeholders through participatory approaches is essential to establish ownership and commitment. The sustainability of capacity development initiatives increases in direct relation to the level of participation and ownership of the internal partners. Mainstreaming of DRR is incomplete without mainstreaming of capacity building on DRR by different Departments and Agencies. Capacity building should also include creating enabling environment by making relevant provisions in existing laws, rules and regulations etc.

As capacity development entails activities on various levels, i.e. legal and institutional frameworks, organizations systems, human and material resources, it is necessary to address challenges on all of them by implementing a mix of activities, on short and long term. Therefore, the focus of many capacity development efforts for DRR must go beyond human resource development paying enough attention to organizational and institutional issues. Partnerships and collaborations are integral to institutional capacity building. In institutional capacity building, emphasis should also be on use of state-of-the-art technologies to upgrade the existing system. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the resilience to disasters. Investing in capacity development is the cost-effective way to save lives, prevent or reduce losses and ensure effective recovery and rehabilitation.

The SDMP envisages a crucial role in Disaster Management capacity development at all levels of government including line departments and across various autonomous institutions. It also stresses the importance of capacity development efforts to promote community-based DM efforts, across the education sector covering schools to professional institutions.

KSDMA AND CENTER FOR DISASTER MANAGEMENT ATI, MYSURU

The KSDMA has the mandate to develop disaster preparedness plans for the State to meet any eventuality arising out of all kinds of disasters such as flood, drought, chemical explosion, etc. The CDM ATI, Mysuru has been identified as a nodal training institute for DM training in the State covering functionaries of all concerned departments. KSDMA in consultation with training and technical institutions is responsible for;

- (i) Design and develop training programme for the Govt functionaries, decision makers, elected representatives and the Civil Society groups.
- (ii) Arranging state and district-wise training to enhance the preparedness levels
- (iii) Establish and maintain a failsafe communication network interconnecting the State, district, block and GP Headquarters for dissemination and collection of information relating to disaster management.
- (iv) Institutional capacity building in terms of modern equipment, technology, capacity building in all forms required at the state and district levels
- (v) Capacity building of the communities and Community Based organisations to handle emergencies .
- (vi) Coordination of NGO efforts.

The role of KSDMA is critical in preparedness, mitigation and capacity building initiatives in the State through designing, developing and implementing effective public policies to reduce risk and vulnerabilities associated with various disasters. A multidisciplinary group in KSDMA will be set up to strengthen the Disaster Management Unit. The group will include technical experts with experience in managing various disasters, rehabilitation experts, IT and GIS personnel, social scientist, geologist, communication specialist.

OPPORTUNITY FOR CAPACITY BUILDING IN DISASTER MANAGEMENT

A strong institutional framework supporting overall capacity building for disaster management has been initiated in India by enacting and enforcing a Disaster Management Act in 2005. The Act has clearly assigned the roles and responsibilities to local, district, state and national authorities for enabling disaster resilient and safe community. The Creation of NDMA, NIDM at national level, SDMA, DDMA, CDM and Disaster Response Forces at State level, , Funding mechanism at various levels, etc., have given a greater thrust to capacity building at every level. In Karnataka, about 23 departments have been identified as responsible for effective disaster management. The Department of Revenue (Disaster Management), GoK, KSDMA, SEC, KSNDMC and DDMA in all the districts have been established and functioning. The Centre for Disaster Management, ATI Mysore is the nodal institute for DM related training in Karnataka.

CAPACITY DEVELOPMENT OF LOCAL BODIES – RURAL AND URBAN

The capacities of Panchayats and ULBs must be developed in the sphere of disaster management. Without adequate capacity development, the local bodies cannot contribute effectively to disaster management

or in ensuring the proper implementation of DM plans. Capacity development is also necessary for true empowerment of the bodies of local self-governance. The elected leaders and officials of Panchayats and ULBs should be trained to competently handle different types of crises, contribute to disaster preparedness, make proper use of available warnings, organize operations such as search, rescue, relief, medical assistance, and carry out damage assessment. They should also have sound understanding of the needs of proper post-disaster rehabilitation. The local leadership can play a big role in disaster management in all stages and in DM planning. Capacity development must aim at increasing the competence of local bodies in all aspects of disaster management, mainstreaming DRR, and in promoting a culture of disaster prevention and DRR. The capabilities of the local bodies must be developed in financial, technical, and managerial spheres. The Center for Disaster Management, ATI will develop need-based training programs for the capacity development of rural and urban local bodies.

Thus, The KSDMA has been forming DM groups at Gramapanchayth level in Karnataka. The elected representatives of the local body / village Panchayath, officers and local youths are the members of the Group. The DM group thus formed are being trained in different aspects of Disaster Monitoring, Management and Mitigation.

TRAINING OF COMMUNITIES

Enhancing the capacity of communities, as they are the first responders to disasters, is a significant part of the capacity development process. The Sendai Framework notes the need to build the knowledge of civil society, communities, and volunteers on disaster risk reduction. Capacity building has to include awareness, sensitization, orientation, and developing skills of communities and community leaders. Assistance from NDRF, SDRF, Civil Defense, civil society organisations, NGOs, local community- based organizations, and Self-Help Groups will be encouraged. The overall responsibility to give impetus to leadership and motivation will rest with local authorities, PRIs and ULBs under the overall guidance of State and District authorities. Community training programmes should be socially inclusive, and they should place special emphasis on building the capacities of women, children, elderly, SC/ST and PWD.

DISASTER RESOURCE NETWORKS –STATE AND DISTRICT

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

establish its own State Disaster Resource Network (SDRN) portal on the pattern of IDRN. The resource network shall cover national level, state-level and district level agencies involved in disaster risk management.

CAPACITY DEVELOPMENT THEMES

The capacity development is applicable to all aspects of disaster management. State agencies will take actions for capacity development of different stakeholders. It must be noted that the division of responsibilities between state and district are described in detail in the responsibility framework given in separate chapters. The capacity development themes for DRM and related responsibilities are summarised in Table 10-1.

Table 10-1: Capacity Development for DRR Themes – State and District

Sl. No.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
1	Deploying advanced technology and equipment	<ul style="list-style-type: none"> • Adopting the state-of-the-art technology • Identifying technology needs based on hazard risk, vulnerability and experiences. • Procurements of best and most appropriate equipment. 	3, 4, 5 & Volume II
2	Disaster Information System	<ul style="list-style-type: none"> • Maintaining the resource network and database • Regular updating the resource data • Developing fail-safe communications with advance technology • Improve data flows across State Dept. and authorized users • Integration of HRVA data with disaster information systems • Ensuring reliable and credible database on disaster losses (direct and indirect) and post-disaster reconstruction 	3, 4, 5 & Volume II
3	Disaster Risk Governance	<ul style="list-style-type: none"> • Mainstream and integrate DRR and strengthen institutional mechanisms for DRM • Promote participatory approaches, partnerships and networks • Promote quality standards, certifications, and incentives 	10

Sl. No.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
	Disaster Risk Management	<ul style="list-style-type: none"> Promote, encourage and facilitate appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions Design and implement social safety-net mechanisms, including community-based systems Disaster resilience of health care systems by integrating disaster risk management into primary, secondary and tertiary health care Business resilience, and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices 	3, 4, 5 & Volume II
5	DM and DRR capacities at local levels	<ul style="list-style-type: none"> Trainings in DRM at different levels of local governance Improve awareness and preparedness of stakeholders at all levels Preparing DM plans, regular updating, and mock drills 	3, 4, 5 & Volume II
6	DRM— in education, research and professional disciplines	<ul style="list-style-type: none"> Incorporate subjects of relevance to DRM in school & college curriculum Introduced specialized programs, degrees, courses and diplomas Promote relevant research projects, programs within institutes and through research grants Technical and professional programs relevant to various specialized aspects of DRM Develop ToTs Research in diverse areas of DRM 	3, 4, 5 & Volume II
7	Early Warning	<ul style="list-style-type: none"> Deploy the state of art methods and technologies Up-grade technical infrastructure and systems Improve EW dissemination and ensure the last mile connectivity to the last-mile Improve the alerts system to make it more relevant and effective at all levels 	7

Sl. No.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
8	Emergency Operation Centres - Strengthening	<ul style="list-style-type: none"> • Set up State and District level EOCs with adequately trained manpower • Enhance emergency response capabilities • Strengthen EOCs, improve infrastructure, upgrade equipment with latest technology, • Improve capabilities based on experience after each disaster event • Deploy best of ICT Tools • Conduct capacity audits of EOCs • Regular reviews and improvement of SOPs, protocols, etc. • Develop Mobile control rooms 	Volume II
9	Global Anthropogenic Climate Change Risks	<ul style="list-style-type: none"> • Recognise and address climate change risks in DRR • Strengthen adaptations to Global Agreement on Climate Change (GACC) 	3 & Volume II
10	Mainstreaming DRM	<ul style="list-style-type: none"> • Incorporating DRM into development plans and programs • Incorporating PM's Ten Point Agenda for DRR into development plans • Making DRR as an inherent part of all ministry, department, state development plans • Extending convergence to the domain of DRR 	5
11	Non-Structural Measures for DRR	<ul style="list-style-type: none"> • Institutional arrangements, policies, legal support, and regulatory framework • Revision of building codes and standards for rehabilitation reconstruction practices both for urban and rural areas • Norms and incentives for retrofitting • Reinforce systems to implement, monitor, and enforce regulations for DRR to promote disaster-resistant built environment 	3, 4, 5 & Volume II
12	Post-2015 Global Frameworks – coherence and mutual reinforcement across themes DRR	<ul style="list-style-type: none"> • Understanding post 2015 global frameworks and their implementation for DRR • Understanding Sendai Framework and its integration into the implementation of DMP at different levels • Understanding DRR aspects of SDG and its implementation for DRR • Understanding COP21 (Paris Agreement on Climate Change) and the integration of climate-related concerns into various DMPs 	3

Sl. No.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
13	Preparedness and Response	<ul style="list-style-type: none"> • Institutional reforms, modernization, and changes in legal framework • Strengthening of Fire and Emergency Services • Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization • Comprehensive revamping of Fire and Emergency Services with institutional reforms and modernization • Adoption and adaptation of emerging global good practices • Rigorous training and HRD of first responders • Table-top exercises, simulations, and mock drills to improve operational readiness of the plans • Rescue equipment at all levels • Systems to provide basic services in emergencies • Preparedness and response plans at all levels • Community-based DRR and DM 	Volume II
14	Recovery and Build Back Better	<ul style="list-style-type: none"> • Post-Disaster Needs Assessment (PDNA) systems and expertise. • Credible damage assessment mechanisms and expertise. • Planning capabilities to ensuring coherence of BBB with overall development efforts and goals. • Studies and research for incorporating resilience into BBB models. • Studies on past disasters and recovery to draw useful lessons. 	7
15	Skill Development for Disaster Resilience	<ul style="list-style-type: none"> • Training and skill development for masons and other artisans. • Promoting community-based DM considering specific needs, regional diversities and multi-hazard vulnerabilities. • Training on CBDR & preparedness at local levels. • Address gender issues, and special needs of children, disabled, aged, etc. holistically in the DM context. • Promote private sector and civil society involvement. • Promote PPPs 	3, 4, 5 & Volume II
16	Social Inclusion in DRM	<ul style="list-style-type: none"> • Gender-based vulnerabilities • Scheduled Castes and Scheduled Tribes • Elderly • Children • Persons with Disabilities 	4, 5 & Volume II

Sl. No.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
17	Understanding Risk	<ul style="list-style-type: none"> • Observation Networks, • Information Systems, • Research • Forecasting • Zoning/ Mapping • Monitoring • Hazard Risk Vulnerability and Capacity Assessment (HVCA) 	Volume II

CAPACITY BUILDING AND TRAINING IN THE STATE

ATI-CDM has planned 148 face to face training programmes and 30 online training programmes, SATCOM and district level volunteers training at various levels in the state during the year 2020-21.

Sl. No	Particulars	No. of Programmes	No. of Participants
1	State level training at ATI	73	2190
2	District and Sub-district training	75	2650
3	SATCOM training for elected representatives and officials of PRIs and ULBs	176 taluks x 40 members from each taluk	7040
4	Online /video conference training for 30 districts	30 x 40 members from each district	1200
5	District level volunteers training	5 districts x 50 volunteers from each district	250

- Group A and B officers will be trained in ATI
- Selected group B & all C and other levels will be trained in DTIs & Talukas
- Elected representatives & functionaries of local bodies will be trained at DTIs & through SATCOM
- Research & case studies
- Development of workbooks, modules & handbooks
- IEC and ICT activities
- Professional support to district administrations and other organisations to prepare DM plans
- Documentation and best practices.

CHAPTER 9

FINANCIAL ARRANGEMENTS

The overwhelming expenditure on disaster management in India, more specifically for post-disaster response, relief and rehabilitation, are incurred by the State Governments and district administration and almost the entire budgetary allocations for the same are met from the allocations made to the States annually for the five year fiscal cycle on the basis of the recommendations made by the Finance Commissions constituted under article 280 of the Constitution of India. In fact, the entire system of financing disaster management in India has evolved around the recommendations of the successive Finance Commissions. The recommendations of the Finance Commissions have been based on the over-riding principle that financial assistance to the States shall be limited to providing immediate gratuitous relief to the victims of natural calamities and to restore the public utilities so that the affected persons are able to restart their economic activities again. This relief centric approach did not encourage strategic thinking on the total financial requirement of the States for holistic management of disasters, quantification of resource gaps and how such gaps can be met over time by various innovative financial instruments for risk management.

The Disaster Management Act 2005 has ushered a complete paradigm shift in disaster management in India. As per DM Act 2005, financial assistance in wake of notified disasters is provided through State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF). These funds have been created under the legal framework of Section 46 and 48 (1) (a) of the Disaster Management Act, 2005 respectively. The allocations to SDRF and NDRF are as per Finance Commission recommendation.

The immediate relief is provided in accordance with the guidelines on constitution and administration of State Disaster Response Fund and National Disaster Response Fund issued by Ministry of Home Affairs, Disaster Management Division vide OM No 33-5/2015-NDM-1, dated 30th July 2015, copy of guidelines enclosed. The quantum of relief paid is in accordance with items and norms of assistance approved by Ministry of Home Affairs, Govt. of India.

In the event of a calamity of severe nature, when the State's SDRF is insufficient, additional central assistance is sought from NDRF through submission of memorandum and following other laid down procedure.

The MHA will follow the following procedure to release financial assistance to the affected state government:

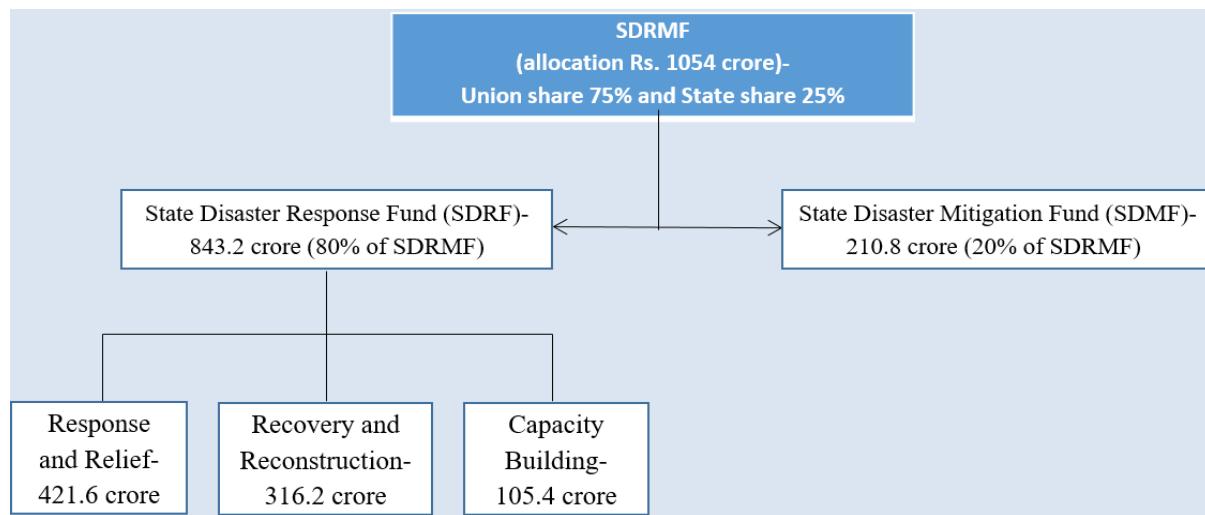
- The memorandum of the State government will be examined to assess the likely requirement of funds as per the items and norms of expenditure under SDRF/NDRF. If a preliminary examination reveals that there are adequate funds in the SDRF with the state for providing relief as per norms, the state will be advised accordingly
- If a preliminary examination reveals that the state is in need of assistance, an Inter-Ministerial Central Team will be deputed to the disaster affected area for an on-the spot assessment
- The report of the Central team will be examined by the NEC through its sub-committee, which will assess the extent of relief expenditure which can be made available through the NDRF, as per the norms of NDRF and SDRF, and make recommendations for the same
- The High Level Committee will consider the recommendations of the Sub-Committee of NEC and approve the quantum of immediate assistance to be released from the National Disaster Response Fund.

Brief on 15th Finance Commission's award pertaining to disaster-related grants

The 15th Finance Commission has made a *departure from response to mitigation aspect* and recommended setting up of National and State Disaster Risk Management Fund (SDRMF). The recommendations of the commission related to financing of relief expenditure have been accepted by Govt. of India. The coverage of funds recommended by the commission for financing of relief expenditure goes beyond the disaster response funds that already exist at the national (NDRF-National Disaster Response Fund) and state (SDRF-State Disaster Response Fund) levels.

National Disaster Risk Management Fund (NDRMF) and **State Disaster Risk Management Fund (SDRMF)** have been created. The allocation for SDRMF for the year 2020-21 for Karnataka is **Rs.1054 crores**.

SDRMF break up:



Brief Note on State Disaster Mitigation Fund (SDMF):

NDMA is finalizing guidelines for administration of State Disaster Mitigation Fund and National Disaster Mitigation Fund.

Broad contour of SDMF draft guidelines is as follows:

- As per the recommendations of the 15th Financial Commission, Mitigation funds has been created separately at the national and state levels, in the form of a National Disaster Mitigation Fund (NDMF) and State Disaster Mitigation Fund (SDMF) are setup. **The Mitigation funds aims to support those local level and community-based interventions, which reduce disaster risks and promote environmental-friendly settlements and livelihood practices, and not large-scale infrastructure interventions.**
- **Mitigation: Concept, Strategy and Scope**
Mitigation refers to proactive measures aimed at reducing the impact of a

potential disaster, while Preparedness means taking specific measures just before a disaster strikes. Mitigation measures are also implemented in course of recovery and reconstruction programmes, so that the infrastructure and assets are in a better position to withstand future disasters ("Build Back Better").

- Mitigation measures can be grouped as *Structural* and *Non-structural*. Structural measures consist of engineering interventions such constructions of small dams, dykes, etc. to contain flooding, or strengthening and retrofitting of existing structures to withstand the impact of a disaster. Non-structural measures typically include promoting environmental measures such as shelter belt plantations and mangroves; policy measures such as regulations, zoning, and enforcement of building codes; research and development for disaster risk reduction; and financial measures such as tax incentives etc. However, effective mitigation measures would involve a combination of structural and non-structural measures, multi-hazard risk assessment, life cycle analysis, and coherence with the overall developmental program of the region.
- The project should not be covered in existing schemes of either State or Central governments. However, there is also space for cross-cutting themes which may be considered as part of the overall mitigation efforts.

Public Funded Schemes

The primary mechanism for funding DRR related schemes and projects in Karnataka are through Public Funded Schemes at Central and State level. Various nodal Ministries play a key role in disaster management as far as specific disasters are concerned. These nodal Ministries as well as other Ministries and Departments have dedicated schemes, aimed at disaster prevention, mitigation, capacity building, etc. within their particular domain. Existing examples include the scheme of MHA for Strengthening of Fire and Emergency Services, Financial assistance to ATIs and other Training institutions for disaster management, Integrated Coastal Zone Management programme of MOEFCC, and flood management and flood forecasting

programmes of MOJS. The Department of Space (DOS) has a Disaster Management Support Programme and MOES has a project on Tsunami and Storm Surge Warning System. NDMA is implementation an important World Bank funded project for National Cyclone Risk Mitigation Project.

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

Flexi Funds as a part of Centrally Sponsored Schemes

As per Department of Expenditure, Ministry of Finance, the NITI Aayog has issued instructions for rationalization of Centrally Sponsored Schemes (CSS), vide OM No. O — 11013/02/2015-CSS & CMC dated August 17, 2016. As per para 6 of the said OM, flexi-funds available in each CSS has been revised to 25% for States, and 30% for UTs, of the overall annual allocation on under each scheme. The flexi -fund component within the CSS can be used to achieve the following objectives:

- a) To provide flexibility to States to meet local needs and requirements within the overall objective of any given Scheme at the sub-head level.
- b) To pilot innovation to improve efficiency within the overall objective of any given Scheme at the sub-head level.
- c) To undertake mitigation/restoration activities in case of natural calamities, or to satisfy local requirements in areas affected by internal security disturbances.

Externally Aided Projects

Besides the funds which are available through public funded schemes, efforts have also been made by the centre to mobilize the resources from external funding agencies for vulnerabilities assessment, capacity development, institutional strengthening of response mechanism and mitigation measures etc. The Central Government would continue to support

states for reconstruction and rehabilitation on in the aftermath of major disasters through aid from Word Bank and other such external funding agencies.

Insurance and Risk Transfer

Pradhan Mantri Fasal Bima Yojana (PMFBY) the government sponsored crop insurance and Weather Based Insurance provides risk cover to farmers.

CHAPTER 10

STRENGTHENING DISASTER RISK GOVERNANCE

BACKGROUND

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices in DM (UNDP 2015). The Governance encompasses the exercise of political, economic and administrative authority in the management of a country's affairs at various levels. It comprises mechanisms, process and institutions, through which groups articulate their interest, exercise their legal rights, meet their obligations and mediate their differences. Governance transcends government. It goes beyond governmental systems and powers by encouraging pro-active citizen engagement. The Risk governance encompasses the full range of risks recognized by human societies, including health and medical, safety and security, and environmental risks, such as hazards and disasters.

The concept of governance has its origins partly in the recognition that many functions carried out by public entities are now provided by several governmental as well as private-sector or civil society entities. Such systems rely on the development and diffusion of various types of norms such as state regulation, self-regulation and market mechanisms (Tierney 2012). It may also rely on other processes such as negotiation, participation, and engagement, which facilitate collective decision making and action. Disaster governance is nested within and influenced by overarching societal governance systems and various aspects such as state-civil society relationships, economic organization, and societal transitions have implications for disaster governance. Governance arrangements and stakeholder participation could vary across different disaster phases, adding to the complexity of governance challenges. Risk-spreading mechanisms, including insurance and reinsurance, are integral part of disaster governance.

The concept has evolved considerably, and the current thinking acknowledges that one cannot separate governance of disaster risk from the governance of other types of risks, including those associated with global climate change, environmental degradation, financial crises, and conflict situations (UNDP 2015). From the mid-2000's onwards, governance was commonly accepted as the crux of DRR, with comprehensive efforts underway to increase the DRR capacity of national and local institutions; to strengthen policy, legal and planning frameworks; to develop human and financial capacities; and to promote multi-stakeholder and multi-disciplinary approaches.

Effectiveness of disaster governance can be judged from stakeholder participation, collaboration, accountability and transparency. There is now greater emphasis on accountability, transparency, responsiveness to the needs of those most at risk, and ensuring the rule of law/compliance with adequate legal provisions. These are of crucial importance in fostering development and promoting risk reduction.

The capacity of relevant individual actors and organisations comes into play when DRR policies – at various levels from the top to bottom – are implemented. Participation, rule of law, transparency, responsiveness, consensus orientation, equity, effectiveness, efficiency, accountability and strategic vision are key factors when implementing a governance structure aimed at sustainable development and disaster risk reduction (UNDP 2004).

SENDAI FRAMEWORK AND STRENGTHENING DISASTER RISK GOVERNANCE

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

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

safety-enhancing provisions of sectoral laws and regulations, including those addressing land use, urban planning, building codes, environment, resource management, health and safety standards, and update them, where needed, for better disaster risk management

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

RESPONSIBILITY FRAMEWORK FOR STRENGTHENING DISASTER RISK GOVERNANCE

Based on these considerations, and the increased emphasis globally on strengthening disaster risk governance to reduce disaster risk and to build resilience, the major tasks, agencies of the central and state government are presented in a responsibility matrix. Karnataka currently has in place many institutions dedicated to disaster reduction, response, and for disaster risk governance within the states at various levels from local to the state. However, there is wide variation in the functioning, structure, and capabilities.

The KSDMP seeks to strengthen the entire system of disaster risk governance in the state using the framework presented here. As discussed in chapter-1, the KSDMP envisages the implementation of various measures in the state over the short (T1), medium (T2), and long- term (T3), ending by year 2022, 2027, 2030 respectively. Many of these are highly ambitious given the extremely uneven level of institutional arrangements across various districts in the state. Based on the current status of implementation of the DM Plans, each Department of the State Government will restructure the respective DM Plans into these time frames for implementation while preparing plans or revising existing ones.

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

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

Sl. No.	Major Themes	<i>Strengthening Disaster Risk Governance</i>			
		<i>State Agencies, District and their Responsibilities</i>			
		State	Responsibility – State	District	Responsibility – District
1	<ul style="list-style-type: none"> • Mainstream and integrate DRR within and across all sectors • Institutional Strengthening 	KSDMA, Revenue Dept. (DM), DSJE, all Depts of GoK	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Empower local authorities • Carry out assessment of the technical, financial and administrative capacity for disaster risk management at state, district, and local levels <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Improve work culture • Promote the coherence and development of relevant laws, regulations, and public policies • Adopt and implement DRR strategies and plans, across different levels and timescale • Make institutions efficient and responsive • Develop mechanisms, and processes to ensure transparency and accountability • Enhance relevant mechanisms and initiatives for transparency • Strengthen/ establish coordination and convergence mechanisms at state, district, and local levels <p>Long Term (T2)</p> <ul style="list-style-type: none"> • Promote necessary mechanisms and initiatives to ensure 	DDMA, PRIs, ULBs, DSW, all depart ments at district level	<p>Short Term (T1)</p> <ul style="list-style-type: none"> • Local authorities including PRIs & ULBs to assess technical, financial and administrative capacities for DRM. • All district level departments to assess technical, financial and administrative capacities for DRM. <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Create DM teams having good work culture and commitment to effective response during all stages of disaster. • Enhance relevant mechanisms and initiatives for transparency such as IRS at taluk and district level. • Establish and strengthen institutional coordination and convergence of all local authorities and organisations including NGOs at the district level <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Promote necessary mechanisms and initiatives to ensure high levels of compliance with the safety-enhancing provisions

Sl. No.	Major Themes	<i>Strengthening Disaster Risk Governance</i>			
		<i>State Agencies, District and their Responsibilities</i>			
		State	Responsibility – State	District	Responsibility – District
			<p>high levels of compliance with the safety-enhancing provisions</p> <ul style="list-style-type: none"> • Make institutions efficient and responsive; Improve work culture • Develop mechanisms and processes to ensure transparency and accountability 		<ul style="list-style-type: none"> • Make institutions efficient and responsive; Improve work culture • Develop mechanisms and processes to ensure transparency and accountability
2	<ul style="list-style-type: none"> • Capacity Development • Empower local authorities • Strengthen coordination mechanisms 	KSDMA, Revenue Dept. (DM), KSNDMC, ATI-CDM, All depts. involved in DM	<p>Recurring</p> <ul style="list-style-type: none"> • Implementation in state, departments, and agencies <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Develop capabilities at state, district, block, and local levels to understand disaster risk, develop DM plans, implement relevant policies, laws, and ensure compliance with risk reduction safety standards <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Involve communities, panchayats, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational institutions • Develop necessary capacity to understand and effectively enforce regulatory norms and 	DDMA, PRIs, ULBs, all district level departments	<p>Recurring</p> <ul style="list-style-type: none"> • Implementation in district, departments, and agencies <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Develop capabilities at district, block, and local levels to understand disaster risk, develop DM plans, implement relevant policies, laws, and ensure compliance with risk reduction safety standards <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Facilitate participation of communities, panchayats, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational institutions • Develop necessary capacity to understand and effectively enforce regulatory norms and standards for DRR • Sensitize all district departments and

Sl. No.	Major Themes	<i>Strengthening Disaster Risk Governance</i>			
		<i>State Agencies, District and their Responsibilities</i>			
		State	Responsibility – State	District	Responsibility – District
			<ul style="list-style-type: none"> • Sensitise all state departments and agencies about the importance of social inclusion in DRR • Create awareness of the role of ecosystems and appropriate land-use in DRR <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Assess existing DRR capacities (all types) at various levels and implement capacity development programmes to address the requirements • Assess current capacities at the state and local levels to address the challenges posed by climate change and implement programmes to develop the required capacities • Integrating environmental and appropriate land-use management in all DRM plans 		<p>agencies about the importance of social inclusion in DRR</p> <ul style="list-style-type: none"> • Create awareness of the role of ecosystems and appropriate land-use in DRR <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Assess existing DRR capacities (all types) at various levels and implement capacity development programmes to address the requirements • Assess current capacities at the district and sub-district levels to address the challenges posed by climate change and implement programmes to develop the required capacities <p>Integrating environmental and appropriate land-use management in all DRM plans</p>
3	• Promote Participatory Approaches, Partnerships and Networks	KSDMA, Revenue Dept. (DM), All depts. involved in DM	Recurring <ul style="list-style-type: none"> • Promote participation of communities, individuals, households, and businesses in all aspects of disaster management 	DDMA, Panchayats, ULBs, women and child welfare department,	Recurring <ul style="list-style-type: none"> • Promote participation of communities, individuals, households, and businesses in all aspects of disaster management

Sl. No.	Major Themes	<i>Strengthening Disaster Risk Governance</i>			
		<i>State Agencies, District and their Responsibilities</i>			
		State	Responsibility – State	District	Responsibility – District
			Short Term (T1) <ul style="list-style-type: none"> Implement participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location 	NGOs, SHGs, VAS, RWAs and all district level departments	Short Term (T1) <ul style="list-style-type: none"> Prepare and Implement DM action plans using participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location
		Especially RDPR and UDD	Long Term (T3) <ul style="list-style-type: none"> Establish and strengthen government coordination forums composed of relevant stakeholders 		Long Term (T3) <ul style="list-style-type: none"> Establish and strengthen government coordination forums composed of relevant stakeholders
4	•Work with elected representatives	KSDMA, Revenue Dept. (DM), All dept. involved in DM, especially RDPR and UDD	Recurring <ul style="list-style-type: none"> Sensitize the political leadership Involve the political leadership at state, district, block, and local levels in discussions on DRR 	DDMA, Panchayats, ULBs	Recurring <ul style="list-style-type: none"> Sensitize the political leadership Involve the political leadership at district, taluk and local levels in discussions on DRR
5	•Grievance Redress Mechanism (GRM)	KSDMA, Revenue Dept. (DM), all depts. involved in disaster response	Recurring <ul style="list-style-type: none"> Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response Short Term (T1) <ul style="list-style-type: none"> Review existing GRM applicable for state and centre and within state Develop plans to strengthen GRM Medium Term (T2)	DDMA, PRIs, ULBs, all district level departments	Recurring <ul style="list-style-type: none"> Ensuring the functioning of a sound grievance redress mechanism in all the departments/agencies involved in disaster response Short Term (T1) <ul style="list-style-type: none"> Review existing GRM applicable for district, taluk and local levels Develop plans to strengthen GRM Medium Term (T2) <ul style="list-style-type: none"> Implement plans for

Sl. No.	Major Themes	<i>Strengthening Disaster Risk Governance</i>			
		<i>State Agencies, District and their Responsibilities</i>			
		State	Responsibility – State	District	Responsibility – District
			<ul style="list-style-type: none"> • Implement plans for strengthening GRM 		strengthening GRM
6	• Promote quality standards, such as certifications and awards for disaster risk management	KSDMA, Revenue Dept. (DM), all state level depts..	<p>Recurring</p> <ul style="list-style-type: none"> • Ensure implementation of standards • Monitor compliance <p>Short Term (T1)</p> <ul style="list-style-type: none"> • Formulate state-level regulations along with wide public consultations <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Develop suitable by-laws specifically for urban and rural areas • Institute systems of certifications and awards for DRR • Develop enforcement mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Implement techno-Legal regimes • Establish institutional arrangements for monitoring compliance 	DDMA, PRIs, ULBs, all district level departments	<p>Recurring</p> <ul style="list-style-type: none"> • Ensure implementation of standards • Monitor compliance <p>Short Term (T1)</p> <ul style="list-style-type: none"> Formulate district-level regulations along with wide public consultations <p>Medium Term (T2)</p> <ul style="list-style-type: none"> • Develop suitable by-laws specifically for urban and rural areas implemented by PRIs and ULBs • Institute systems of certifications and awards for DRR • Develop enforcement mechanisms <p>Long Term (T3)</p> <ul style="list-style-type: none"> • Implement techno-Legal regimes • Establish institutional arrangements for monitoring compliance

CHAPTER 11

INTERNATIONAL COOPERATION

PARTICIPATION IN INTERNATIONAL EFFORTS

India plays an active role in global initiatives on disaster management and also a signatory to the Sendai Framework for DRR and is committed to achieve the priorities and the objectives through systematic and institutional efforts. With multi-dimensional initiatives and expertise, India remains committed to playing a leading role in strengthening regional and international cooperation efforts in mitigating and reducing the impacts of disasters.

India is one of the participating countries and works closely with the UNISDR. The United Nation Disaster Management Team in India comprises of UN agencies such as Food and Agriculture Organization, International Labor Organization, United Nations Development Program, United Nations Educational, Scientific and Cultural Organization, United Nations Population Fund, United Nations High Commission for Refugees, United Nations Children's Fund, World Food Program and World Health Organization.

India is participating in the Global Facility for DRR program and is one of the founder members of Asian Disaster Reduction Centre. India has agreements with the several countries for cooperation in the field of disaster management and has been working closely with many countries for the exchange of ideas and expertise in disaster management.

Thus, the state Government agencies to develop plans and programs in accordance with the National norms and protocol, programs, initiatives and commitments at international platforms towards Disaster Management.

ACCEPTING FOREIGN ASSISTANCE

As a matter of policy, the Government of India does not issue any appeal for foreign assistance in the wake of a disaster. However, if the national government of another country voluntarily offers assistance as a good will gesture in solidarity with the disaster victims, the decision on acceptance of all such offers vests solely with the Central Government. The primary responsibility for reviewing such foreign offers of assistance rests with the Ministry of External Affairs which will consult and coordinate with the Ministry of Home Affairs, Govt. of India

All offers of assistance from foreign governments will be routed through the Ministry of External Affairs. Offers of assistance in-kind, including technical assistance, emergency rescue teams, reconstruction assistance, etc. will be evaluated on a case-by-case basis, in consultation with the Ministry of Home Affairs, which will assess the requirements based on inputs from the State government.

In the case of contributions from NRIs, PIOs and foreign non-governmental bodies, donations may be accepted through the Prime Minister's and Chief Minister's relief funds. All other donations from foreign non-governmental entities to Indian non-governmental entities must be compliant with extant regulations, including the Foreign Contribution (Regulation) Act 2010.

ACCEPTING MULTILATERAL ASSISTANCE

In the case of an offer of assistance from UN Agencies, the Government of India will evaluate and consider all such offers on its merits. If accepted, GoI will issue directions to the respective Ministry or State Government to coordinate with the concerned UN agency. India will permit UN agencies and international NGOs already operating in the country at the time of the disaster event to continue render their humanitarian assistance to people in the affected area in coordination with the relevant Central Ministries/Departments and the State Government in accordance with applicable norms and protocols.

ROLE OF AGENCIES IN DISASTER MANAGEMENT

KSDMA/DDMAs will take all appropriate measures for transparency in the relief operations. Affected people shall be apprised of the nature and quantum of relief admissible to them. Proper formats will be developed to acknowledge the receipt of relief materials and their further distribution. GoI has issued norms for relief compensation for different damages and losses vide (Period 2015-20, MHA Letter No. 32-7/2014-NDM-I Dated 8th April 2015)

Following are the different agencies play a vital role at the time of disaster management.

VOLUNTARY, BILATERAL AND MULTILATERAL AGENCIES

Participation of the community is crucial in Disaster Management. However, preparing the community for appropriate response within a limited time and motivating it for adopting long-term mitigation measures would require a very sustained, intimate and a flexible approach. This is a challenge which can be effectively addressed through involvement of NGOs and CBOs (Community Based Organizations) due to their close linkages with the community, their outreach and flexibility in procedural matters.

NGOs & CBOs

Local NGOs and CBOs, due to their proximity to the community, can act as a vital link between government and the community particularly during emergencies. They are in a better position to appreciate the area and time specific problems of the people and their flexibility in approach makes them more acceptable in the community. These organizations work generally in the fields of health, education, livelihood, micro-finance, infrastructure, animal husbandry, social reforms, etc.

Indian Red Cross Society and other international NGOs have considerable experience and expertise in emergency management. These organizations, apart from their resources and expertise, have a network of NGOs whom they can harness during emergencies. They could also play a vital role in information dissemination because of their existing global network.

The NGOs can be used through following actions:

Sl. No.	Issues	Action Points
1.	Geographic spread of NGOs	Develop a database of NGOs at all levels working on disaster management focusing on geographic outreach and thematic capacities of the organizations. (Action: SDMA and DDMAs with the help of other Departments and NGOs)
2.	Volume of support provided by NGOs	Compile statistics on quantum of support provided by NGOs at all levels, both international and national. (Action: SDMA and DDMAs)
4.	Coordination	Establishing inter agency mechanisms for coordination and networking activities (information and knowledge management, training and capacity building, collaborative advocacy, quality and accountability) at all levels. (Action: DDMA)
5.	Accessibility	Establish protocols for cooperation and ensure access to the affected areas with support from government agencies at respective levels like NDRF and SDRF that have good logistics base to reach inaccessible areas. (Action: SDMA , DDMA, NGOs, CBOs)
6.	Hazard and vulnerability based planning	Conduct community centric hazard and vulnerability analysis at all levels, and develop disaster management plans in accordance. (Action: DDMA, NGOs)
7.	Community participation	Ensure community participation in assessment, planning, implementation and monitoring of activities at all levels. (Action: DDMA, NGOs, CBOs)

Sl. No.	Issues	Action Points
8.	Mainstreaming of Disability Issues in DM	Support the most vulnerable groups through mitigation activities as well as disaster preparedness and response, with a particular focus on the special needs of the Persons with Disabilities (PWDs). (Action: DDMA, NGOs)
9.	Gender Mainstreaming	Make women's as well as men's concerns and experiences an integral dimension in the design, implementation, monitoring and evaluation of policies and programs such that inequalities between men and women are not perpetuated through the routine operations of DM. (Action: DDMA)
10.	Focus on most vulnerable rather than only on Epicentre	State level: Coordinate among actors to identify gap areas District and Local level: Ensure targeting with equity and outreach to all excluded areas. (Action: District NGO Task Forces in DDMA)
11.	Rural-urban diversity	Develop the capacities of NGOs or specialized civil society agencies at all levels to manage urban as well as rural disasters and accordingly make investments. (Action: DDMAs)
12.	Adherence to standards	State level: Develop minimum standards for the state District and Local level: Develop capacities for adherence to minimum standards through collective and coordinated efforts of all stakeholders (Action: SDMA, DDMAs, NGOs, CBOs)
13.	Transparency and accountability	Develop an agreed framework of accountability for all levels and mechanisms to bring in transparency. (Action: SDMA and DDMAs)
14.	Do No Harm	Advocacy at all levels on Do No Harm through disaster response and development interventions. (Action: District NGO Task Forces in DM)
15.	Exit strategy	Ensure that the NGO programmes have an exit strategy to link with long term recovery/rehab/development programs of other NGOs or the government. (Action: District NGO Task Forces in DM)

BILATERAL ORGANIZATIONS

Bilateral agencies play a major roles role in disaster management and work through government as well as NGOs and other partner agencies. They provide resources for preparedness, research, networking and institution development, relief, reconstruction and rehabilitation. They can assist in making suggestions for possible changes in policies by sharing of disaster management applications in other parts of the world. In addition they can provide technical expertise and give support by mobilizing advanced rescue and

evacuation teams from other countries during the time of extreme emergencies. These organizations carry out responsibilities in coordination with the Government of the affected country, other donor Governments, international organizations, UN agencies and NGOs.

CORPORATE BODIES

So far the role of corporate sector has been limited to relief and reconstruction activities following emergencies. Some business centers and corporate houses have special cells to take up relief activities.

- The corporate sector can play an active role in preparedness and planning through raising community awareness in their project areas on various aspects of disaster preparedness.
- Providing specialized equipments (earthmoving equipments, boats, etc. for disaster response).
- The corporate sector will be encouraged to develop a fund for preparedness and post-disaster activities.
- Mobilization and creation of contingency fund for relief and recovery activities.
- Provision of technical know-how to manage disasters (especially industrial accidents, fire etc.)

UN AGENCIES:

The UN has a central and unique role through the organizations under its aegis, coordinate international co-operation in the field of disaster management and mitigation. Even though disaster management and mitigation rests on the National Government, the UN agencies are responsible for providing advice and assistance to the government and responsible to mobilize and provide technical and material assistance according to its mandate and resources.

UNICEF (UNITED NATIONS INTERNATIONAL CHILDREN'S EMERGENCY FUND)

The SDMA/the Department of Revenue (DM)/State administration may request the UNICEF for following assistance

Provision of emergency relief to the affected communities

- Immunization
- Restoration of health infrastructures
- Supply of educational and other infrastructures to the affected schools
- Restoration and augmentation of sanitation and drinking water facilities
- Establishment of child labour prevention school

- Supply of boats to the State Government

The key areas of UNICEF's involvement in disaster mitigation will be

- Post disaster situation and needs analysis with the help of NGOs or Govt. machinery.
- Promoting & guiding disease surveillance
- Training support for medical personnel for control of epidemics / pandemics
- Provision of relief support to the affected community as per its mandate.
- Supply of emergent food aid relief, medicine and study materials for children of the affected communities.
- Allocate/generate financial assistance for restoration and rehabilitation activities in the affected areas.
- Restoration of drinking water and sanitation facilities in post disaster period.
- Incorporate disaster preparedness aspects in its ongoing programs.
- Special programs for child and mother health

UNDP (UNITED NATIONS DEVELOPMENT PROGRAM)

UNDP is mandated to promote incorporation of disaster mitigation in development planning and provide financial support and technical assistance for different facets of disaster management. Assistance is also provided in the planning and implementation of post disaster rehabilitation and reconstruction and incorporation of risk reduction techniques in the affected areas.

The activities of UNDP in the State could be as follows;

- ✓ Supporting the State and district administration in distribution of relief
- ✓ Co-ordination of NGO activities in the affected areas
- ✓ Promotion of alternative housing techniques in the affected areas
- ✓ Strengthening of disease surveillance
- ✓ Supporting Disaster Preparedness initiatives in the State through organizing workshops, training programs for various stake holders
- ✓ Initiating community based disaster preparedness program in the State
- ✓ Initiation of sustainable livelihood programs
- ✓ Provision on agricultural inputs immediately after emergencies
- ✓ Provision of tents, family relief kits

UNDP can play the following roles in a disaster management;

- ✓ Incorporation of disaster mitigation in development planning.

- ✓ Support and get involved in planning and implementation of relief and rehabilitation activities of the State Govt.
- ✓ Propagate disaster preparedness in community level through Govt. machinery.
- ✓ Support the State Govt for preparing DM plans at state, district, block and community levels.
- ✓ Provide necessary support and guidance for designing early warning systems.

WFP (WORLD FOOD PROGRAM)

World Food Program provides targeted food aid to vulnerable communities for humanitarian relief and supports rehabilitation, reconstruction and risk reducing development programs.

FAO (FOOD AND AGRICULTURE ORGANIZATION)

FAO provides technical advice in reducing vulnerability and helps in the rehabilitation of agriculture, livestock, fisheries and local food production. It also monitors food production and forecasts any requirements of exceptional food assistance.

WHO (WORLD HEALTH ORGANISATION)

WHO provides advice and assistance in various aspects of preventive and curative health care including preparedness of health services for rapid disaster response.

CHAPTER 12

MAINTAINING AND UPDATING THE PLAN

BACKGROUND

The preparation, maintenance and updating the Disaster Management Plan is a dynamic process. To ensure the relevance and effectiveness of the DM Plan, it must be revised periodically, by incorporating the updated information, changes in Government policies, initiatives, and priorities as well as technological changes and global experiences. The Evaluation of the effectiveness of DM plans involves a combination of training events, exercises, and real-world incidents to determine whether the goals, objectives, decisions, actions, and timing outlined in the plan led to a successful response. In this way, the emergency preparedness exercises become an integral part of the planning process. The DM planners must be aware of lessons learnt from the recent disaster events and best practices adopted elsewhere. The trainings, mock drills and exercises is crucial to evaluate the operational aspects of the plan, fill up the gaps and improve the efficiency of the plan. The likelihood of emergencies and actual occurrences are also occasions for evaluating the plan, making innovations, and for updating the plan, SOPs and guidelines. At times, operations experience setbacks due to outdated information, ineffective procedures, incorrect role assignments, and outdated norms. Further, the priorities for a jurisdiction may change over time, as the makeup of the included communities change, as resources expand or contract, and as capabilities evolve.

TRAINING

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

Each nodal agency for DM must hold workshops, training programs with mock drills, at least twice a year. Such programs are crucial to ensure full preparedness and to maintain operational readiness of the disaster response teams, institutional mechanisms, and the equipment. It also helps to test their readiness to deploy within the shortest possible time following the DMP activation. They shall be conducted in a manner similar to that of the drills carried out firefighting department or the army units. These workshops and drills must be held at the pre-designated locations under the guidance of the

designated incident commanders and associated departmental heads. These trainings go beyond concepts and guidelines into inculcating in the individuals the critical importance of working as a coherent team for emergency response with a clear chain of command. The workshops and drills will also provide an opportunity to practice and update SOPs.

TESTING THE PLAN AND LEARNING TO IMPROVE

Evaluating the effectiveness of a plan involves a combination of training events, exercises and real-time incidents to determine whether the goals, objectives, decisions, actions and timings outlined in the plan led to a successful response. The purpose of exercises and drills is to promote preparedness by testing the plan with equal participation of all relevant stakeholders. The process of evaluation and remedial actions will identify, illuminate, and correct problems with the DMP. This process must capture information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, or lessons-learned. Members of the planning team should reconvene to discuss the problem and to consider and assign responsibility for generating remedies across all mission areas.

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

REVISE/UPDATE

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

- Major review and revisions after each major incident.
- After significant change in operational resources (e.g., policy, personnel, organizational structures, management processes, facilities, equipment).

- Subsequent to any notification or formal update of planning guidance or standards.
- After every case of plan activation in anticipation of an emergency.
- After the completion of major exercises
- A change in the district's demographics or hazard or threat profile.
- Enactment of new or amended laws or ordinances.

In exceptional circumstances, where the magnitude of the incidence or the situation demands, appropriate authority will make necessary amendments. The State government departments to cooperate and actively participate in the process of DM plan revision.

AS PER SECTION 23(5) OF THE DM ACT, SDMP IS TO BE REVIEWED AND UPDATED ANNUALLY.

