GOA STATE DISASTER MANAGEMENT PLAN

Towards a Disaster Resilient Goa

July 2024

GOA STATE DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF GOA

State Disaster Management Plan

State Disaster Management Plan

A publication of:

Goa State Disaster Management Authority
Revenue Department,
Government of Goa
2nd Floor, Secretariat, Porvorim,
Goa-403521

State Disaster Management Plan - 2014
Revised Edition - July 2024

When citing this Plan, the following citation should be used:

State Disaster Management Plan, 2024.
A publication of the Goa State Disaster Management Authority, Government of Goa.
July 2024, Porvorim, Goa.

State Disaster Management Plan

Goa State Disaster Management Authority
Revenue Department
Government of Goa

July, 2024

DR. PRAMOD SAWANT

CHIEF MINISTER,

Chairman Goa SDMA,

Government of Goa

MESSAGE

It is a pleasure to learn that Goa State Disaster Management Authority (GSDMA) has revised State Disaster Management Plan (SDMP). The revised SDMP is an improvement over the earlier version and has been aligned as per the National Disaster Management Plan-2019. This plan will enhance the understanding of stakeholders on disaster risks and will further strengthen our capacity to recover in the wake of both natural as well as human induced disasters.

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

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

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

I congratulate SDMA for coming out with a revised and more comprehensive State Disaster Management Plan with some new relevant features to cover more disasters and adding new dimensions of sustainable development and climate change. I am sure that this will help in making Goa more resilient to disasters and our State will lead in the field of disaster management by putting right set of Disaster Risk Reduction Strategies in place.

(Dr. Pramod Sawant)

SHRI. ATANASIO MONSERRATE

MINISTER FOR REVENUE,

Vice-Chairman Goa SDMA,

Government of Goa

MESSAGE

I am glad to express that Goa is progressing well in the field of disaster management and has already put in place many effective methodologies to deal with natural disasters. The revised State Disaster Management Plan, I am sure, will prove to be a strategic tool in further strengthening disaster resilient development in the State.

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

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

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

(Shri. Atanasio Monserrate)

DR. PUNEET KUMAR GOEL, IAS

CHIEF SECRETARY
CEO Goa SDMA,
Government of Goa

MESSAGE

Goa is vulnerable to both natural and human induced disaster. The recent disasters that the State of Goa has witnessed include Taukte Cyclone 2021 and Floods 2021 and have been a lesson learning experience in terms of colossal economic impact and unfortunate loss of lives in these recent disasters. Keeping the disaster risk and vulnerability of the State into consideration, it is need of the hour to have appropriate disaster preparedness and mitigation measures in place.

The State Disaster Management Plan-2024 (SDMP) revised in accordance with the National Disaster Management Plan-2019 is a commendable job done by Goa SDMA team. The integration of notified Incident Response System-IRS in the SDMP has been a great value addition for making it more actionable and result oriented document. The roles and responsibilities of all the Stakeholders defined in the Plan are indeed necessary to avoid any chaos in any disaster situation. The State Plan can guide in facilitating the mobilisation of stakeholders along with resources and coordination among various departments, individuals and community based organisation for mitigating the impacts of disasters in the State. The aim is to protect lives of citizens and take appropriate preventive measures so that the impact of the impending disaster situations is minimised. I am confident that SDMP-2024 will be implemented as per the timelines defined in the Plan and shall be used widely by disaster managers and other stakeholders as a ready reckoner for Disaster Management in the State. I wish the publication of the SDMP all the success.

(Dr. Puneet Kumar Goel IAS)
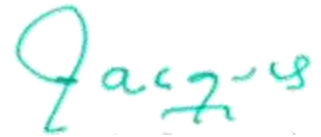
SHRI. SANDIP JACQUES, IAS

SECRETARY REVENUE

Member Secretary Goa SDMA,

Government of Goa

MESSAGE

It is a privilege to acknowledge that the Goa State Disaster Management Authority (Goa SDMA) has come up with a revised State Disaster Management Plan (SDMP) aligned as per National Disaster Management Plan-2019. The SDMP-2024 has been revised with a two pronged approach-to improve the existing content and to add new dimension to it. The task of revising the SDMP has been conducted under Sendai Framework for Disaster Risk reduction Project. The revised SDMP-2024 is comprehensive Disaster Management Plan and may guide the sustainable development in the State by incorporating the Disaster Risk Reduction measures in all the developmental projects. The incorporation Multi-Hazard Maps in the SDMP is vital for understanding the vulnerability of the State. The SDMP shall guide Departments and DDMAs to align their Disaster Management Plans accordingly.

I convey my best wishes to the team SDMA for their efforts in bringing out revised SDMP-2024 and congratulate all associated in this noble assignment.

(Shri. Sandip Jacques, IAS)

Preface

A Disaster Management Plan needs to be a dynamic and actionable document, which needs to be updated and revised periodically. Keeping this in mind, the existing State Plan of 2014 has been revised enhancing it considerably improving the approach and adding new dimensions. We hope that the revised version will prove to be more useful and effective in addressing the difficult challenges of disaster risk reduction facing State Government.

The revision of the existing State Disaster Management Plan 2014 started in November, 2021 after Goa SDMA appointed a Sr. Consultant under SFDRR Scheme for Strengthening of SDMA. This was followed by several rounds of extensive consultations internally and with different stakeholders and experts from different domains. After 3-4 rounds of revision process, a final draft was also placed on the website of SDMA for one month inviting comments and suggestions from all stakeholders including common people and was also circulated to all Ministries / Departments and States / UTs for comments and inputs. Incorporating their comments and suggestions suitably the revised Plan was finalized and approved by Members of SDMA.

The hazard and vulnerability profile of Goa is now well known as Government has notified the State Specific Disaster into 02 categories including: Category A-Natural Disasters and Category B-Human Induced Disasters. Goa's proneness to multiple disasters caused by natural and human induced factors aggravated by climate change impacts pose many threats and challenges for communities and agencies involved in management of Disasters in the State. As per the Disaster Management Act 2005, Government of Goa has constituted Goa State Disaster Management Authority-SDMA headed by Hon'ble Chief Minister as Chairperson; State Executive Committee-SEC headed by Chief Secretary of the State and District Disaster Management Authorities-DDMAs for North and South Goa headed by respective District Collectors as Chairpersons.

This Plan has been aligned with the National Management Plan 2019, and special emphasis has been laid on establishing coherence between the three International Agreements (Sendai Framework for Disaster Risk reduction 2015, Sustainable development Goals 2015 and Paris Agreement on Climate Change at the 21st Conference of Parties (COP 21) with special consideration to Prime Minister's Ten Point Agenda on DRR during Asian Ministerial Conference on DRR 2016 in New Delhi. This will help the concerned Stakeholders at the State level to achieve the National Goals.

In the responsibility framework for the State Level Stakeholders, an additional Thematic Area on Climate Change Risk Management has been incorporated to mitigate the climate change impacts on frequency and intensity of disasters.

The real essence of this State Disaster Management Plan lies in its effective implementation to ensure strengthening of Disaster Management Authorities at State, District and Taluka level, to enhance the level of disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction. The Plan lays emphasis on mainstreaming of disaster risk reduction measures in developmental plans and policies by the State Government and its implementation by all concerned Stakeholders.

The beauty of the SDMP lies in its inclusive approach to address to the vulnerabilities and capacities of vulnerable groups of the society based upon the physical, socioeconomic and other factors. An exclusive chapter of the SDMP on Social Inclusion lays emphasis on addressing to the special considerations and calls for addressing to the gender-based vulnerabilities, conditions of SC/ST communities, the elderly, children and persons with disabilities. The idea is to guide inclusiveness

of all the plans at Departmental level, District level and local level including all other concerned stakeholders in the State.

As the SDMP 2024 is aligned with the NDMP 2019, the activities in the Plan have been envisaged as short, medium and long term ending in 2022, 2027 and 2030 respectively. All responsibilities of the State Government and Line Departments have been placed with a definite time frame, which start and go on simultaneously with different timelines of completion.

Albeit the revision of the SDMP have been carried out with dedication and utmost care, however, due to its dynamic nature, the Plan will always have a scope for improvement. The current version of the SDMP with one volume is the improved version of the earlier SDMP with seven volumes. The Plan in its implementation phase shall bring more insights to be incorporated in the future versions. We are sanguine about the Plan to assist all the concerned Stakeholders in the State in their Disaster Risk Reduction efforts and initiatives in making Goa a disaster resilient State. We shall appreciate and welcome the valuable suggestions and inputs for the value addition of the Plan.

Shri. Sandip Jacques, IAS	**Shri. Surendra F Naik**	**Shri. Sandip S Gawde**	**Shri. Gowhar Jeelani**
Secretary (Revenue)/ Member Secretary (Goa SDMA), Revenue Department Government of Goa	Joint Secretary (Revenue), Revenue Department Government of Goa	Under Secretary (Rev-II) Revenue Department Government of Goa	Senior Consultant (Goa SDMA) Revenue Department Government of Goa

Acknowledgements

Contents

List of Figures

List of Tables

Abbreviations

AAI	: Airports Authority of India
ADWR	: Airborne Doppler Weather Radar
AERB	: Atomic Energy Regulatory Board
AMCDRR	: Asian Ministerial Conference on Disaster Risk Reduction
ANM	: Auxiliary Nurse Midwife
AR5	: IPCC's Fifth Assessment Report
ARG	: Automatic Rain Gauge
ATI	: Administrative Training Institute
AWS	: Automatic Weather Stations
BBB	: Build Back Beer
BIS	: Bureau of Indian Standards
BMTPC	: Building Materials and Technology Promotion Council
BPHE	: Biological and Public Health Emergencies
CADA	: Coastal Area Development Authority
CAPF	: Central Armed Police Forces
CBRN	: Chemical, Biological, Radiological and Nuclear
CCA	: Climate Change Adaptation
CCM	: Climate Change Mitigation
COP	: Conference of the Paris
CDEF	: Civil Defence
CIMFR	: Central Institute of Mining & Fuel Research
CISF	: Central Industrial Security Force
CMG	: Crisis Management Group
CM	: Chief Minister
COR	: Commissioner of Relief
CRZ	: Coastal Regulation Zone
CS	: Chief Secretary
CSS	: Centrally Sponsored Schemes
CUD	: Cultural Department
CWC	: Central Water Commission
CWWG	: Crop Weather Watch Group
CZMA	: Coastal Zone Management Authority
DAE	: Department of Atomic Energy
DCOP	: Department of Captain of Ports
DDMA	: District Disaster Management Authority
DEOC	: District Emergency Operation Centre
Dept.	: Department
DF&ES	: Directorate of Fire and Emergency Services
DGM	: Directorate of Geology and Mining
DHE	: Directorate of Higher Education
DHSF	: Directorate of Health Services
DFRI	: Disaster Risk Financing Instruments
DITC	: Directorate of Industries, Trade and Commerce
DMP	: Disaster Management Plan
DOT	: Department of Telecommunications
DoA	: Directorate of Accounts
DoAg	: Directorate of Agriculture
DoE	: Directorate of Education
DoI&P	: Department of Information & Publicity

DRDO	: Defence Research and Development Organization
DRM	: Disaster Risk Management
DRR	: Disaster Risk Reduction
DCRA	: Disaster Composite Risk Atlas
DoE & CC	: Department of Environment & Climate Change
DoF	: Department of Finance
DoIP	: Department of Information & Publicity
DoUD	: Department of Urban Development (Municipal Administration)
DoFh	: Directorate of Fisheries
DSS	: Decision Support System
DSLR	: Directorate of Settlement & Land Records
DSW	: Directorate of Social Welfare DSW DWCD DEPwD
DWCD	: Directorate of Women and Child Development
DWR	: Doppler Weather Radar
DTW	: Directorate Tribal Welfare
DEPwD	: Department of Empowerment of Persons with Disabilities
DRD	: Department of Rural Development
DAH&VS	: Directorate of Animal Husbandry and Veterinary Services
DMG	: Directorate of Mines & Geology
ED	: Electricity Department
EIA	: Environment Impact Assessment
EOC	: Emergency Operations Centre
EWS	: Early Warning System
FC	: Finance Commission
FCSD	: Food and Civil Supply Department
FC-XIII	: Thirteenth (13th) Finance Commission
FC-XIV	: Fourteenth (14th) Finance Commission
FC-XV	: Fifteenth (15th) Finance Commission
FD	: Forest Department
GACC	: Global Anthropogenic Climate Change
GDP	: Gross Domestic Product
GSI	: Geological Survey of India
GIPARD	: Goa Institute of Public Administration and Rural Development
GSPCB	: Goa State Pollution Control Board
GOG	: Government of Goa
GSCCC	: Goa State Climate Change Cell
GU	: Goa University
HAP	: Heat (Wave) Action Plan
HAZCHEM	: Hazardous Chemicals
HAZMAT	: Hazardous Material
HFA	: Hyogo Framework for Action
HRVCA	: Hazard Risk, Vulnerability and Capacity Assessment
IAF	: Indian Air Force
IAP	: Incident Action Plan
IBTA	: Industry/ Business/ Trade Association (s)
ICG	: Indian Coast Guard
IDRN	: Indian Disaster Resource Network
IEC	: Information Education Communication
IFB	: Inspectorate of Factories and Boilers
IMD	: India Meteorological Department
INCOIS	: Indian National Centre for Ocean Information Services

IPCC	: Inter-Governmental Panel on Climate Change
IRS	: Incident Response System
IRT	: Incident Response Team
ISO	: International Organization for Standardization
ISRO	: Indian Space Research Organisation
MAH	: Major Accident Hazard
MEA	: Ministry of External Affairs
MPA	: Mormugao Port Authority
MHA	: Ministry of Home Affairs
MoU	: Memorandum of Understanding
NCC	: National Cadet Corps
NCMC	: National Crisis Management Committee
NDMA	: National Disaster Management Authority
NDMP	: National Disaster Management Plan
NDRF	: National Disaster Response Force
NEC	: National Executive Committee
NERC	: National Emergency Response Centre
NGO	: Non-Governmental Organisations
NIDM	: National Institute of Disaster Management
NRSC	: National Remote Sensing Centre
NSS	: National Service Scheme
NYKS	: Nehru Yuva Kendra Sangathan
PRI	: Panchayati Raj Institutions
PAGG	: Principal Accountant General, Goa
PWD	: Public Works Department
RD	: Revenue Department
SAPCC	: State Action Plan on Climate Change
SAPCC	: State Council of Educational, Research and Training
SDG	: Sustainable Development Goals
SDMA	: State Disaster Management Authority
SDRF	: State Disaster Response Force
SEC	: State Executive Committee
SEOC	: State Emergency Operation Centre
SFDRR	: Sendai Framework for Disaster Risk Reduction
SHG	: Self Help Group
SIDM	: State Institute of Disaster Management
SIHFW	: State Institute of Heath and Family Welfare
SIRD	: State Institute of Rural Development
SLBC	: State Level Bankers' Committee
SCERT	: State Council of Educational Research and Training
DSDE	: Directorate of Skill Development and Entrepreneurship
SOG	: Standard Operating Guidelines
SOP	: Standard Operating Procedure
SPCB	: State Pollution Control Board
SPWD	: State Public Works Department
SREX IPCC	: Special Report on Managing the Risks of Extreme Events to Advance Climate Change Adaptation
T1	: Short-Term Goals, ending 2022
T2	: Medium-Term Goals, ending 2027
T3	: Long-Term Goals, ending 2030
TAA	: Thematic Area for Action

TOD   : Tourism Department
ToT   : Training of Trainers
TRAD   : Transport Department
UDD   : Urban Development Department
UFDM   : Urban Flood Disaster Management
ULB   : Urban Local Bodies (Municipal Corporations, Municipalities)
UN   : United Nations
UNDP   : United Nations Development Programme
UNESCO   : United Nations Educational, Scientific and Cultural Organization
UNFCCC   : United Nations Framework Convention on Climate Change
UNISDR   : United Nations International Strategy for Disaster Reduction, now UN Office for DRR
USDDM   : Urban Storm Drainage Design Manual
UT   : Union Territory
VHF   : Very High Frequency
WAP   : Wildlife Action Plan
WRD   : Water Resource Department

Executive Summary

Background

The Disaster Management Act, 2005 (DM Act 2005) lays down institutional and coordination mechanism for effective Disaster Management (DM) at the National, State, District and local levels. As mandated by this Act, the Government of Goa has notified the constitution of State Disaster Management Authority (SDMA) headed by Hon'ble Chief Minister of the State and the District Disaster Management Authorities (DDMA) headed by the concerned District Collectors of both North and South Goa districts. In the State of Goa, Revenue Department is the Nodal Department for coordination of Disaster Management. The institutional arrangements have been set up consistent with the paradigm shift from the relief-centric approach of the past to a proactive, holistic and integrated approach for Disaster Risk Reduction (DRR) by way of strengthening disaster preparedness, mitigation, and emergency response.

The 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 emerging best practices and knowledge base in disaster management. It is in accordance with the provisions of the DM Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, and other National Level Guidelines prepared by National Disaster Management Authority.

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. It is meant to be implemented in a flexible and scalable manner in all phases of disaster management:
a) Mitigation (prevention and risk reduction), b) Preparedness, c) Response and d) Recovery (immediate restoration and build-back better). While the names of departments of the State having specific roles and responsibilities are mentioned in the Plan, in the spirit of the DM Act 2005 and the exigencies of humanitarian response, every ministry/ department and agency is expected to contribute to DM going beyond their normal rules of business.

Main Pillars of SDMP

The SDMP, in a sense, has five main pillars:
I. Conforming to the DM Act 2005, NDMP 2019 and the NPDM 2009
II. Participate proactively to realising the global goals —Sendai Framework for DRR, Sustainable Development Goals (SDGs) and Conference of Paris (COP21) Paris Agreement on Climate Change
III. Prime Minister's Ten Point Agenda for DRR-Preparation of Road Map for its Implementation
IV. Social inclusion as a ubiquitous and cross-cutting principle
V. Mainstreaming DRR as an integral feature

The SDMP of 2014 was revised attempting to incorporate the emerging national approach of bringing about coherence and mutual reinforcement of the three Post-2015 Global Frameworks. The revised plan also incorporates the Ten Point Agenda on DRR, enunciated by Hon'ble Prime Minister during Asian Ministerial Conference on DRR (AMCDRR) in November 2016 in New Delhi.

The period envisaged as 'Long-Term' in this revised plan is co-terminus with year 2030, the ending year of the major post-2015 global frameworks. The activities running concurrently in most cases are grouped under overlapping time frames—short, medium, and long-term, ending by 2022, 2027 and 2030 respectively in addition to the recurring/ regular (i.e., routine) ones. They do not signify any order of priority. The measures mentioned here are indicative and not exhaustive. Based on global practices and national experiences, the plan will incorporate changes during the periodic reviews and updates.

Vision

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

Multi-Hazard Vulnerability

Goa, is a multi-hazard prone coastal State. Vulnerability to human-induced disasters/emergencies also exists. The SDMP covers disaster management cycle for all types of hazards—natural and human-induced. Heightened vulnerabilities to disaster risks can be related to increasing population, urbanisation, industrialisation, development within high-risk zones, environmental degradation, and climate change. Besides the natural factors and anthropogenic climate change, various human activities could also be responsible for aggravated impacts and increased frequency of disasters.

Building Resilience

The role of the central agencies is to support the disaster-affected State or the UT in response to requests for assistance. The central agencies will play a pro -active role in disaster situations. In the domains of DM planning, preparedness, and capacity building, the central agencies will constantly work to upgrade Indian DM systems and practices as per global trends. The priorities of the Sendai Framework and those related to DRR in SDGs and Paris Agreement have been integrated into the planning framework for Disaster Risk Reduction under the following Thematic Areas for Disaster Risk

Reduction:

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

These above themes have been included in the SDMP, and have been elaborated in greater detail. Besides, there are chapters describing three cross -cutting themes:

a) Coherence and Mutual Reinforcement for DRR of the Post-2015 Global Frameworks

b) Social Inclusion and

c) Mainstreaming DRR

Response

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

Government of Goa has notified the Incident Response System-IRS and assigned specific roles/ responsibilities to for coordinating disaster-specific responses. The Incident Response Team-IRT at State level will ensure liaison with the concerned IRTs of the districts where the disaster has occurred and coordination among various relevant departments to provide quick and efficient response. The state government will activate the Incident Response Teams (IRT) at state, district, or the Taluka level as per demand of the situation. The State Government shall seek assistance from the National Authority in the

response efforts whenever the need arises. The various agencies whose responsibilities are defined in detailed DM plans for the State/ UT and district will be responsible for specific response measures. The nodal department for coordination of response at State will be Revenue Department-RD and at the district level DDMA supported by other agencies.

Recovery and Building Back Better

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

Capacity Development

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

Financial Arrangements

The financing of disaster relief has been an important aspect of federal fiscal relations. According to NPDM 2009, the primary responsibility of disaster management lies with the State Governments. This means, the primary responsibility for undertaking rescue, relief, and rehabilitation measures during a disaster lies with the State Government. The Central Government may supplement the efforts of State Government through logistic and financial support. The DM Act 2005 provides the legal framework for disaster management and all related matters, including the financial aspects. The financing of the entire disaster management cycle will be as per Items and Norms set by the Ministry of Home Affairs, Government of India. The disaster risk reduction will be achieved by mainstreaming the requirements into the developmental plans.

Changes Introduced—Highlights

This SDMP, the revised version, comprises of single volume with fourteen chapters compared to seven volumes with multiple chapters in the previous plan including chapters on three cross-cutting themes relating to DRR: **a) coherence and mutual reinforcement of three post-2015 global frameworks b) social inclusion and c) mainstreaming.** Since Government of Goa has notified State Specific Disasters into two Categories- Category A: Natural Disasters-Gusty Winds, Heavy Rains, Thunder & Lightning

Strikes/Cloudbursts, Floods, Landslides, Biological Hazards, Heatwave, Tsunami, Earthquakes, Category B: Human Induced Disasters-Fires including Forest Fires, Drowning Incidents, Landslides (Mining Areas), Industrial hazards, Boat Capsize, Road/Railway/Aircraft Accidents, Terrorism/Stampede/Riots, so the sections pertaining to these have been added accordingly. The following challenges of DRR have been discussed in some detail: **a) Climate Change Risks b) Livestock c) Environment and Wildlife d) Cultural heritage sites, their precincts and museums and e) Global Catastrophic Risks.** Another major feature added is the inclusion of time frames and providing an indicative grouping of various elements of the plan into the time frames. Based on feedbacks and intensive reviews, more details have been added to different sections.

Structure of the Plan

The SDMP has fourteen chapters:

1) Preliminaries,

2) Hazard Risks and Challenges,

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

4) Social Inclusion in DRR,

5) Mainstreaming DRR,

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

7) Building Disaster Resilience – Responsibility Framework, Part-B,

8) Preparedness and Response,

9) Recovery and Building Back Better,

10) Capacity Development – An Overview,

11) Financial Arrangements,

12) Strengthening Disaster Risk Governance,

13) International Cooperation, and

14) Maintaining, Monitoring and Updating the Plan.

Chapter 1
Preliminaries

1   **Preliminaries**

1.1 Rationale

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

The DM Act 2005 uses the following definition for disaster:

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

The SDMP provides a framework and direction to the government agencies for all phases of disaster management cycle (Fig. 1-1). 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 NDMP 2019 with the provisions of the Disaster Management (DM) Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, and other National Level Disaster Management Guidelines prepared by National Disaster Management Authority. The Plan lays emphasis upon the Disaster Management Strategy that the relevant Agencies – Central or State or District – will carry out disaster management activities in different phases in the disaster-affected areas depending on the type and scale of disaster.

Primarily, the State Government shall be responsible for Disaster Management in the State. However, in situations where the resources of the State are inadequate to cope effectively with the disaster situation, the State Government may 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 agencies will be to support the respective state governments. Barring exceptional circumstances, the state governments will deploy the first responders and carry out other activities pertaining to disaster management.
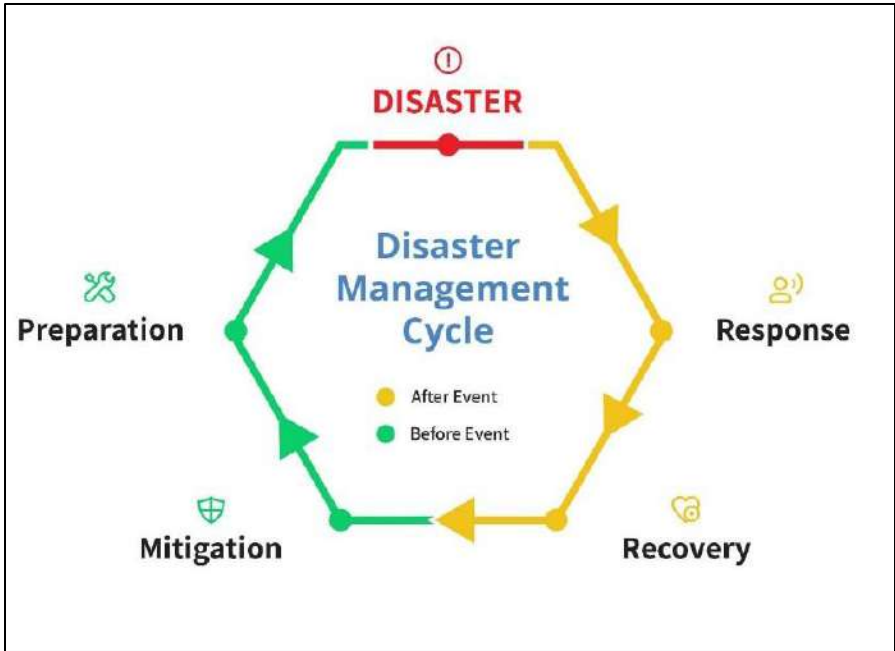
Figure 1-1: Disaster Management Cycle

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

The SDMP provides a framework with role clarity for rapid mobilization of resources and effective disaster management by the Central and State Governments and other concerned stakeholders in India. While it focuses primarily on the needs of the government agencies, it envisages all those involved in disaster management including communities and non-government agencies as potential users. The 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 National practices and State experiences, the plan will incorporate changes during the periodic reviews and updates.

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

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

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

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

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

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

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

1.2 Paradigm Shift

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

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

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

1.3 Main Pillars of the SDMP

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

I. Conforming to the national legal mandates – the DM Act 2005, NPDM 2009 and NDMP 2019
II. Participating proactively to realise the global goals as per agreements to which India is a signatory – Sendai Framework for Disaster Risk Reduction (SFDRR), Sustainable Development Goals (SDGs) and Paris Agreement on Climate Change – consistent with the international consensus for achieving mutual reinforcement and coherence of these frameworks
III. Prime Minister's Ten Point Agenda for DRR articulating contemporary national priorities
IV. Social inclusion as a ubiquitous and cross-cutting principle
V. Mainstreaming DRR as an integral feature

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

1.4 Legal Mandate

Sub section (1) of Section 23 of the DM Act 2005 mandates that there shall be a plan for disaster management for every State to be called the State Disaster Management Plan. The SDMP complies with the National Policy on Disaster Management (NPDM) of 2009 and conforms to the provisions of the DM Act making it mandatory for the various central ministries and departments to have adequate DM plans. While the SDMP will pertain to the disaster management for the whole of the State, however, as per clause (g), Sub-Section (2) of Section 38 of the DM Act, every ministry and department of the State Government shall ensure the preparation of disaster management plans in accordance with the guidelines laid down the National Authority and the State Authority, detailing how each of them will contribute to the State Level efforts in the domains of Disaster Prevention, Preparedness, Response, and Recovery. The Section 39 of the DM Act 2005, states that it shall be the responsibility of every department of State Government to integrate into their development plans and projects, the measures for prevention of disaster and mitigation.

As per the mandate of the DM Act 2005, the SDMP assigns specific and general responsibilities to all stakeholders/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 ministries to accept all the implicit and explicit responsibilities mentioned in the SDMP even if they are beyond what are explicitly mentioned in the normal rules of business. Disaster management requires assumption of responsibilities beyond the normal functioning. The SDMP will be complemented by separate contingency plans, SOPs, manuals, and guidelines at all levels of the multi-tiered governance system in the State.

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

The adoption in 2015 of three landmark global agreements - the Sendai Framework for Disaster Risk Reduction (UNISDR 2015a), Sustainable Development Goals (UN 2015) and COP21 Paris Agreement on Climate Change (UNFCC 2015) has opened the significant opportunity to build coherence across

DRR, sustainable development and response to climate change. The adoption of SDGs – 'Transforming Our World: The 2030 Agenda for Sustainable Development' is a global transformative plan of action that has poverty eradication as an overarching aim. It has, at its core, the integration of the economic, social and environmental dimensions of sustainable development. The Paris Agreement on global climate change points to the importance of averting, minimizing, and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.

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

Strong commitment to ambitious goals and accelerated implementation of these international agreements are global priority. Given the complementarities between the post-2015 agendas, synchronising and mutually reinforcing the actions in the three domains helps in better outcomes. Efforts must be made to ensure that each of them do not build in "policy risks" or, contradictory policies, that generate more - rather than less - risk in development. Promoting coherence and mutual reinforcement in all three agreements requires political recognition, monitoring, reporting and supporting partnerships at various levels. Recognising the emerging global consensus, the 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.

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

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

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

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

First, all development sectors must imbibe the principles of disaster risk management. This will ensure that all development projects - airports, roads, canals, hospitals, schools, bridges – are built to appropriate standards and contribute to the resilience of communities they seek to serve. Over the next couple of decades, most of the new infrastructure in the world will come up in Asia. This points to the need for ensuring that all the infrastructure development conforms to the best available standards of disaster safety. Such an approach is a smart strategy, which will pay off in the long term. It is necessary that all the public investments must incorporate disaster risk considerations. In India, the 'housing for all' programme and

'smart cities' initiative s represent such opportunities. India will work with other partner countries and stakeholders to build a coalition or mechanism for promoting disaster resilient infrastructure in the region. This will help generate new knowledge for hazard risk assessment, disaster resilient technologies and mechanisms for integrating risk reduction in infrastructure financing.

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

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

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

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

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

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

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

Ninth, ensure that the opportunity to learn from a disaster is not wasted. After every disaster there are studies and reports on lessons learnt that are rarely applied. Often the same mistakes are repeated. It is necessary to have a vibrant and visual system of learning. The United Nations could relief, rehabilitation, reconstruction and recovery afterwards. Post -disaster recovery is an opportunity to not just 'build back better' in terms of physical infrastructure, but also in terms of improved institutional systems for managing

risk. For this, it is necessary to put in place systems that can quickly provide risk assessments. India must work with partner countries and multilateral development agencies to establish a facility for technical support to post-disaster reconstruction of houses.

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

1.7 Social Inclusion

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

1.8 Mainstreaming DRR

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

1.9 Vision

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

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

1.10 Scope

As per the DM Act 2005, the SDMP shall include:
  a) the vulnerability of different parts of the State to different forms of disaster;
  b) the measures to be adopted for prevention and mitigation of disasters;
  c) the manner in which the mitigation measures shall be integrated with the development plans and projects;
  d) the capacity –building and preparedness measures to be taken;
  e) the role and responsibilities of each Department of the Government of the State in relation to the measure specified in clauses (b), (c) an (d) above;

f) the roles and responsibilities of different Departments of the Government of the State in responding to any threatening disaster situation or disaster.

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

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

The SDMP 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 Government of Goa-GoG has notified Incident Response System at State and District level to assign the nodal responsibilities for overall coordination of disaster management and for coordinating immediate post-disaster response. In addition, GoG has notified State Specific Disasters into two categories - Category A: Natural Disasters and Category-B: Human Induced Disasters. These notified Incident Response Teams-IRTs shall carry out the roles assigned to them. At the same time, each district and department must formulate respective DM plans specifying how each entity can contribute to effectively manage disasters.

1.11 Objectives

Along with the mandate given in the DM Act 2005 and the NPDM 2009, the SDMP-2024 has incorporated the national commitments in the domain of DRR associated with the three major post 2015 global frameworks and the PM's Ten Point Agenda. Accordingly, the broad objectives of the SDMP are:

1. Improve the understanding of disaster risk, hazards, and vulnerabilities
2. Strengthen disaster risk governance at all levels from local to State level
3. Invest in disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development
4. Enhance disaster preparedness for effective response
5. Promote "Build Back Better" in recovery, rehabilitation and reconstruction
6. Prevent disasters and achieve substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental)
7. Increase resilience, prevent the emergence of new disaster risks, reduce the existing risks and manage the residual risks
8. Promote the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures to prevent and reduce hazard exposure and vulnerabilities to disaster
9. Empower both local authorities and communities as partners to reduce and manage disaster risks
10. Strengthen scientific and technical capabilities in all aspects of disaster management
11. Capacity development at all levels to effectively respond to multiple hazards and for community-based disaster management
12. Provide clarity on roles and responsibilities of various Departments involved in different aspects of disaster management
13. Promote the culture of disaster risk prevention and mitigation at all levels
14. Facilitate the mainstreaming of disaster management concerns into the developmental planning and processes
15. Ensuring DRR is socially inclusive, gender sensitive and empowering
16. Build and strengthen the resilience of poor communities to prevent disasters aggravating poverty and to protect livelihoods
17. Enhanced mainstreaming of disaster risk reduction and climate adaptation strategies within the agriculture sector including sustainable farming
18. Special focus on disaster risk reduction measures for agriculture and livestock
19. Promoting resilient health systems to develop the capacities and resilience of communities to cope and recover from disaster impacts
20. Enhance the resilience of health systems by integrating DRR into all levels of health care

21. Promote disaster-resilient schools, colleges and other educational facilities
22. Promote women's leadership and active participation in disaster risk reduction
23. Strengthen efforts to mainstream DRR into water management and reduce the likely impacts of water-related hazards
24. Strengthening and promoting the resilience of new and existing critical infrastructure
25. Integration of disaster risk reduction considerations and measures into financial and fiscal instruments
26. Mainstreaming DRR into development and implementation of all projects and schemes (rural and urban)
27. Strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems
28. Promote comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios
29. Implementation of ecosystem-based approaches regarding shared resources, such as within river basins, mountainous regions and coastlines
30. Effective use of science, technology and traditional knowledge in all aspects of DRR

1.12 Time Frames – Short, Medium and Long-Term

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

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

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

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

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

In the case of recovery, there are three recovery periods after a disaster:
   a) **Early** – within eighteen months,
   b) **Medium** – within five years and
   c) **Long-term** – within five to ten years.
These depend on the specific disaster and are relevant only with reference to the types of recovery programmes. Hence, the SDMP discusses them only in general terms without timelines.

1.13 Types of Disasters

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

natural and human-induced disasters. The human society is also vulnerable to Chemical, Biological, Radiological, and Nuclear (CBRN) threats and events that might escalate to emergencies/ disasters.

1.13.1 Natural Hazards

The widely accepted classification system used by the Disaster Information Management System of DesInventar[3] classifies disasters arising from natural hazards into five major categories and is used globally for the Sendai targets monitoring:

1) **Geophysical:** Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Hydro-meteorological factors are important contributors to some of these processes

2) **Hydrological:** Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up

3) **Meteorological:** Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)

4) **Climatological:** Events caused by long-lived meso- to macro-scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)

5) **Biological:** Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

1.13.2   Human-Induced Disasters

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

1.14   Institutional Framework

1.14.1 State Level
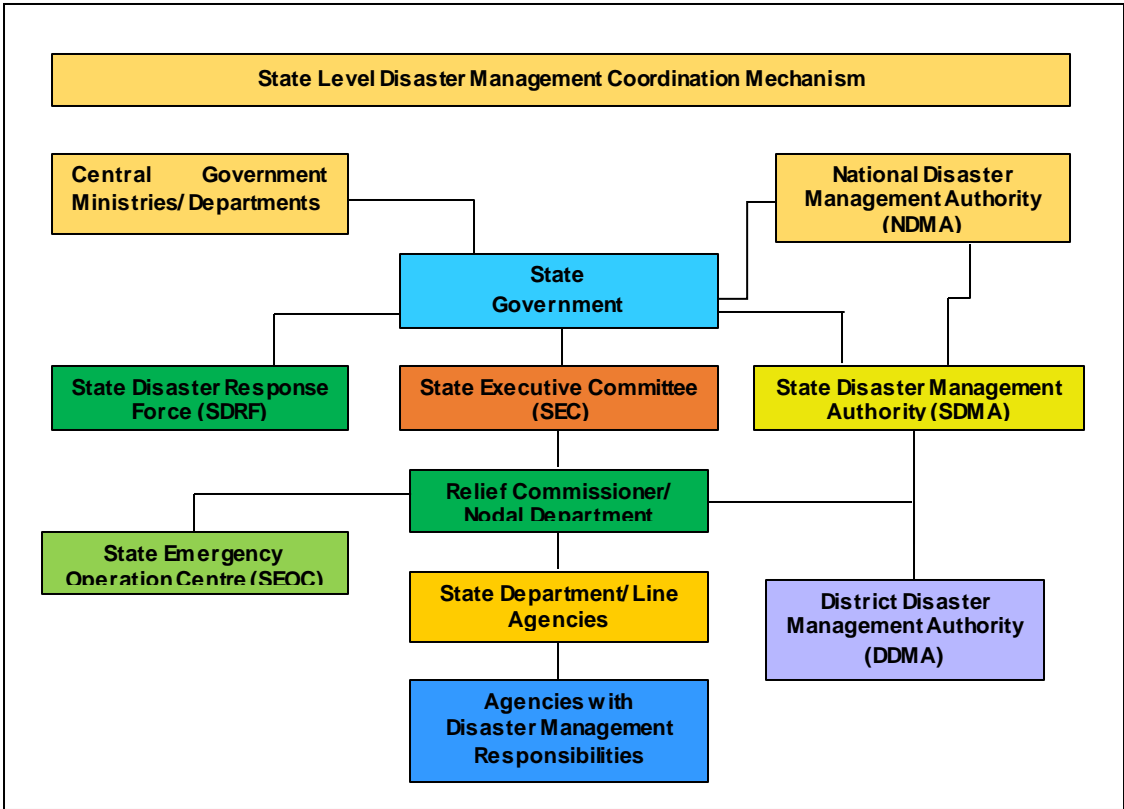
Figure 1-3: State-level disaster management - basic institutional framework
Note: The figure represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

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

The DM Act mandates the setting of a State Disaster Management Authority (SDMA) in the State. At the district level, District Disaster Management Authority (DDMA), the District Collector or District Magistrate or the Deputy Commissioner, as applicable, will be responsible for overall coordination of the disaster management efforts and planning. Figure -1-3 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, the State Government shall establish a State Disaster Management Authority (SDMA) or its equivalent as notified by the state government with the Chief Minister as the Chairperson. The SDMA will lay down policies and plans for DM in the State. The SDMA will approve the disaster management plans prepared by various departments. It will, inter alia approve the State Plan in accordance with the guidelines laid down by the NDMA, coordinate the implementation of the State Plan, recommend provision of funds for mitigation and preparedness measures and review the developmental plans of the different departments of the State to ensure the integration of prevention, preparedness and mitigation measures. The State Government shall constitute a State Executive Committee (SEC) to assist the SDMA in the performance of its functions. The SEC will be headed by the Chief Secretary to the State Government. The SEC will coordinate and monitor the implementation of the National Policy, the National Plan, and the State Plan. The SEC will also provide information to the NDMA relating to different aspects of DM.

Goa Disaster Management Rules 2008:

A. Composition of the State Disaster Management Authority[1]. –

(1) The State Authority may consist of the following members, namely: -

S. No.	Designation	Goa SDMA Composition
1	Chief Minister	Chairperson Ex. Officio
2	Revenue Minister	Vice Chairperson Ex. Officio
3	Chief Secretary	Chief Executive Officer Ex. Officio
4	Collector (North)	Member
5	Collector (South)	Member
6	Director of Fire & Emergency Services	Member
7	Director General of Police	Member
8	Principal Chief Engineer (PWD)	Member
9	Chief Engineer (Electricity)	Member
10	Principal Chief Engineer (WRD)	Member
11	Secretary (Revenue)	Member Secretary

(a) the Chief Minister of Goa, who shall be Chairperson, ex officio;

(b) such number of officials of the Government, not exceeding four, to be nominated by the Chairperson of the State Authority;

(c) such number of non-officials, not exceeding four, to be nominated by the Chairperson of the State Authority; possessing qualifications, knowledge and experience of scientific, engineering or Management aspect of flood control, environment etc.;

(d) the Chairperson of the State Executive Committee ex-officio Chief Executive Officer of the State Authority.

(2) The Chairperson of the State Authority may designate one of the members nominated under clauses (b) and (c) above to be the Vice-Chairperson of the State Authority. The Chairperson of the State Authority shall,

---

[1] Goa Disaster Management Rules_2008_Official Gazette Government of Goa

in case of emergency, have the power to exercise all or any of the powers of the State Authority but exercise of such power shall be subject to Ex-post facto ratification by the State Authority.

1. Term of office and conditions of service of members of the State Authority. –

(1) Save as otherwise provided by or under the Act, a non-official member of the State Authority other than the Chairperson, shall hold office for a period of three years from the date of his nomination. The term may be extended by the Government for further period not exceeding one year. Provided that a member shall, notwithstanding expiration of his term, continue to hold office until his successor enters upon his office.

(2) The term of office of an Official member nominated under clause (b) of sub-rule (1) of rule 3, shall cease to be member as soon as if he ceases to hold office under the Government.

2. Removal of a member of the State Authority. -
(1) The Government may, if it thinks fit, remove any member of the State Authority before expiry of the term of his office, after giving him a reasonable opportunity of showing cause against the same.

(2) A non-official member of the State Authority may, at any time, resign his office by writing under his hand addressed to the Chairperson of the State Authority and on acceptance of his resignation, the office of such member shall thereafter become vacant.

3. Filling up casual vacancy. -
A casual vacancy of a member in the State Authority shall be filled up by as fresh nomination and the person nominated to fill up a casual vacancy shall hold office only for the remainder of the term of the member in whose place he was nominated.

4. Allowances admissible to a member of an advisory committee constituted by the State Authority. - A member of an advisory committee constituted by the State Authority shall be entitled to TA/DA if he is non-official, as admissible to Class I Officer of the Government.

B. Composition of the State Executive Committee. – Subject to the provisions of the Act, the State Executive Committee, constituted by the Government to assist the State Authority shall consist of the following members, namely: -

S. No.	Designation	SEC Composition
1	The Chief Secretary to the Government	Chairperson Ex. Officio
2	The Secretary (P. W. D.)	Member Ex. Officio
3	The Secretary (Road and Transport)	Member Ex. Officio
4	The Secretary (Science and Technology)	Member Ex. Officio
5	The Secretary (Revenue)	Member Secretary Ex. Officio

5. Powers and functions of the Chairperson of the State Executive Committee. –
   (1) Subject to the provisions of the Act, the Chairperson, in addition to presiding over the meetings of the State Executive Committee, shall have powers to take all such measures as he deems necessary or expedient for the purpose of protecting, preventing any disaster and to provide all necessary assistance in implementation of the State plan prepared by the Government from time to time.

   (2) In particular and without prejudice to the generality of the provision of sub-rule (1), the Chairperson shall exercise such powers or take such measures in respect of all or any of the following matters, namely: -
      (i) coordinate action of the Government officers and other authorities: -

         (a) under the Act or the rules, made thereunder;

         (b) under any other law for the time being in force which is relatable to the object of the Act;

   (ii) planning and execution of the State wise programmes prepared for the prevention, control, abatement of any disaster in the State;

   (iii) inspection of affected area due to disaster and issuing such directions to authority or Officer or person as he may consider necessary to take appropriate steps for prevention relief control, abatement of disaster;

   (iv) to exercise such other powers and functions as delegated by the State Authority.

6. Procedure for transaction of business of the Executive Committee. –

(1) The meeting of the Executive Committee shall be held on such date as may be fixed by its Chairperson.

(2) The Chairperson shall, upon written request of not less than three members of the Executive Committee or upon a direction of the State Authority for the Government, as the case may be, call a special meeting of the Executive Committee.

(3) Eight clear days' notice of an ordinary meeting and two days' notice of a special meeting specifying time, the place at which such meeting to be held and an agenda of the business to be transacted thereat, shall be given by the Chairperson or any other officer of the Executive Committee.

(4) Notice of the meeting may be given to the member by delivering the same by messenger or sending it at his office or by such other manner as the Chairperson may, in the circumstances of the case, think fit.

(5) No member shall be entitled to bring forward for the consideration of meeting any matter of which he has not given five days' notice to the officer or Chairperson of the Executive Committee, as the case may be, unless the Chairperson in his discretion permit him to do so.

(6) If the Chairperson or presiding officer adjourns a meeting from day to day or any particular day, he shall give reason therefor and no fresh notice shall be required for such adjourned meeting.

7. The Chairperson to preside over the meeting. -
Every meeting of the Executive Committee shall be presided over by the Chairperson and in his absence, by a presiding officer to be elected by the members present from amongst themselves.

8. All questions to be decided by the majority. –
(1) All questions or issues at a meeting shall be decided by a majority of votes of members present and voting shall be by raising of hands in favour of the proposal.

(2) In case of an equality of votes, the Chairperson or Presiding Officer shall have a second or casting vote.

9. Quorum. –
(1) Three members of the Executive Committee shall form the quorum for any meeting.

(2) If, at any time fixed for any meeting or during the course of any meeting, a quorum is not present, the Chairperson or the Presiding Officer shall adjourn the meeting for twenty minutes and if a quorum is not available after the expiration of twenty minutes from such adjournment, the Presiding Officer shall adjourn the meeting to such time on the following day or on such other future date as he may fix.
(3) No matter which had not been on the agenda of the original meeting shall be discussed at such adjourned meeting.

10. Minutes. –
(1) Records of proceedings of every meeting alongwith the names of members who attended the meeting shall be kept by the office of the Executive Committee as specified by the Chairperson, in a book maintained by him exclusively for the purpose.

(2) The minutes of the previous meeting shall be read at the beginning of every succeeding meeting and shall be confirmed and signed by the Chairperson or Presiding Officer at such meeting.

(3) The proceedings shall be open to inspection by any member at the office of the Executive Committee, Secretariat, during office hours.

11. Maintaining order at meeting. –
(1) The Chairperson or Presiding Officer shall preserve order at a meeting.

12. Transaction of business at a meeting. –
(1) No business shall be transacted in the meeting without any quorum.

(2) Except with the permission of the Chairperson or presiding officer no business which is not entered in the agenda or of which notice as not been given by a member under sub-rule (5) of rule 10 shall be transacted at any meeting.

(3) At any meeting, the business shall be transacted in the order in which it is entered in the agenda circulated to the members under sub-rule (3) of rule 10.

(4) Either at the beginning of the meeting or after the conclusion of the debate on a motion during the meeting, the Chairperson or Presiding Officer or member may suggest a change in the order of business as entered in the agenda and if the majority of the members present agree, the Chairperson or Presiding Officer shall agree to such change.

13. Remuneration of expert. –
Any person associated as an expert with any Committee or sub-Committee shall be paid such daily allowance and also travelling allowance at such rate as is admissible to Grade I or Class I Officer of the Government for each day of the actual meeting of the Committee which he attends or such honorarium/fee as fixed by the Government as it deems fit.

District Disaster Management Authority (DDMA):

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

C. Composition of District Disaster Management Authority. –
(1) Sub to the provisions of the Act, the District Disaster Management Authority (hereinafter referred to as the "District Authority") constituted by the Government for North Goa District, and for South Goa District, shall consist of the following members, namely:

(I) North Goa District, Disaster Management Authority: -

S. No.	Designation	North DDMA Composition
1	Collector of North Goa District	Chairperson Ex. Officio
2	Mayor of the Corporation of City of Panaji	Co- Chairperson Ex. Officio
3	Chairman of North Goa District, Zilla Panchayat, North-Goa	Co-Chairperson Ex. Officio
4	Superintendent of Police North-Goa	Member Ex. Officio
5	Director of Health Services, Directorate of Health Services	Member Ex. Officio
6	Director of Panchayats	Member Ex. Officio
7	Director of Municipal Administration	Member Ex. Officio
8	Additional Collector of North Goa District	Chief Executive Officer

(II) South Goa District, Disaster Management Authority: -

S. No.	Designation	South DDMA Composition
1	Collector of South Goa District	Chairperson Ex. Officio
2	President of Margao Municipal Council	Co- Chairperson Ex. Officio
3	Chairman of South Goa District, Zilla Panchayat	Co-Chairperson Ex. Officio
4	Superintendent of Police South-Goa	Member Ex. Officio
5	Medical Superintendent Hospicio Hospital, Margao	Member Ex. Officio
6	Deputy Director of Panchayats	Member Ex. Officio
7	Deputy Director of Municipal Administration	Member Ex. Officio
8	Additional Collector of South Goa District	Chief Executive Officer

1. The Chief Executive Officer of the District Authority shall be Member Secretary of the District Authority.

2. Powers and functions of the Chief Executive Officer. –
(1) Subject to the provisions of the Act, the Chief Executive Officer, in addition to powers delegated to him by the District Authority, shall have power to take all such necessary measures as he deems necessary or expedient for the purpose of prevention or mitigation of disaster and for providing all necessary assistance in implementation of district plan in the District.

(2) In particular and without prejudice to the generality of the foregoing powers, the Chief Executive Officer shall exercise such powers and perform such functions in respect of all or any of the following matters, namely: -

   (a) collection and this dissemination of information in respect of matter relating to any disaster likely to be affected in the District;

   (b) co-ordinate action of the Government Officers and other authorities under the Act, and the rules made thereunder;

   (c) give instructions to different authorities at the Taluka levels as well as at the District levels to take such necessary measures or preventive actions in order to avoid any disaster in the area there of;

   (d) direct such persons or authority to desist from taking such action as is likely to cause hardship to the people in an area affected by disaster;

   (e) to inspect an area affected by disaster and to ascertain for the propose of determining whether and if so, in what manner, any function to be performed by the authority concerned or whether any provisions of the Act or the rules made thereunder or any notice, order, direction or authorization served, made, given or granted under the Act is being or has been complied with;

   (f) to maintain proper record, relating to meeting of the District Authority;

   (g) to assist the Chairperson of the District Authority in performance his functions;

   (h) to take follow up action, to ensure that decisions taken in the meeting of the District Authority are implemented time;

   (i) to exercise such powers and discharge such functions as assigned by the District Authority from time to time.

1.15   Plan Implementation

The DM Act 2005 enjoins State Government to make provisions for the implementation of the disaster management plans. In this respect, the sections of the DM Act 2005 applicable for state, and district DM plans are 23, and 31. The Chapters V and VI of the DM Act spell out the responsibilities of the state, and local governments with respect to disaster management. The DM Act states that each 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 outs the priorities, time frames and defines the Thematic Areas for DRR along with Sub-Thematic Areas that must be implemented in a highly distributed, decentralised and coordinated manner by the central and state governments. It is *not* one omnibus plan that must be implemented by one agency with using one overarching budget; instead it is one that must be financed from the union and state budgets through various ministries and government agencies. The centrally allocated finances are limited to 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 States and State -level agencies, there cannot be a separate financial allocation for it.

The Act mandates that each District must prepare a DMP in accordance with the SDMP. Respective DM authorities must regularly review and update their DM plans. DDMAs will integrate DRR into their all development activities. 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 SDMP 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 SDMP applies to all those working for disaster risk reduction in the State, be it government, private, not for- profit entities.

The plan is highly ambitious and the complete implementation of all elements across the State 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 DM plans at Departmental and District level must be made in accordance with SDMP-2024 and consistent with it in terms of goals and timeframes. It is not possible to give an exhaustive list of activities envisaging all the disaster risk reduction functions pertaining to all the tiers of government (State, District and local) and all other stakeholders. Hence the DDMAs and Line Departments should go beyond the activities mentioned in this document in identifying activities based on the context for pro-active disaster risk reduction using SDMP as a guide rather than as a final word.

45

Chapter-2
Hazard Risks and Challenges

2

Hazard Risk and Challenges

2.1 Background:

Goa is a multi-hazard prone western coastal State of India with a hot and humid climate for most of the year. Goa covers an area of 3702 square kilometres and comprises of two Revenue Districts-North Goa and South Goa which are further divided into 12 into talukas. Boundaries of Goa State are defined in the North by Terekhol river which separates it from Maharashtra, in the East and South by Karnataka State and West by Arabian Sea. The state has a literacy rate of 88.70%. The State's main industries include tourism, agriculture, and mining. The State is known for its beaches, temples, and churches, and is a popular tourist destination in India. The State has a coastline of 105 Km.

Table 2.1: Goa-General Profile

S.No.	Feature	Description
1.	Geographic Location	N 14˚53'57'' and N 15˚47'59'' latitudes and E 73˚40'54'' and E 74˚20'11'' longitudes
2.	Date of Formation	30th May 1987
3.	Area	3,702 Km² (1,429 sq mi)
4.	Altitude	Sea level to 1,022 mts.
5.	States sharing border	Maharashtra & Karnataka
6.	Capital	Panaji
7.	Districts	02
8.	Talukas	12
9.	Villages	320
10.	Panchayats	191
11.	Municipalities	13
12.	Corporations	1
13.	Sex Ratio	973
14.	Density/Km²	394
15.	Climate	Hot and Humid
16.	Literacy	88.70 %
17.	Human Development Index (HDI)	0.779
18.	Gross State Domestic Product (GSDP)	Rs. 53,959.86 crores
19.	Net State Domestic Product (NSDP)	Rs. 29,396 crores
20.	No. of Industrial Estates	24
21.	No. of operating industrial units	~ 4000 units
22.	Power demand	~ 500 MW
23.	Road network	10,768 km (260 km National Highways)
24.	Rail Network	167 km (156 km- Konkan Railway and 69 km-South Western Railway)
25.	Navigable internal waterways	255 km
26.	Ports	1 Major (Mormugao), 5 Minor
27.	No. of airports	2 (Dabolim and Mopa)
28.	No. of bank branches	668

2.4
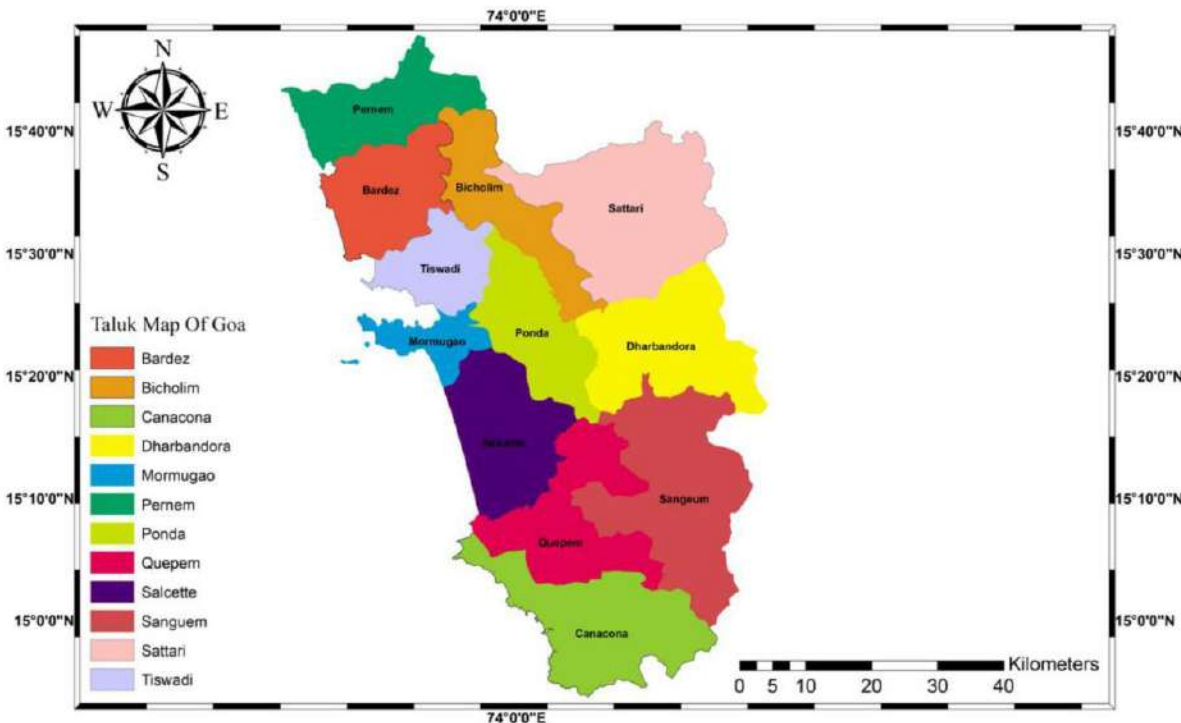
Figure 1: Map showing Talukas of Goa
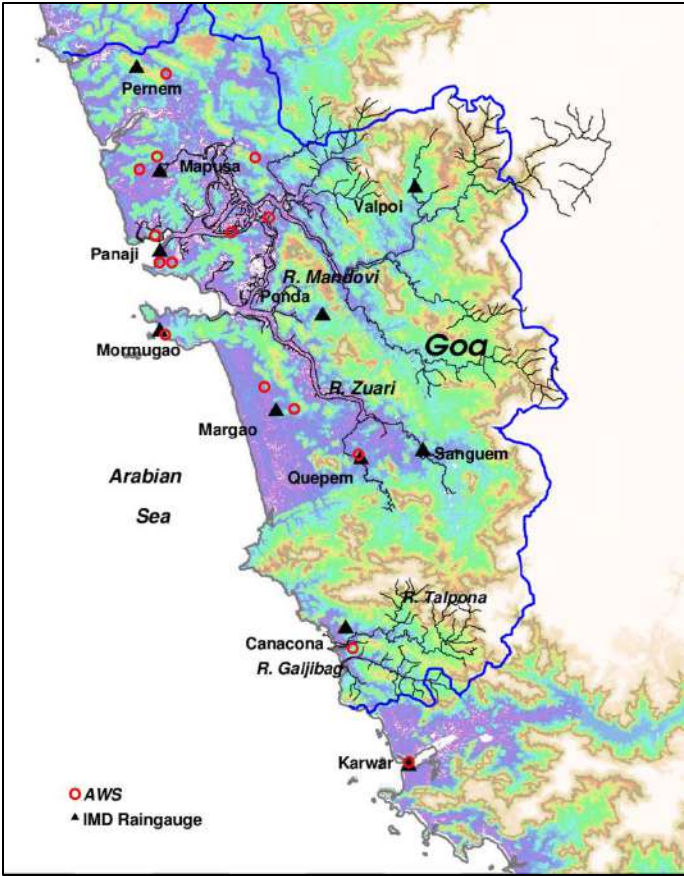
Figure 2: The topographic map (topography from SRTM DEM) of Goa and its surroundings.
The colour scale at the top of the figure gives topography (elevation in m). The blue line marks the border of Goa. Locations at which rainfall data are available are also shown on the map (black triangles are India Meteorological Department rain-gauge stations and red circles are Indian Space Research Organisation's Automatic Weather Stations (AWSs).

Social Profile

2.4.1   Religion

Majority of the population in the state practices Hinduism. Religion wise population of the state is mentioned in Table 2.2.

Table 2.2: Percentage of population by religion in the State

Religion	Percent of Total Population
Hindu	66.08%
Christian	25.10%
Muslim	8.33%
Sikh	0.10%
Buddhist	0.08%

Jain	0.08%
Other Religions	0.02%

2.4.2 Caste and Tribe

Goa is one of the four states (Himachal Pradesh, Sikkim, Arunachal Pradesh, Goa) where the increase in the population of SC/ST has been more than 1% from 2001 to 2011 Census. The population has increased from 0 % in 2001 to 10% in 2011 and includes tribal population of Kunbi, Gawda and Velip.

2.5   Economic Profile[2]

GSDP: Goa's GSDP (at constant prices) is estimated to grow by 4.7% in 2021-22, as compared to a growth of 1.6% in 2020-21. In 2021-22, India's GDP (at constant prices) is estimated to increase by 8.7% (against a contraction of 6.6% in 2020-21).

Sectors: In 2021-22, at current prices, agriculture, manufacturing, and services sectors are estimated to contribute 7%, 49%, and 44% of the economy respectively. In 2021-22, agriculture, manufacturing, and services sectors are estimated to grow (at constant prices) by 10.2%, 3.9%, and 6% respectively.

Per capita GSDP: The per capita GSDP of Goa in 2021-22 (at current prices) was Rs 5,44,865; 8% higher than the corresponding figure in 2020-21. In 2021-22, per capita GSDP of Goa was higher than the per capita GDP at the national level (Rs 1,72,913 at current prices).

Table 2.3: GSDP of Goa in 2021-22   **Source:** Goa Budget Documents 2022-23; PRS.

Items	2020-21 Actuals	2021-22 BE	2021-22 RE	% change from BE 21-22 to RE 21-22	2022-23 BE	% change from RE 21-22 to BE 22-23
Total Expenditure	17,957	24,733	26,419	7%	24,274	-8%
(-) Repayment of debt	3,819	2,264	2,264	0%	2,583	14%
Net Expenditure (E)	**14,138**	**22,469**	**24,154**	**8%**	**21,691**	**-10%**
Total Receipts	18,191	21,088	21,819	3%	22,960	5%
(-) Borrowings	6,783	4,494	4,394	-2%	5,571	27%
Net Receipts (R)	**11,408**	**16,594**	**17,424**	**5%**	**17,388**	**0%**
Fiscal Deficit (E-R)	**2,730**	**5,875**	**6,730**	**15%**	**4,303**	**-36%**
as % of GSDP	2.96%	6.57%	7.53%	4.71%		
Revenue Balance	**-665**	**58**	**-19**	**-133%**	**434**	**2348%**
as % of GSDP	-0.72%	0.07%	-0.02%	0.48%		
Primary Deficit	**1,069**	**3,981**	**4,836**	**21%**	**2,314**	**-52%**
as % of GSDP	1.16%	4.45%	5.41%	2.53%		

Note: Positive revenue balance indicates a revenue surplus while negative revenue balance shows a revenue deficit.
BE is Budget Estimates; **RE** is Revised Estimates.

2.5.1   Main Occupation

The per capita GDP of Goa is two and a half times than that of the nation, making it one of the richest States in the country. Goa solely demands 12.5% of the tourism of India, making tourism one of the main sources of revenue for the State. The population of the State doubles during certain months due to influx of tourists. The Economy of Goa has grown at a rapid pace in the past twenty years and depends on agriculture, mining, industrial and tourism sectors.

2.5.2 Sectors of Economy

2.5.2.1 Tourism Sector

The Economy of the State largely depends on the tourism sectors because of the high tourist influx in the state. In 2010, more than 2 million tourists visited the coastal areas of Goa and 1.4 million visited the inlands. Goa alone handles 12% of the foreign tourists arriving in the country, making tourism sector, its primary industry. Goa has two main tourist seasons – summer and winter. Foreign tourists mainly come during the winter season due to the pleasant climate and in summers, tourists from India come to Goa to spend their holidays.

The State has a very low excise duty on alcohol, making it relatively inexpensive. This draws many young tourists from around the globe looking for economical holidays. Along with this, the pristine beaches, cultural festivals, Gothic churches and temples draw a lot of tourists to the State. The Portuguese, Dutch and British influence has led to a blend of religion and ethnic history, garnering much appreciation from Indian and foreign tourists.

---

[2] PRS Legislative Research

2.5.2.2 Mining Sector

Mining is the second biggest industry in the State. Goa is the leading producer and exporter of iron ore, manganese, bauxite, high magnesia, limestone and clay. Thus after tourism, the mining industry thrives in Goa. Thus, mining has given a major boost to the economy of Goa and provided employment opportunities to many. Most of the mines are located in Northern and Eastern Goa while Marmagoa port handles the mine extracts. It is responsible for handling over 39% of the country's Iron Ore exports.

2.5.2.3 Agriculture Sector

Agriculture has been losing its importance over the past years, but it still is a source of livelihood for majority of the people in Goa. Rice is the principle agricultural crop grown. Other important crops include paddy, ragi and maize. Various cash crops like cashew nuts, mango, jackfruit, bananas, and pineapple are also grown in abundance. Cashew nuts are used for production of feni, an intoxicating drink. Canals, rivers, tanks and streams constitute the main source of irrigation.

2.5.2.4 Industrial Sector

The Industrial sector includes various manufacturing units of tyres and tubes, pesticides, fertilizers, iron ore pellets, wheat products, pharmaceuticals, steel rolling, sugar, footwear, fish canning, textiles, leather, bamboo crafts, handloom and brewery products.

2.5.2.5 Fisheries

Fishing was a hereditary occupation, long established in the Goan culture. But in recent times, the employment generated by the sector has reduced due to fall in catch and dependence on technological advancements like large scale mechanized trawling.

Goa has witnessed steady growth over the past few years because of steady growth of tourism industry and a strong mining industry backed by the agricultural sector.

2.6 Climate

2.6.1 Summers in Goa

Summers in Goa are usually hot and humid with the month of May being the hottest at 35°C during the day. The nights are not much different; however, some nights might be cooler depending upon the winds.

2.6.2 Monsoons in Goa

Monsoon is the main season in Goa that starts from the month of June till the month of September. The month of July receives the highest amount of rainfall while the month of February is the driest. Most of Goa's annual rainfall is received during the monsoon season only.

2.7 Cultural Profile

Goa's distinct culture is evident from the dress, language, religion and cuisine. There is also a fusion of western and Indian folk culture in their music, dance and in the celebrations of festivals. This small territory became a part of India only in 1961 but the 400-odd years of Portuguese rule are still apparent from the lifestyle of the people. Goa was a Portuguese colony till 1961. Panaji is the capital of Goa and is the third largest city after Vasco and Margoa.

Goa is one of India's most popular holiday destinations, with its idyllic beaches, lush paddy fields, coconut plantations and villages dotted with pretty white washed churches and grand mansions. Its other attractions include the Hindu temples around Ponda and magnificent cathedral of old Goa.

2.7.1 Languages[3]

Konkani is the mother-tongue of Goans – the people of Goa. It is also the State's Official Language having been recognised as so in 1976 and is also one of the languages recognised in the constitution of India.

---

[3] Department of Tourism, Govt. of Goa.

2.7.2 Dance[4]

The Veerbhadr is a form of ritualistic dance popular during the Shigmo in central region. The ritual of this dance has a deep meaning. The torch bearing Veerbhadra signifies the light giver and the sword wielding the protector. The dance assures light and protection to the people. The ritual dance having a southern origin has acquired a distinct place in Goa's cultural life, as most townships in central region were under the rule of some or the other Southern Kings in the distant past. The significant dance form known as Talgadi is everywhere in Goa. The other forms are Tonyo, Goff; Morulo and Diwlyam nach at few places.

2.7.3 Food

Goa has a great cuisine with fish, fish-curry with rice (xit-codi) occupying a central position. A variety comprising of shell fish, lobsters, prawns, sweets like bebinca, mangane, curries like sol-kadi, dry salted fish, cashew nuts etc.

2.7.5   Fairs and Festivals[5]

Goa has some unique festivals like Shigmo. Carnival was introduced by the Portuguese. Dhalo, Musal Khel, Tonyamel, Goff, Veerbhadra, Zagor are the unique folk dances and folk songs of Goa. She has historic temples like Mangueshi, Shantadurga, Kavlem, Mahalasa - Mardol, Devki Krishna-Marcela, Kamaxi-Shiroda, Budbudyanchi talli at Netravali, Mahadeva temple at Tambdi Surla, Saptakoteshwara at Narva-Bicholim and historic mosques like the Safa Masjid at Ponda.

2.8   Geophysical Profile:

The State of Goa has a hilly terrain especially on its eastern side, where lies the southern end of the Sahyadri ranges. These mountains, after skirting a considerable portion of the north-eastern and south-eastern boundaries, branch off westward across the State with many spurs and ridges. The terrain is interspersed by several rivers flowing westwards, which provide a network of internal waterways. The important rivers are Mandovi, Zuari, Terekhol, Chapora, Sal, Betul and Kushavati. The rivers are navigable for a total length of 256 Kms. The coast is full of creeks and estuaries formed by these rivers which provide a good shelter for fishing crafts. The 105 km long coastal line of Goa is endowed with some of the loveliest beaches in the world which have earned the frame of bearing idyllic beauty spots.

The land elevation ranges from sea level to 1022 meters. The highest point is the Wagheri hills in Sattari taluka. The natural vegetation of Goa consists of dense forest and dry deciduous to moist deciduous type. Moderately sloping lands with laterite outcrops are covered by grass and shrubs. The habitat of the flora is of semi-evergreen type. Evergreen forests are seen only on high hills. The vegetation consists of trees, shrubs, herbs climbers, sedges and grasses. The coastal tracts are namely covered by palms and mangroves. Goa receives rains from the southwest monsoons. The average annual rainfall of the State, as recorded is 2776.9 mm. The rainy season is spread over four months from June to September. Occasional thundershowers are experienced in May and October. Goa experiences a warm and humid tropical climate. The summer temperature ranges from 24°C to 36°C. In winter, the mercury hovers between 21°C to 30°C. Due to the Global Warming effect, the picture seems to be slightly changing.

Goa receives rains from the South West monsoons. The average annual rainfall of the State, as recorded is 2776.9 mm. Rainy season is spread over four months from June to September. Occasional thunder showers are experienced in May and October. Goa experiences warm and humid tropical climate. The summer temperature ranges from 24°C to 36°C. In winter, the mercury hovers between 21°C to 30°C. Due to Global Warming effect, the picture seems to be slightly changing.

---

[4] Directorate of Art and Culture, Government of Goa, India
[5] Directorate of Art and Culture, Government of Goa, India

Figure 3: Geographical zones of Goa

2.8.1 Forest Profile:

Forests of Goa form the part of Western Ghats, the region which have been internationally recognized as Biodiversity Hotspot of the world owing to its rich flora and fauna. Most of the Goan forests are located in the eastern region of the state. The forests of Goa are known for their grandeur and majesty. They are like a green pearl of the tourist paradise state. From Moist Mixed Deciduous Forests to Sub-Tropical Hill Forests, from Semi-Evergreen Forests to Evergreen Forests. The forests are the life supporting systems of the State as they are the store house of precious rivers & other natural resources.[6]
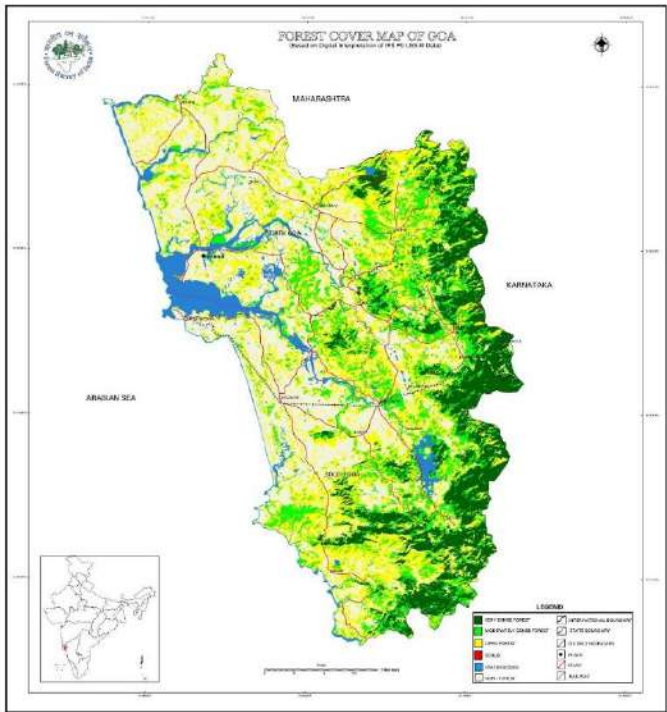
Figure 4: Forest Cover Map of Goa
Source: Goa Forest Department

The State has a Forest Area of **2219 Km²** which is 59.94 % of the State's total geographical area (3720 Km²). **Table 1** mentioned the area covered by different types of forests in the State.

Table.2.4: *Areas covered by different types of forests in the State.*

				Area in Km2
Altitude Zone	Very Dense Forest	Moderately Dense Forest	Open Forest	Total Area
0-500m	444	561	1058	2063
500-1000m	99	24	33	156
Total	543	585	1091	2219
			Source: Goa Forest Department	

---

[6] Goa Forest Department

Climate Change Scenario:

Goa's mean annual temperature has increased by over 1°C since the beginning of the 20th century till date (1901-2018), much of it during 1990-2018 period. The mean annual rainfall in Goa has increased by 68% over the period 1901-2015. With increasing rainfall, the inter-annual rainfall variability in the state has also increased especially since 1970s. While mean annual rainfall in the state has increased, moderate to light rainfall days (IMD category I) in Goa have declined over 1901-2015 period, whereas very heavy and exceptionally heavy rainfall events (IMD category III) in the state have increased by a dramatic more than 100%.

Mean annual temperatures in Goa may increase by around 2°C in 2030s compared to 1901-1950 period, and further to by around 4°C by 2080s under high emission scenarios. Goa will start experiencing heat waves (>40C) beyond the 2040's, as maximum temperature increases by about 5°C towards the century end under high emission scenarios. Minimum temperatures are expected to rise even more by up to 8°C by the century end under the high emission scenarios.

Below shows the mean annual temperature map of Goa over the long-term period of 1951-2014. Mean temperature in Goa is found to be 26.70ºC, which is higher than the national average annual temperature i.e. 23.3ºC (Chaturvedi et al 2012). While spatial temperature variability is not high in Goa, hilly areas in the Eastern parts of the State are generally cooler than the coastal areas in the West.
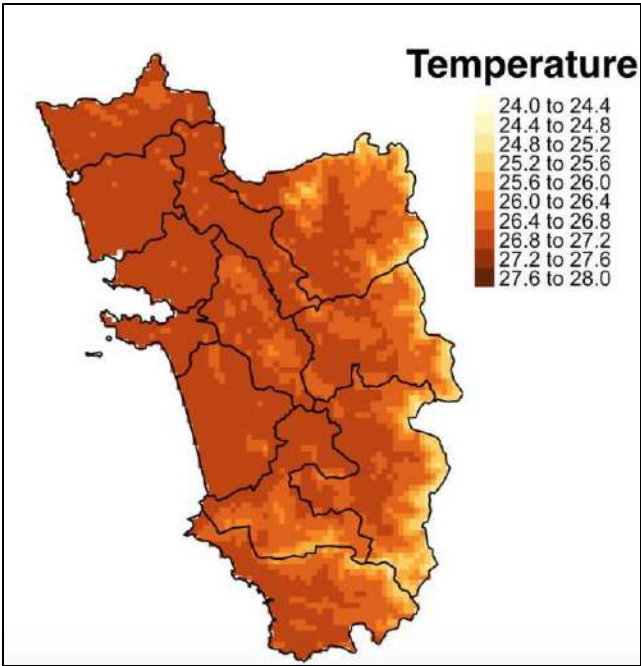
Figure 5: Long period average (1951-2014) spatial distribution of mean temperature (C) in Goa

Goa experiences a hot summer (April- June) followed by pleasant monsoon (June-September) season, temperatures temporarily rise again in the month of October, following pleasant winter months (November to March). **Figure 5** shows the mean monthly temperature profile in the Goa, based on the long-period mean temperature average over the period 1951-2014.[7]

---

[7] **State Action Plan on Climate Change for The State of Goa for Period of 2020-2030**
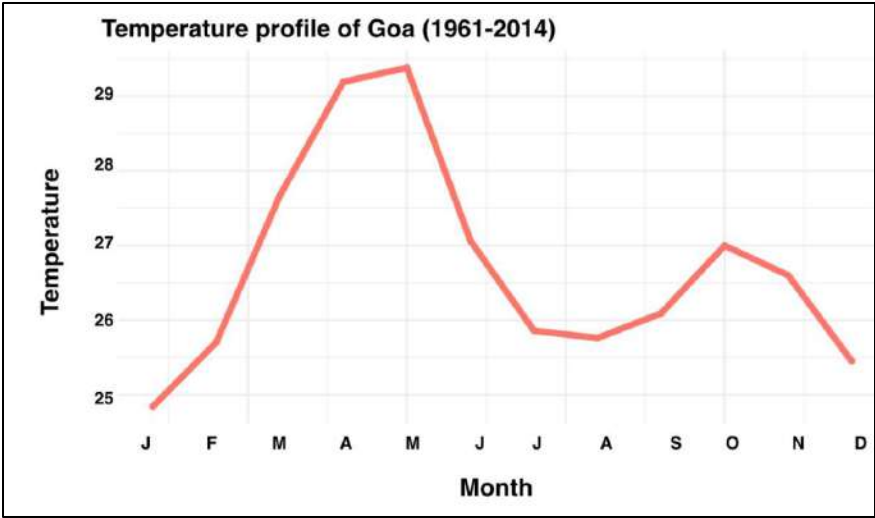
Figure 6: *Long-period average (1951-2014) annual temperature profile in Goa*

1.1   TEMPERATURE PROFILE OF GOA[8]:

The monthly, seasonal and annual maximum, minimum and mean temperature anomalies averaged over the State of Goa for the year 2023 is given in the **Fig. 7.** The anomalies were computed based on the LPA for the period 1981-2010. Top 10 warmest/coolest months/seasons are marked on the graph. It may be mentioned that apart from the whole year, some individual months viz. February, March, June & August and the premonsoon season as a whole was the
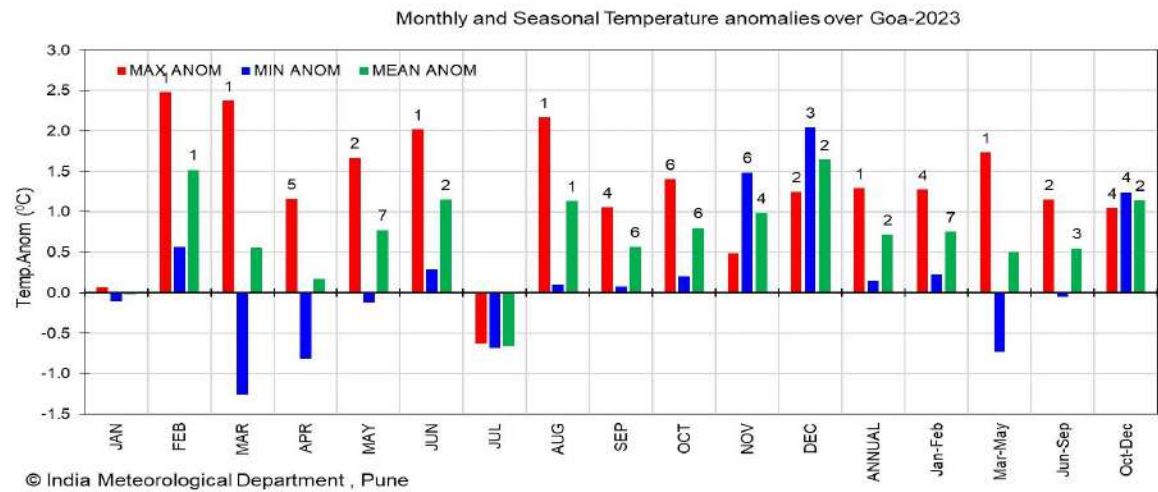
Fig. 7: Monthly and Seasonal Maximum, Minimum and Mean Temperature anomalies averaged over Goa during 2023.

warmest since 1901.State was relatively cooler in terms of minimum temperature during the premonsoon season. The mean temperature for the state was warmer than the average by +0.720C (2nd warmest year on record since 1901). The annual maximum and minimum temperature averaged over the state during the year 2023 were warmer by 1.290C (warmest since 1901) & 0.150C (23rd warmest since 1901) respectively.

---

[8] STATEMENT ON CLIMATE FOR THE STATE OF GOA: 2023 ISSUED BY IMD PUNE

The Spatial pattern of Annual Maximum, Minimum and Mean Temperature anomalies over Goa during 2023 is given in **Fig 8.** The maximum temperature was above normal by 1 to 20C while minimum temperature was near normal (anomaly between 0 to 0.50C) over most parts of the state. Over all mean temperature was above normal by 0.5 to 1 0C over most parts of the state.
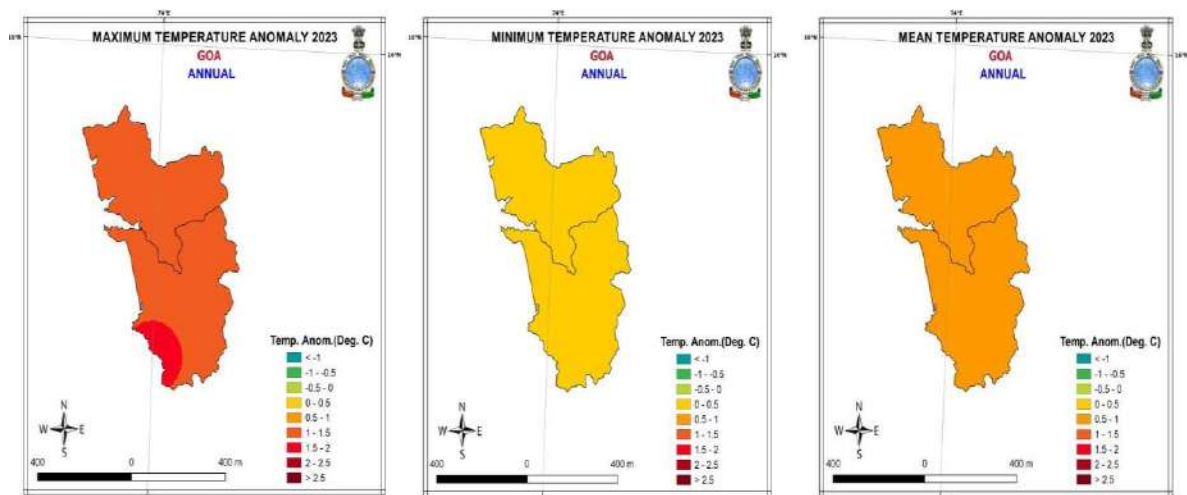
Fig. 8: Spatial pattern of Annual Maximum, Minimum, and Mean Temperature anomalies over Goa during 2023

The time series of variation of annual maximum, minimum and mean land surface air temperature anomalies averaged over the State for the period 1901-2023 is given in **Fig 9**. A significant
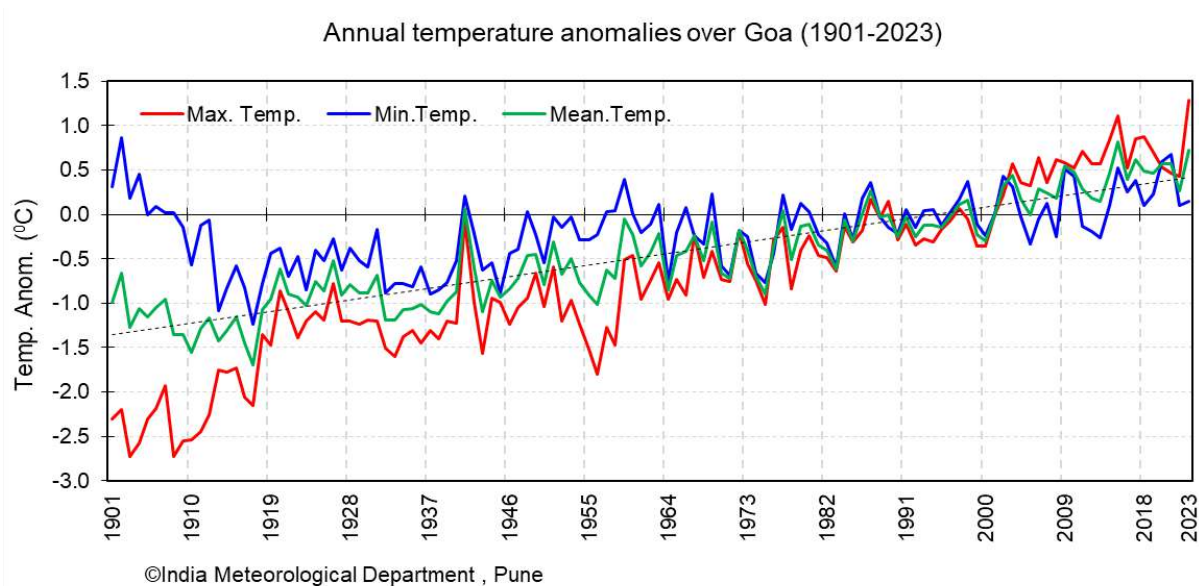
Fig. 9: Annual maximum, minimum and mean land surface air temperature anomalies averaged over the State of Goa for the period 1901-2023.The anomalies were computed with respect to the base period of 1981-2010. The dotted black line indicates the linear trend in the annual mean temperature time series

increasing trend of 1.45 0C/100 years is observed in the State averaged annual mean temperature for the period 1901-2023. It was more significant in respect of maximum temperature (+2.40C/100 years) and relatively less significant (+0.510C/100 years) in respect of minimum temperature. The five warmest years on record in order for Goa are 2015(anomaly+0.816°C), 2023(+0.719°C), 2017(+0.615°C), 2021(+0.571°C) and 2020(+0.565°C).

Fig. 10(a and b) shows daily variation of minimum and maximum temperature anomaly during the year respectively. The anomalies were computed with respect to the base period of 1981-2010. State was considerably warmer in respect of minimum temperature during November & December months and cooler during March, April & July months. Except for July month, the state was considerably warmer in respect of maximum temperature almost during the entire year.
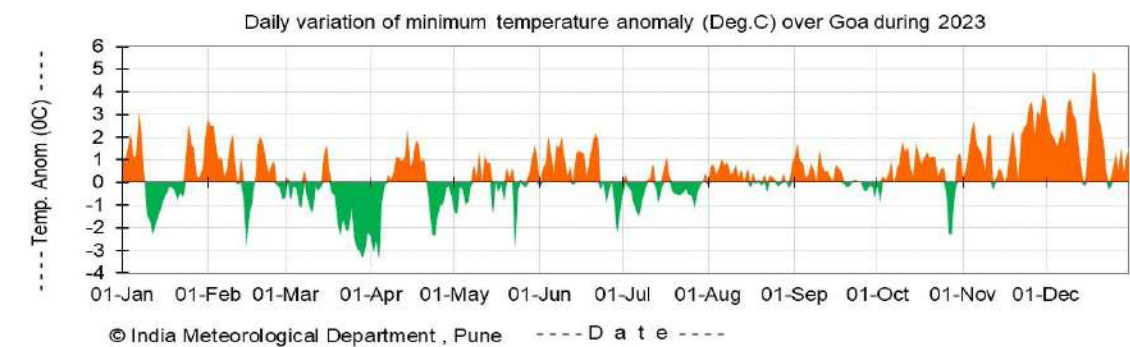
Fig. 10(a): Daily variation of minimum temperature anomaly (⁰C) over Goa during 2023
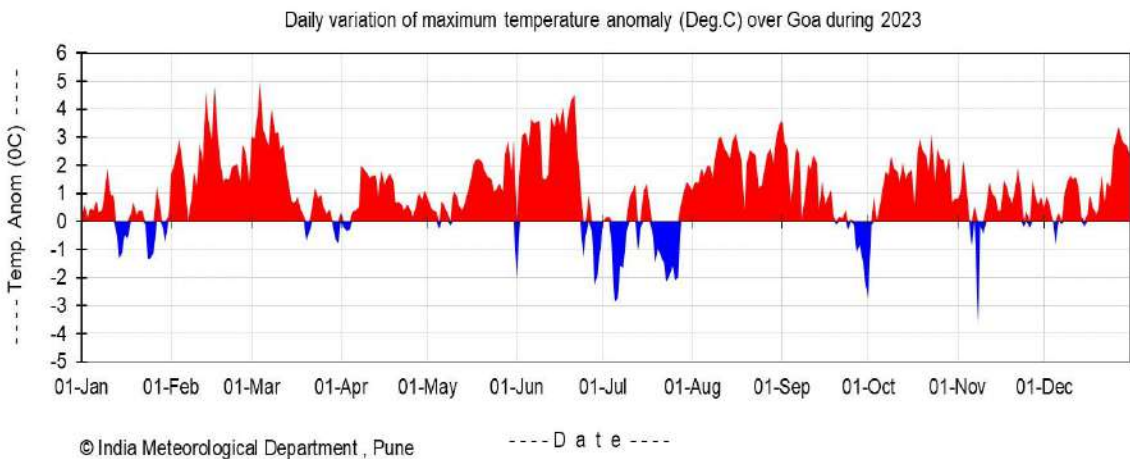
Fig. 10(b): Daily variation of maximum temperature anomaly (⁰C) over Goa during 2023

Rainfall Profile of Goa

Based on 1971-2020 climatology, Goa state as a whole receives no rainfall during the winter season (Jan-Feb), 2.2% during the Pre-Monsoon season (Mar-May), 91.7 % during the southwest monsoon season (Jun-Sept) and 6% during the Post-Monsoon season (Oct-Dec). Thus, Southwest monsoon season is the principal rainy season for the state. **Fig. 11** shows the annual percentage departure of rainfall over different districts of Goa during 2023. The anomalies were computed based on the 50 year LPA for the period 1971-2020. The two districts of the state received normal rainfall (-19% to +19% of its 1971-2020 period LPA).
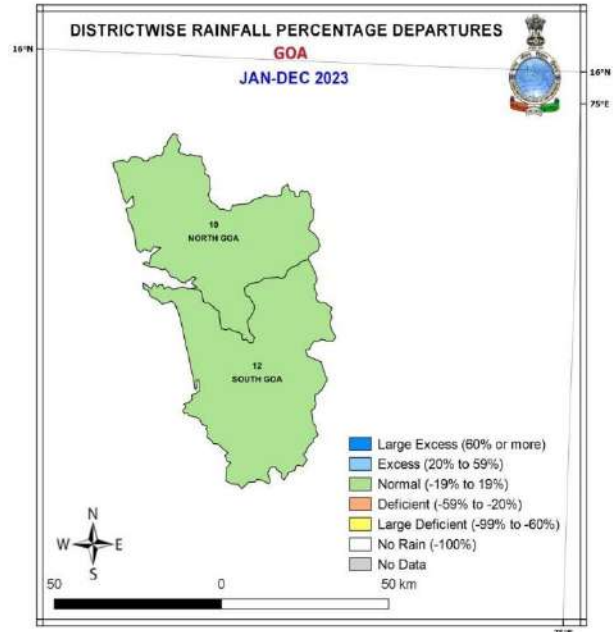
Fig. 11: District-wise annual rainfall percentage departures

The daily variation of rainfall (mm) during the year for the state is shown in **Fig. 6(a).** The state received above normal rainfall on many days in July and September months below normal rainfall on many days in June and August months.

The daily variation of rainfall (mm) during the year for the state is shown in **Fig. 6(a).** The state received above normal rainfall on many days in July and September months below normal rainfall on many days in June and August months.

serie ... d 1901-2023 are S...t to the LPA
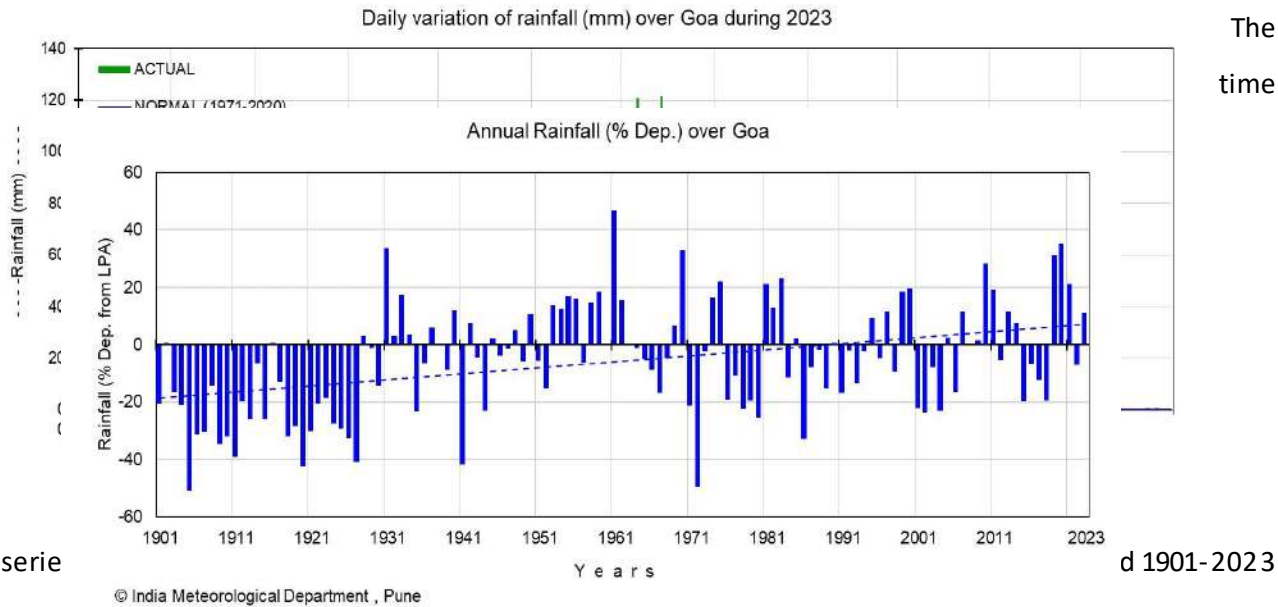
Fig. 12(b): Time series of % departure of southwest monsoon rainfall averaged over Goa (1901-2023)

... and 111
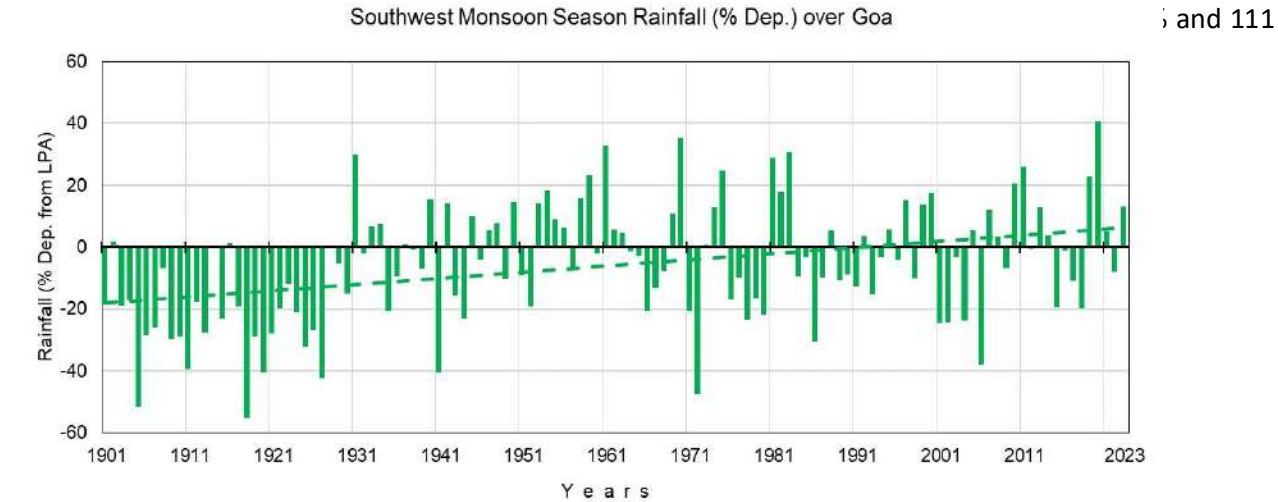
Fig. 12(c): Time series of % departure of annual rainfall averaged over Goa (1901-2023)

Table 2.5 shows the monthly, seasonal and annual rainfall statistics for the State for 2023. The state did not receive any rainfall during the winter season. During the pre-monsoon season it received large deficient rainfall. During July and September months the state received large excess rainfall (60% more than its LPA). During the monsoon and post monsoon seasons and the year as a whole, the state received normal rainfall.

Table 2.5

MONTH / SEASON	ACTUAL (mm)	NORMAL (mm)	% DEP.	CATEGORY
JANUARY	0.0	1.2	-100.0	NR
FEBRUARY	0.0	0.4	-100.0	NR
WINTER SEASON	**0.0**	**1.6**	**-100.0**	**NR**
MARCH	0.9	4.5	-79.4	LD
APRIL	0.0	5.1	-100.0	NR
MAY	24.3	62.0	-60.8	LD
PRE-MONSOON SEASON	**25.2**	**71.6**	**-64.8**	**LD**
JUNE	653.1	914.0	-28.5	D
JULY	1846.5	1047.0	76.4	LE
AUGUST	297.3	728.3	-59.2	D
SEPTEMBER	598.6	318.4	88.0	LE
MONSOON SEASON	**3395.5**	**3007.7**	**12.9**	**N**
OCTOBER	127.1	164.7	-22.8	D
NOVEMBER	94.5	29.2	223.6	LE
DECEMBER	0.0	4.8	-100.0	NR
POST-MONSOON SEASON	**221.6**	**198.7**	**11.5**	**N**
ANNUAL	**3642.3**	**3279.6**	**11.1**	**N**

	LARGE EXCESS [LE]	+60 % OR MORE
	EXCESS [E]	+20 % TO +59 %
CATEGORY	NORMAL [N]	-19 % TO +19 %
	DEFICIENT [D]	-59 % TO -20%
	LARGE DEFICIENT [LD]	-99 % TO -60 %
	NO RAIN [NR]	-100%

District-wise trend in annual rainfall for the period 1951-2022 is given in **Fig 13.** Non-significant increasing/decreasing trend was observed in North/South Goa.
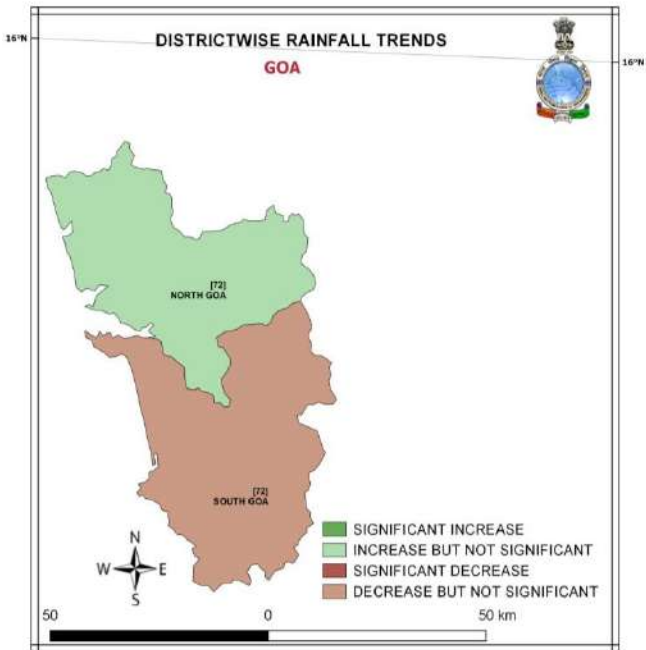
Fig. 13: District-wise annual rainfall Trend for Goa
[Numbers in the bracket for each district indicates the number of years up to 2022 used to calculate the trend]

Standardized Precipitation Index (SPI)

The district wise Annual SPI Map for the state for the year 2023 is shown in **Fig. 14.** The SPI is based on precipitation and is used for measuring drought. This index is negative for drought and positive for wet conditions. As the wet and dry conditions become more severe, the index becomes more positive or negative. Mildly wet conditions were observed over two districts of the state.
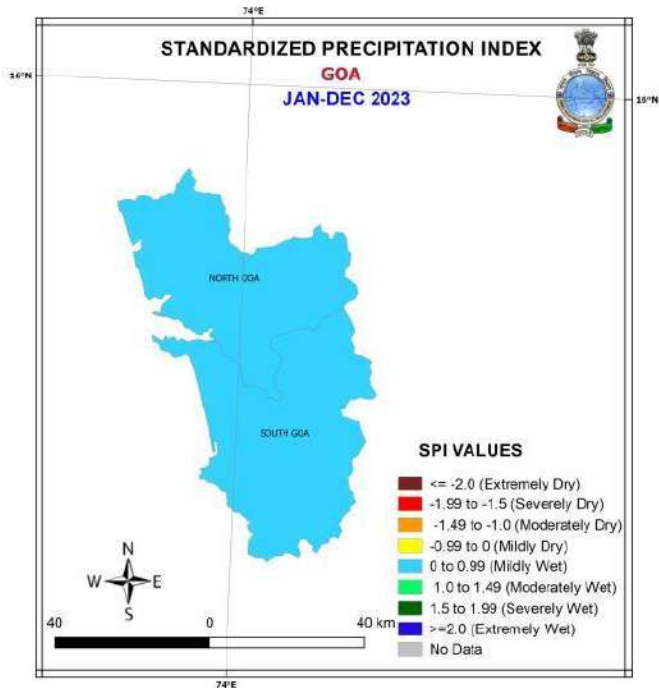
Fig. 14: District wise Annual SPI Map for Goa for the year 2023

Extreme Weather Events

Heavy (64.5-115.5mm), very heavy (115.6-204.4 mm) and extremely heavy (>= 204.5 mm) rainfall events were recorded over some stations of Goa. **Fig. 15** shows the location and frequency of occurrence of such events during the year. **Table 2.6** shows the Very heavy and extremely heavy rainfall values with the date of its occurrence and the location.
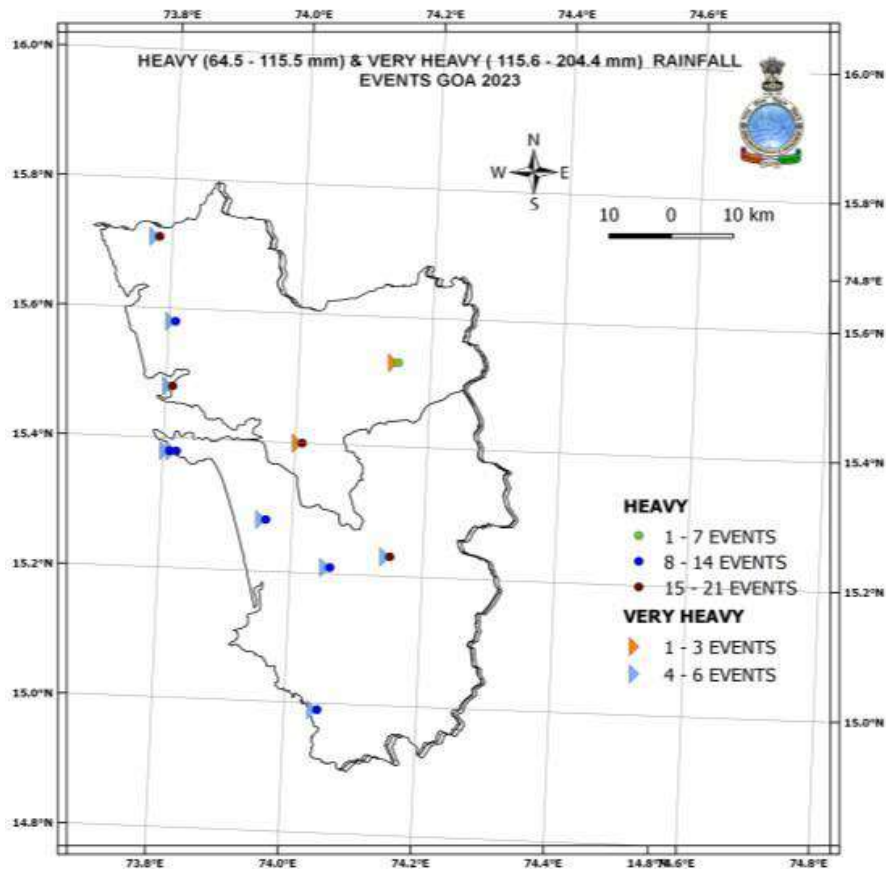
Fig. 15: Location and frequency of heavy, very heavy and extremely heavy rainfall events reported over stations of Goa during the period January to December 2023

Table 2.6

Very Heavy (115.6-204.4 mm) or extremely heavy rainfall (>= 204.5 mm) recorded over stations of Goa during January – December 2023 #

DATE	STATION NAME	RAINFALL (mm)	DATE	STATION NAME	RAINFALL (mm)
23-MAY	QUEPEM	120.0		MAPUSA	125.2
18-JUN	MARGAO	127.0		PANJIM - IMD OBSY	158.3
25-JUN	CANACONA	118.2		PERNEM	130.8
28-JUN	MAPUSA	184.0		PONDA	126.0
	PANJIM - IMD OBSY	202.9	6-JUL	CANACONA	168.8
	CANACONA	117.6		DABOLIM N.A.S.- NAVY	126.4
	DABOLIM N.A.S.- NAVY	193.4		MARGAO	140.0
	MARGAO	118.6		MORMUGAO - PMO IMD	140.0
	MORMUGAO - PMO IMD	179.2		QUEPEM	120.0
30-JUN	MAPUSA	147.3		SANGUEM	155.5
	PANJIM - IMD OBSY	118.6	7-JUL	CANACONA	126.8
	DABOLIM N.A.S.- NAVY	141.0		MAPUSA	129.2
	MORMUGAO - PMO IMD	141.8		PERNEM	147.0
1-JUL	MORMUGAO - PMO IMD	124.0	14-JUL	PONDA	133.0
2-JUL	QUEPEM	120.0		QUEPEM	150.8
3-JUL	PERNEM	130.4		SANGUEM	148.1
	MARGAO	168.3	19-JUL	VALPOI	196.7
	QUEPEM	170.0	22-JUL	MAPUSA	133.0
	SANGUEM	153.8		PERNEM	135.8
5-JUL	PANJIM - IMD OBSY	119.6	23-JUL	PERNEM	115.8
	CANACONA	170.2	25-JUL	PONDA	117.0
	MARGAO	122.6		SANGUEM	121.0
	QUEPEM	140.6	26-JUL	VALPOI	160.7
				SANGUEM	142.5
			29-SEP	DABOLIM N.A.S.- NAVY	116.6
			30-SEP	MAPUSA	127.5

(#: Rainfall figures are for past 24 Hrs. ending on 8:30 Hrs. IST of the date)

The location of impact occurred due to major extreme weather events in Goa during the year 2023 is shown in **Fig 16.** The state experienced flood/heavy rains, lightning and Gale events during the year 2023.

MAJOR EXTREME WEATHER EVENTS 2023, GOA

FLOODS/ HVY RAIN   LIGHTNING   GALE
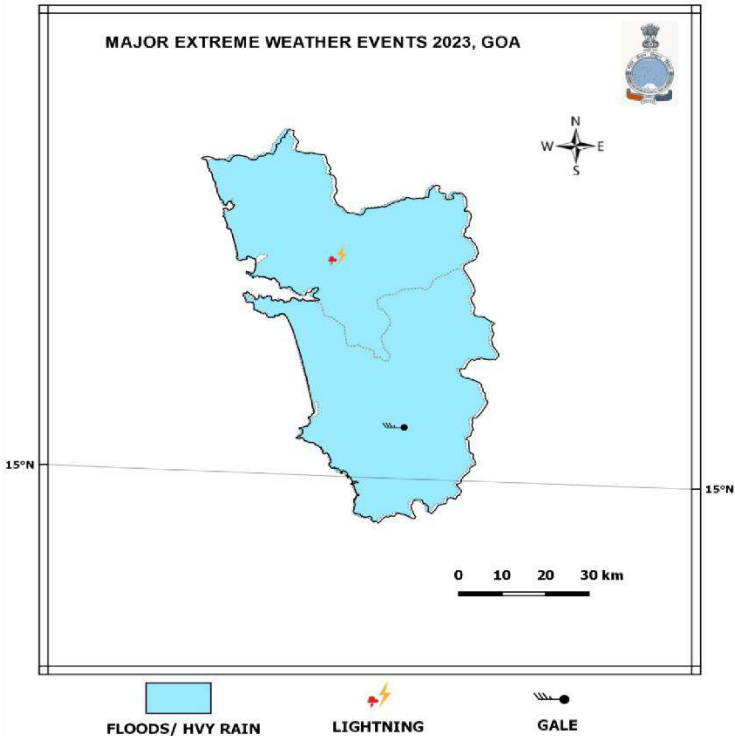
Fig. 16: Locations of impact occurred associated with Major Extreme Weather Events during 2023 (details provided in the Table 3)

Table 2.7 Major extreme weather events during 2023 which caused loss of human lives occurred in Goa

Event	Date	Loss of Life	Season	Affected Districts
Floods/Heavy Rains	(7 July)	1	Monsoon (June -Sept.)	South Goa

The taluka-wise Estimated Economical Loss (in Lakhs) due to major extreme weather events during 2022 is given in **Fig 17.**
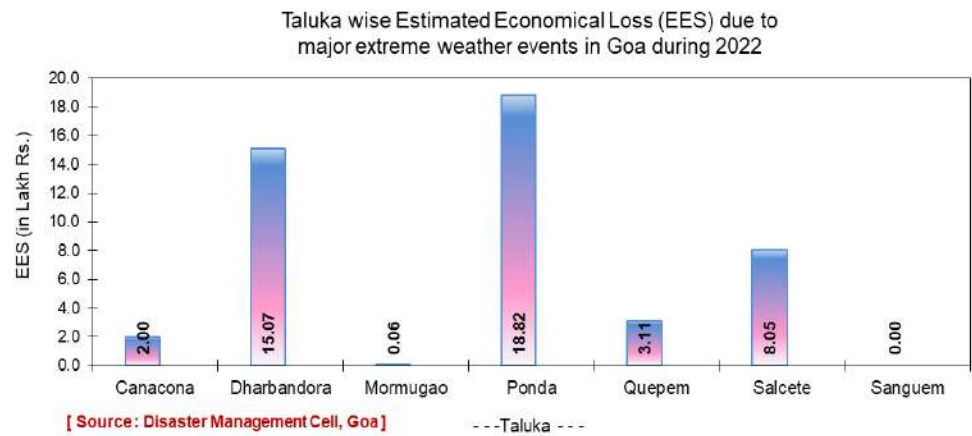
Fig.17: Shows the taluka-wise Estimated Economical Loss (in Lakhs of Rupees) due to major extreme weather events in Goa during 2022
(Source: O/o The Collector and District Magistrate, South Goa District, Disaster Management Cell, Goa)

Analysis of flood vulnerability in Goa

Flood vulnerability in Goa under current climate as well as under future climate is spatially mapped using the high-resolution digital representation of orography based on SRTM Digital Elevation Model (DEM), published by the CGIAR-Consortium for Spatial Information (http:// srtm.csi.cgiar.org), with a cell size (spatial resolution) of 90 m, is used (Farr et al.2007, Reuter et al. 2007). On the basis of elevation, Goa is categorized in multiple elevation zones, elevation zone of 0-5 meter (**Figure 18**) is considered to be most vulnerable to flooding from multiple hazards including sea level rise, and extreme precipitation events. The talukas of Salcete, Tiswadi, and Bardez most vulnerable to flooding related hazards.
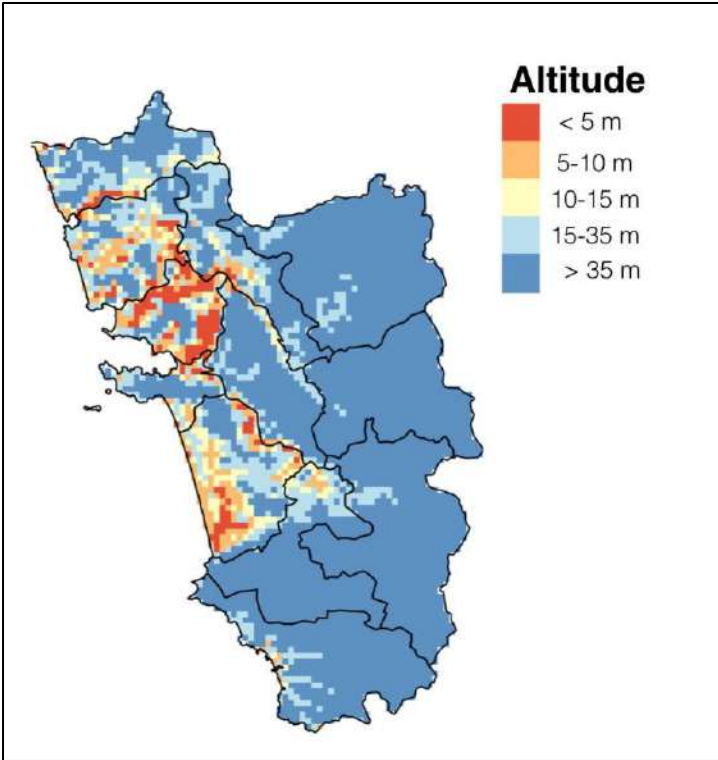
Figure18: Flood vulnerability map of Goa

Vulnerability assessment

The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as "the propensity or predisposition to be adversely affected"[9], which encompasses the basic components of exposure,

---

[9] Summary for Policymakers - IPCC-2014

sensitivity, and adaptive capacity. Key sector-specific indicators have been utilized to assess the sensitivity and adaptive capacity of the sector.

The coastal areas of the country, face grave risks due to climate change. There is the risk of cyclones and tsunamis, the intensity of which is predicted to rise. Rising sea levels, which could flood land (including agricultural land) and cause damage to coastal infrastructure and other property, pose another threat.

Coastal Vulnerability: UNDP predicts, Goa stands to lose a large percentage of its land area, including many of its famous beaches and tourist infrastructure, which are very significant to states' socio-economic status. A one-metre rise in sea level, it is estimated, will affect 7 percent of Goa's population and cause damage to the tune of Rs 8,100 crore.1 Because of this, it becomes essential to understand the vulnerability to different parts of the 100km vast coastline of Goa.

The multi-hazard vulnerability assessment of the coastline of Goa carried out by NIO in 2014 provides a reasonable assessment of coastal flooding and inundation for Talukas along the coast. This is accomplished by using seven physical and geologic risk variables characterizing the vulnerability of the coast, including historical shoreline change, rate of relative sea-level change, coastal regional elevation, coastal slope, mean tidal range, significant wave height, and geomorphology using conventional and remotely sensed data, in addition to two socio-economic parameters: population and tourist density data. The results of this composite vulnerability index-based study suggest that the 30 km of the coastline of the talukas of Salcete,
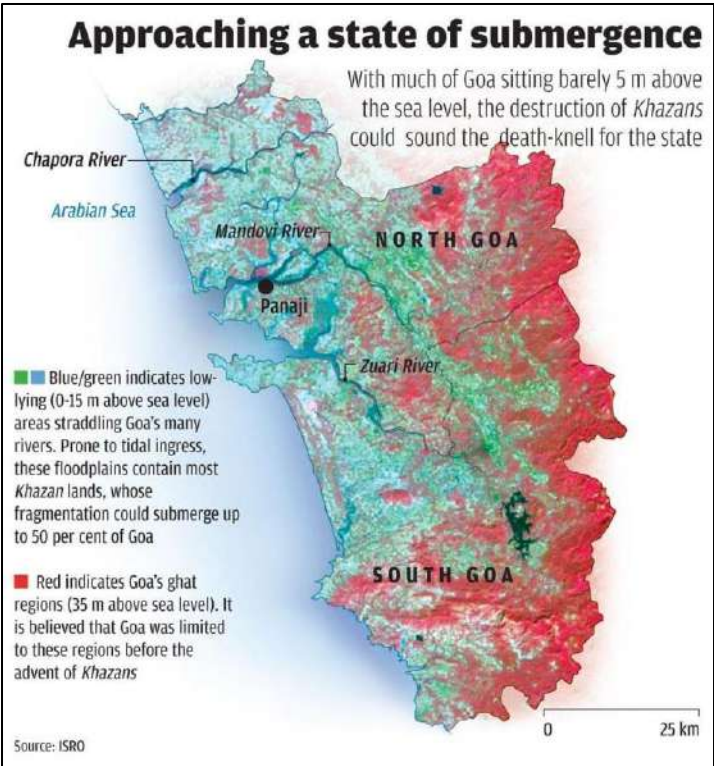
Figure 19: Composite Vulnerability Index   Source: ISRO

Bardez, and Tiswadi has a coastal regional elevation of fewer than 35 m and is at the highest risk due to sea-level rise and flooding. Bardez and Salcete talukas have both experienced erosion rates of more than 0.6 m/year while the erosion rate for Tiswadi was found to be above 0.3 m/year. These are also the most populated talukas and most prominent tourist spots, further increasing the risk of erosion in these talukas.

Other Physical Vulnerability

The riverine water system of Goa and the creeks and backwaters are vulnerable to high-intensity precipitation scenarios predicted for the state. The brackish water areas have very rich ecosystems and exist along creeks and rivers. Some of them are protected by sluice and gate systems whereas others are at the risk of ingress of saline water due to climate change. Groundwater extraction is not well regulated and intrusion of groundwater is likely to increase saltwater intrusion into the groundwater system. As the sea level rises this problem will be further exasperated. The high groundwater levels in certain areas pose the challenge of water percolation capacity of the soil. Thus, increasing the vulnerability of these areas like Panaji.

Levels of Disasters:

Based on severity of the disaster, degree of material and physical losses and assistance requirements different levels of disasters are being identified. The activation of the plan will be dependent on the declared level of disaster.

Level 0 (L0) – This is a level during peace and normal times; time will be utilized for monitoring, prevention and preparatory activities. Capacity building of key departments, mock rescue, rehearsals, testing evacuation plans is rehearsed during this level. Similarly, response and recovery mechanisms are reviewed at state, district, level.

Level I (LI) – At this level, district machinery can manage the disaster; state and central governments will monitor the progress and remain alert to activate other mechanisms if needed. General inundation, crop losses, livestock losses, minor property losses and disrupted normal life due to disaster/incident.

Level II (LII) – At this level, active participation of state departments, mobilizing resources at the state level and close monitoring in coordination with district machinery is warranted. Mobilizing rescue and recovery teams consisting of paramilitary forces may be required at this level. In addition to losses identified in LI, human and livestock losses and substantial property losses such as damaged homes, damaged infrastructure and isolation of an area due to the severity of the disaster are part of Level II.

Level III (LIII) – This is critical and highest level. State and district machinery would need active assistance from the union government. Mobilizing rescue and recovery teams consisting of paramilitary forces may be required at this level. Early warning mechanisms both at state and central government play significant role in identifying situations that may be declared as Level III disasters. Similar levels of losses are identified in LI and LII at higher proportions.

Activation of the plan would vary depending on the information received from competent agencies like IMD, INCOIS, DGRE, FSI, etc. and on the level of disasters and intensity as identified; however, at all levels, certain activities especially preparedness, prevention, mitigation and capacity building are round the year functions.

2.2 Hazard Risks and Vulnerabilities

2.2.1 Multi-Hazard Vulnerability

As per the definition adopted by UNISDR, hazard is a dangerous phenomenon, substance, human activity, or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Disturbance can be caused due to occurrence of frequent hazards like earthquakes, fires, cyclones, terrorism, biological wars and chemical explosions. When hazards connect with risk and vulnerabilities leads to the massive destruction. Level of risk (high/medium/low) depends upon the various hazards for which any specific area is prone to and/or also on the various physical, social-economic and institutional parameters. The chapter has been covered into two parts. First part is covering hazard assessment and second part is covering vulnerability and risk assessment on the basis of hazard assessment.

[10]The MHVM recorded 183.43 km2, with 10.71 percent of the North Goa district's area being more vulnerable when compared to South Goa. In contrast, the South Goa district recorded a 57.32 km2 area of MHVM with 2.98% **(Table 4).** The higher MHVM area was recorded in North Goa due to the Mandovi-Zuari estuary system with a wide estuary mouth. This suggests vulnerability in the vicinity of the estuary-creek system. Fortunately, the open coasts in North Goa recorded less MHVM area. South Goa in the southern parts also recorded large areas. Notably, open coasts along North Goa have recorded more areas under MHVM along the Margao urban coasts being vulnerable.

Figure 20: MHVM map of Goa Coast

Table 2.8. Area of MHVM recorded at each district and their percentage with respect to the district's geographic area along the Goa coast.

District	MHVM Area (sq. km)	Percentage
North Goa	183.43	10.71
South Goa	57.32	2.98
Total	240.75	
		Source: INCOIS

---

[10] COASTAL MULTI-HAZARD VULNERABILITY ATLAS by INCOIS HYDERABAD

A combination and geographical factors like climate, geomorphology, drainage pattern, proximity to the open sea etc. render Goa State prone to a variety of natural disasters like floods, cyclones, earthquakes, Tsunamis etc. As per the all India seismic categorization, Goa falls in Seismic Zone III which indicates that Goa has a moderate damage risk due to Earthquakes. A number of large and small river systems drain the districts and the gradient and topography of the region combined with heavy monsoons and high tide conditions cause flooding and water logging in quite a few places in the State. The occurrence of cyclones / floods, however, is restricted to the monsoons only. The impact of cyclonic winds is felt towards the onset of the monsoons in April end and May and again towards the fag end around September/October.
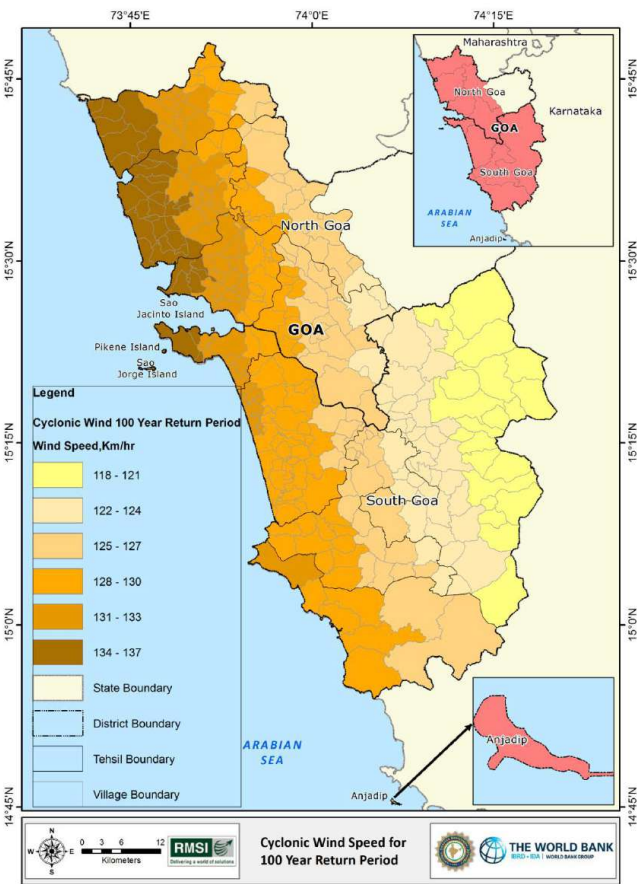
Figure21: Cyclone Hazard Map (100 Year Return Period)

Disaster Risk = Hazard + Vulnerability

Disaster Risk = function (Hazard, Exposure, Vulnerability)

To reduce disaster risk, it is important to reduce the level of vulnerability and to keep exposure as far away from hazards as possible by relocating populations and property. Growing exposure and delays in reducing vulnerabilities result in an increased number of natural disasters and greater levels of loss. (Asian Disaster Reduction Centre).

Hazard Assessment: In order to focus limited resources on to those areas of the state at risk, it is necessary to understand the pattern of hazard activity precisely and put a quantitative probability to the likelihood of occurrence of hazards. Information is available through newspaper clippings and records maintained with the various government departments of the hazard prone areas in the State with respect to various hazards has been documented for assessing the types of hazards probably occurring in Goa.

Earthquake Hazard:

Goa falls in Seismic Zone III-Moderate Damage Risk Zone in the country, which indicates that Goa has Medium probability for occurrence of earthquakes. Though Goa has not directly witnessed any earthquake however, it has been affected by tremors from devastating earthquakes that occurred in the neighbouring States like Maharashtra.

Table 2.9: History of Earthquake Occurrence

Disaster Type	Year of Occurrence	Impact
The tremors of the devastating earthquakes with magnitude 5.0 or	1967	Residential as well as public structures, infrastructures were

more that hit "Koyana" Maharashtra, that affected life of people in Goa		damaged severely, although no casualties were taken place
The tremors of the devastating earthquakes with magnitude 5.0 or more that "Latur" in Maharashtra, that affected life of people in Goa	1993	Residential as well as public structures, infrastructures were damaged severely, although no casualties were taken place
		Source: DMP AH&VS

Flood Hazard

If cyclonic winds are accompanied by heavy rainfall then there is possibility of flooding in low lying areas, in Goa. The rainfall pattern is very heavy in the western Ghats which is over 180 inches and gradually reduces towards the coastal plains. The rivers in the coastal plain are having tidal influence, which retard the high flood water drainage during the high tides, there by leading to the flooding of the low laying areas.

River Basins of the State of Goa:

There are 09 river basins in the State of Goa as indicated in the below Table

Sr. No	River Basin	Length within the State	Catchment area in Sq kms
1.	Terekhol	26.00	71.00
2.	Chapora	32.00	255.00
3.	Baga	10.00	50.00
4.	Mandovi	52.00	1580.00
5.	Zuari	145.00	973.00
6.	Sal	40.00	301.00
7.	Saleri	11.00	149.00
8.	Talpona	32.00	233.00
9.	Galgibag	14.00	90.00
	Total		3702.00

➤ **Major Rivers of the State are:**
- Mondovi river
- Zuari river
- Chapora River
- Galzgibag river

Dams on River Basins:

Mondovi River Basins
- Anjunem irrigation project.
- Minor irrigation dam at Amthane. Panchawadi Dam

Zuari River Basins
- Major irrigation Salaulim, in Sanguem Tal. South Goa

Chapora River Basins
- Tillari Dam located in Maharashtra State (Interstate project)

Galgibag River
- Two minor irrigation dams Chapoli and Gawane are located

Fig. 22: Flood Hazard Map (100 Year Return Period)

Monitoring of Flood Prone Rivers:

The Water Resources Department has developed a network of flood forecasting stations and water levels are monitored 24x7 during monsoon season for all the flood prone rivers. An automated SMS is generated by the flood monitoring instruments indicating the flood levels like

Low flood   – Water level between warning level and danger level

Moderate flood – Water level below 0.5m less than HFL and above danger level

High flood   – Water level less than highest flood level but still with 0.5 m of the HFL

Unprecedented flood – Water level is equal and above highest flood level

Flood mitigation measures:

- The river basins of Mondovi and Chapora have history of flooding of the low laying areas.
- The regular flood areas are identified and demarcated.
- The flow in river is regularly monitored by the automated flood ministering stations located at over 15 locations. Which generate alert signals and disseminate the same through SMS to all the stake holders.
- Flood prevention / Protection measures for the areas which are frequented by the floods on regular basis are in place. Structural measures like flood water pumping station, marginal bunds, sluice gates are in place and monitored operated by staff 24 X7 during the monsoon.
- The dam gate operation schedule is in place to route the floods during the heavy rainfall.

How does the system work?

- The Control Room (at collector) informs the stake holders the information of the weather and reverent information to the stake holders by phone, SMS and e-mail.
- When water level in any river reaches warning levels, the control room, concerned Sub-divisional magistrates are informed about the situation and automated SMS is generated by the gauging stations.
- Sirens and warnings are sounded / issued to the people in the low lying areas.
- The Authorities/Stakeholders departments go on alert, to attend the eventuality.
- Rise in the river level, dam level, heavy intensity rainfall, land slide, floods etc. are informed to the control room, by the sub divisional staff at taluka headquarters to the Dy. Collector, Panchayat etc., who in turn alters the stake holders.
- Men and material are kept on standby to handle eventuality.

Flood Observation Stations during Monsoons
No. of Stations :15 nos.

Sr. No.	River Basin	Name of River / Stream	Location of flood observation Station
I	Madei	Madei River	1. Ganjem village, Ponda Taluka
		Veluz River	2. Valpoi, Sattari Taluka
		Virdi ,Gotolli Nalla	3. Near , Keri, Sattari
		Bicholim River	4. Near Shantadurga, School,
		Bicholim River	5. Bridge near Kadamba Bus Stand
		Valvonta River	6. Sanquelim Market, Sanquelim
		Valvonta River	7. Near , Sanquelim
		KhandeparRiver	8. Opa, Waterworks
II	Zuari	Kushavati River	1. At bridge on road taking off from Quepem-Margao road near Paroda and leading to Avedem village
		Bhiunsa Nalla	2. Culvert on NH-17 near Petrol Pump at Cuncolim, Salcete
		Guleli River	3. Ghatia Pandu, 2 Kms downstream of Salauli dam
		Kapileshwari Nalla	4. Near Kurtarkar Arcade, Behind Canara Bank
III	Sal	Sal River	1. At Mungul bridge on Margao-Colva road
IV	Galjibag	Galjibag River	1. At Loliem bridge on Poinguinim road
V	Talpona	Talpona River	1.At Galjibag bridge on Galjibag-Bhatpal road
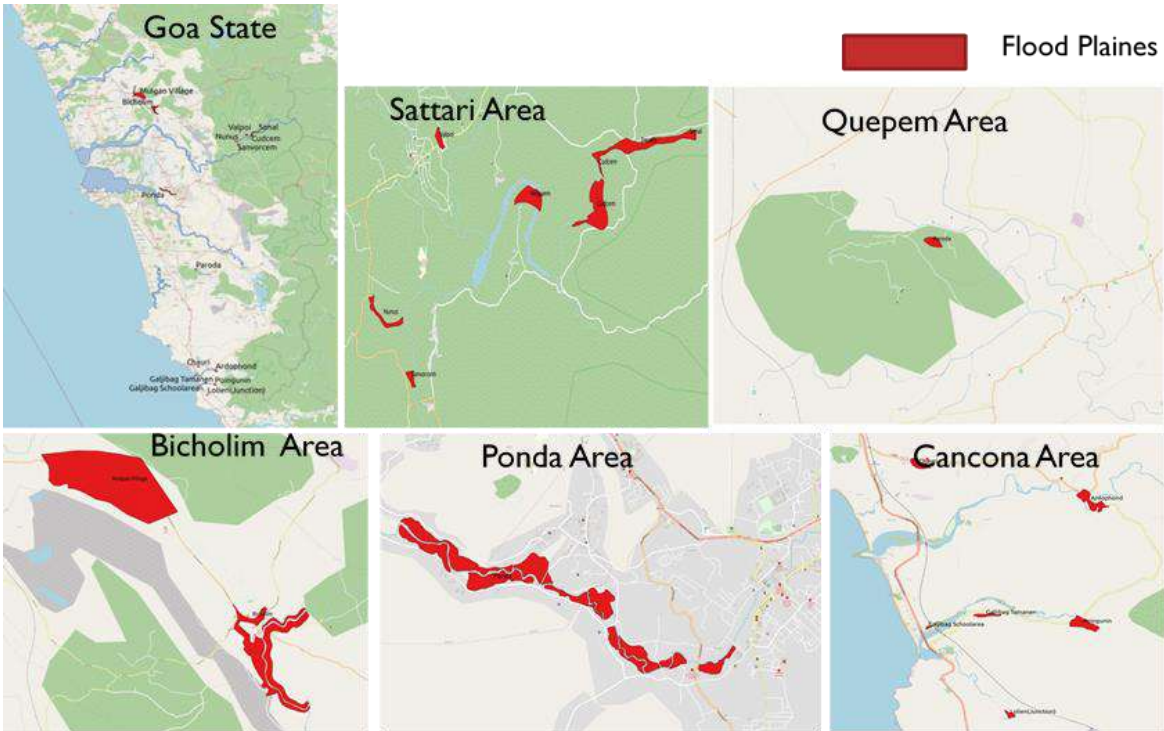
Figure 22 Identified & demarcated flood prone areas of the State

Fire Hazard: Fire hazards, include fires due to chemicals, LPG, explosives as well as short circuit of electrical systems. The Directorate of Fire & Emergency Services provides timely assistance to the people in distress. The Directorate of Fire and Emergency Services has prepared a team to form the department contingent in the State Disaster Response Force. The contingent has already been trained in Urban Search and Rescue (USAR), Medical First Responder (MFR), Swift Water Flood Rescue (SWFR), besides the Basic Fire Fighting and other related skills. The Directorate collates data on day-to-day basis so as to provide

information and analyses on the status and scope of the various categories of incidents in the State of Goa. The data highlights the past and current emerging trends in incidents that have occurred, including property lost & saved, lives lost & saved etc.
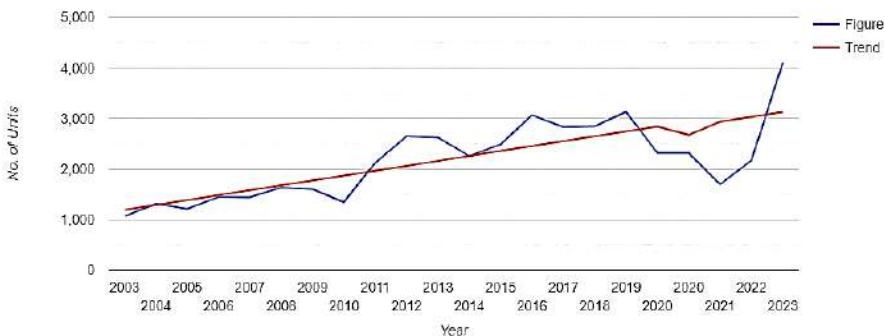
Category	Statistics	Trend	
Fires	**4,108** in 2023	**285%** from 2003	↑
Emergencies	**4,968** in 2023	**314%** from 2003	↑
Lives Lost (H)	**131** in 2023	**14%** from 2003	↑
Lives Saved (H)	**206** in 2023	**69%** from 2003	↑
Property Lost	**85.24 Cr** in 2023	**1,526%** from 2003	↑
Property Saved	**259.40 Cr** in 2023	**257%** from 2003	↑
		Source: DF&ES	

Forest Fire Hazard:

Forest Fire reported in Goa in the past five years:

Forest fire in Goa is an annual phenomenon mostly during March to May. The deciduous forests to semi evergreen forests present in both the district are impacted by the forest fire every year, however, on a minor scale. Number of Fire incidence reported during the last five years and area affected is tabulated as under:

Table. 2.10: *Incidences of forest fires in past 5 years & Affected Area (in ha)*

Year	No of forest fire Incidence	Area affected in Ha
2017-18	58	117.3
2018-19	34	98.22
2019-20	34	232.6
2020-21	46	87.37
2021-22	15	51.87
Total	**187**	**587.48**
		Source: Goa Forest Department
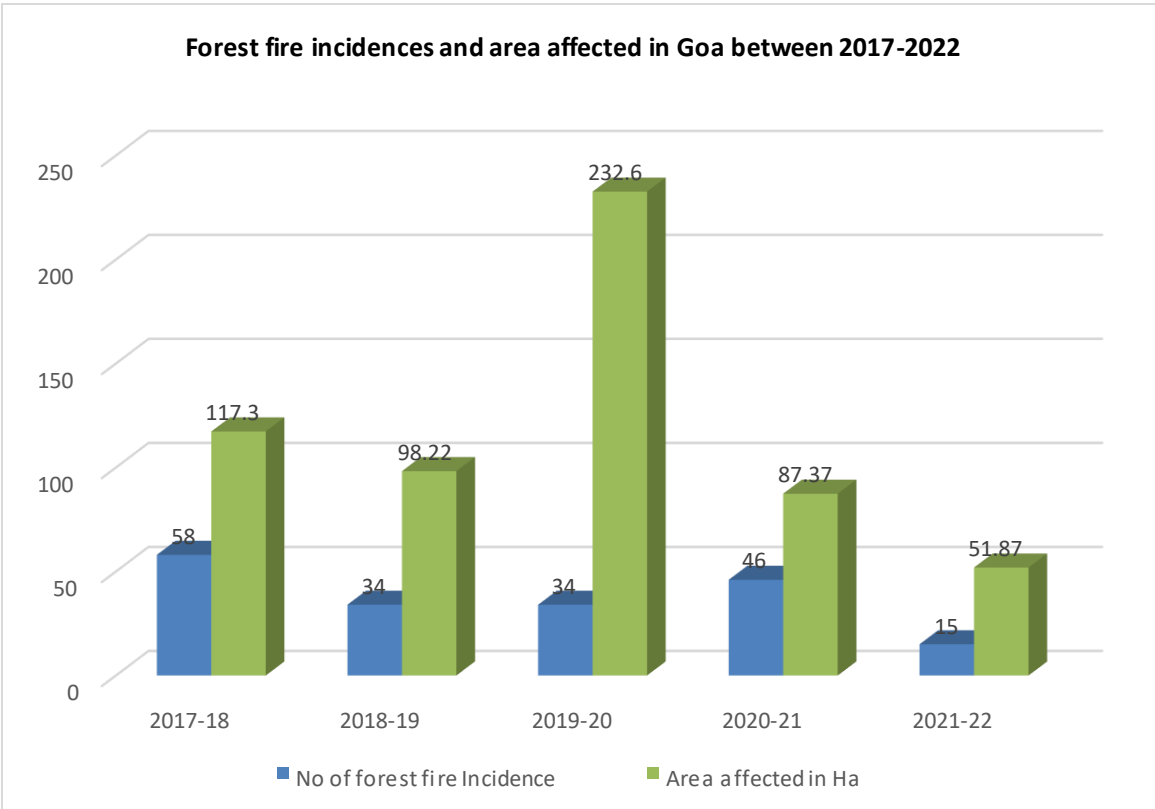
Fig.23: *Forest Fire Area affected area in the past five years in Goa.* **Source:** Goa Forest Department

During last five years, since 2017, a total of 187 forest fire affecting 587.48 ha area were reported. It is observed that, anthropogenic factors like burning grass lands for pastoral and agricultural purpose, burning of dry leaf litter in cashew plantations in order to facilitate ease of collection of cashew fruits from plantation floor are the primary causes for forest fire in the state of Goa. The matter of prime concern is that most of the cashew orchards are either contiguous to Forest or Forest rights settlement pockets inside forest areas, so the spread of fire to the forest is consequential and inevitable in such situation. As seen from fire data of past five years no significant pattern or rising trend in forest fire incidences is observed.

Forest Fire reported in Goa in the year 2023:

Sporadic fires were reported and detected all across the State including forests, private areas, *Communidade* lands, plantations, revenue lands, etc. especially since 05th March, 2023. Below are the forest fire incidents reported in the State in the month of March 2023.

Table. 2.11: Forest *fire incidence reported by divisions between 4th March to 15th March 2023*

S.No.	Division	No of fire incidences	Area affected in Ha
1	North Goa Forest	19	119.8
2	South Goa Forest	16	62.5

3	North (WL & ET)	25	143.013
4	South (WL & ET)	8	84.5
5	Social Forestry	1	5.0
6	GFDC	5	4.325
	Total	**74**	**418.138**
			Source: Goa Forest Department

Forest fire incidences and area affected in Goa in 2023
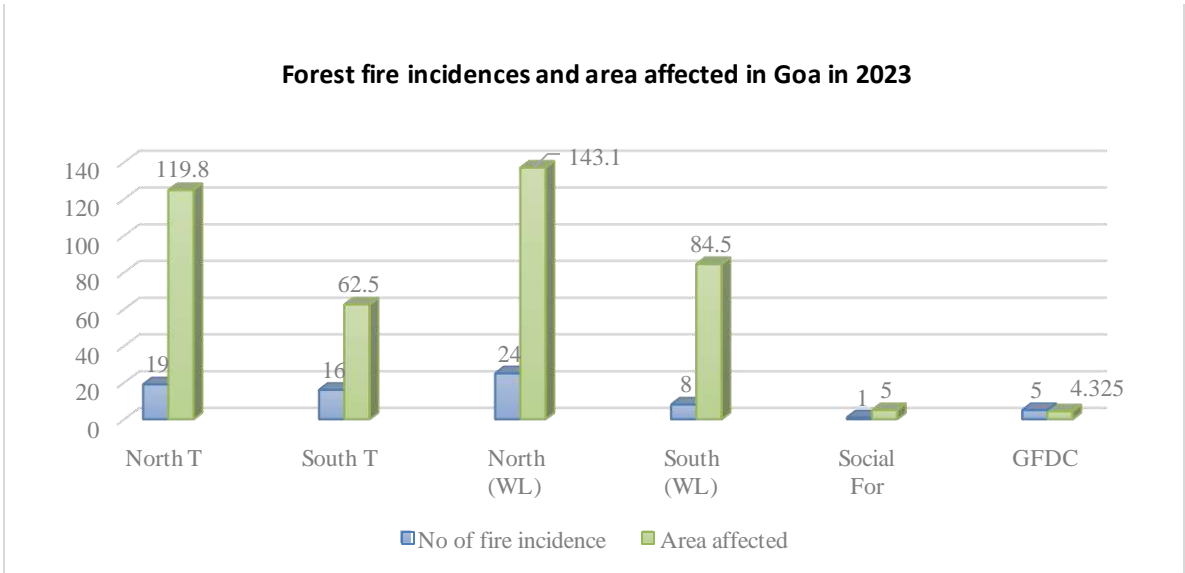
Fig 24: *Number of fire incidence &Area affected in different division 4th to 15th March 2023*

Source: Goa Forest Department
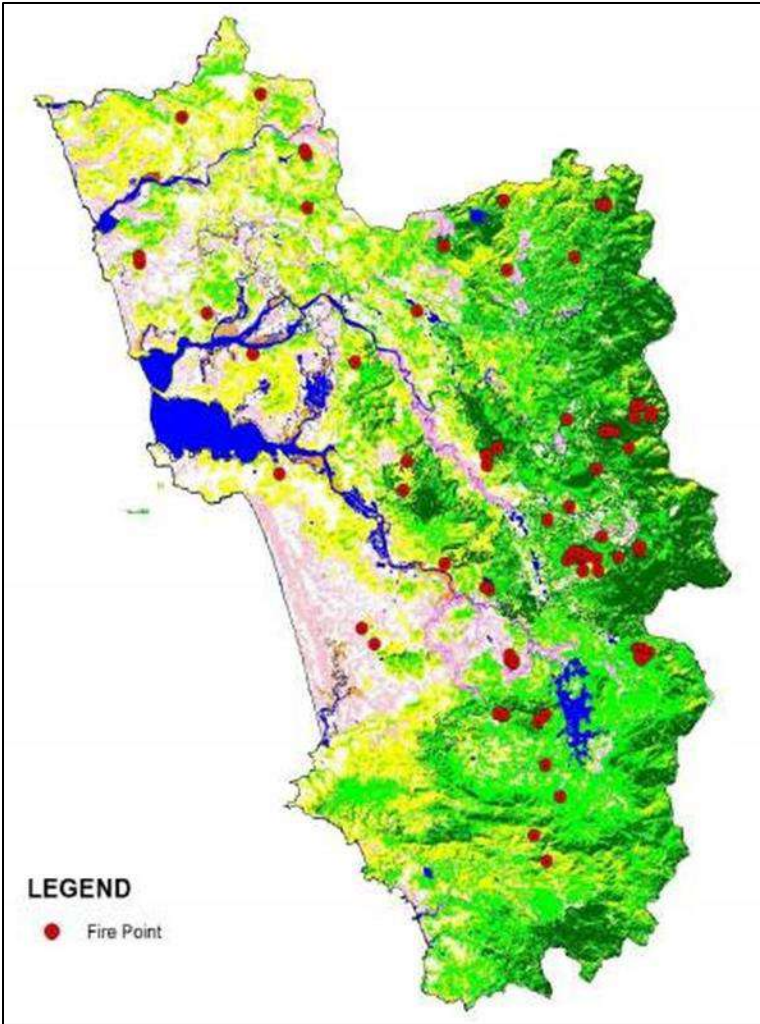
Figure 25: Map indicating forest fire incidences reported in Goa in 2023
Source: Goa Forest Department

Heat Wave: Based upon the increasing trend of temperatures in the State especially in the months of March to May, both North & South Goa districts are experiencing the Heatwave like conditions or discomfort with temperature ranging from 33-35°C.

Cloud Burst: Though it is not a regular hazard affecting Goa, it did occur in last decade affecting some parts of Canacona taluka.

Thunder Storm & Squall: The summer season lasts from mid-March to the end of June, with average maximum and minimum temperatures of 32°C to 40°C; it is characterized by frequent thunderstorms and squalls, which are most frequent in April and May.

Epidemics Hazard: In Goa, preventive, and curative livestock and poultry health is being looked after by the department of A.H. & V.S. There are Hospitals, Dispensaries, sub centers supplementing the task. With the view of detecting epidemics at the earliest, a Disease Investigation Unit has been established under the Directorate of A.H. & V.S. Therefore, the incidence of epidemics is negligible over last 15 years.

Road & Rail Accidents: The areas in the vicinity of the Konkan and Western Rail lines are vulnerable to railway accidents across North and South Goa. Besides, the State is experiencing the increasing trend to road accidents. As per the monthly report issued by the Directorate of Transport for the month of September 2023, 227 road accidents were reported, out of which 14 were Fatal Accidents (North Goa – 06 and South Goa –08).

Industrial Hazards: Industrial accidents may occur as a result of natural phenomena, such as earthquakes, forest fires etc., however, most accidents occur as a result of human activity leading to accidental or deliberate harm. Although there are a number of different definitions of these accidents, the most practical appears to be as follows: any incident connected with an uncontrolled development (such as leak, fire and / or explosion) of an industrial activity involving a serious immediate or delayed hazard to man and / or the environment.

CBRN Disaster: Goa being a tourist State is also under the threat of any form of conventional and contemporary warfare. CBRN threats could be one of the major potential hazards in Goa. With respect to probability of emergencies due to Nuclear Hazards, the nearest Nuclear Power Plant-NPP is Kaiga Generating Station in Uttar Kannada District of Karnataka State which is approximately 200 km away from Goa. There is high threat of biological disaster caused due to bioterrorism. The threat of chemical attack and chemical disasters caused by hazardous units may not be very high. To address to any Risk posed by CBRN Emergencies, Government of Goa in collaboration in NDRF and NDMA, conducts the preparedness and capacity building trainings/mock drills and accordingly, 03 Officials from Directorate of Fire and Emergency Services have been trained in CBRN Emergency Management by Department of Atomic Energy-DAE Mumbai. Besides, 02 Basic Trainings on CBRN Emergency Management for Airport and Seaport Emergency handlers were conducted by Goa SDMA in collaboration with NDMA and DAE at Manohar International Airport Mopa, North Goa and Mormugao Port Authority Vasco, South Goa.

Terrorist attacks and bomb blasts: Goa being a peaceful and touristic place is also under the threat of any form of conventional and contemporary warfare. History perceives that generally terrorist attacks takes place in important government building, air ports, cantonment areas, historical monuments, populous places and important public gathering etc. Many events of bomb-blasts and terrorist attacks across India give an insight towards the importance of this issue.

Around **30** odd types of disasters have been identified and they are grouped into **5** broad categories:

1) **Water and climate related disasters** – drought, flood, cyclone, heavy rains, cloudburst, gale wind, whirlwind, tornado, hailstorm, lightening, Tsunami, heat wave etc.
2) **Geologically related disasters** – earthquakes, volcanoes, landslide etc.

3) **Chemical, Industrial and Nuclear** related disasters.

4) **Accident related disasters** like air crash, rail collision etc.

5) **Biological disasters.**

The **table 2.12** illustrates the number of potential threats and the elements at risk during the disaster expected in the State:

Table 2.12: Number of potential threats and the elements at risk.

Hazard	Risk
Floods	Everything located in flood plans. Crops, livestock, machinery, equipment, infrastructure, weak buildings, their contents, people, local economy.
Earthquakes	Weak buildings, their occupants and contents, machinery, equipment, infrastructure, human lives, dairy and poultry infrastructure and livestock
Landslides	Anything located on or at the base of steep slopes or cliff tops, roads, infrastructure, buildings on shallow foundation, human lives, crops, vegetation, dairy and poultry infrastructure and livestock.
Cyclone	Damage to the buildings, infrastructures, crops, vegetation, telecommunication / power lines, roads, dairy and poultry infrastructure and livestock. etc.
Tsunami	Everything located in the coastal areas upto 500 mts -1 km belt.

Source: DMP AH&VS

Hazard Profile:

Generally, Goa is prone to natural hazards such as flood, oil spills and cyclone. Considering the hazard potential and existing vulnerabilities in the State, it has become very crucial to enhance the preparedness level, especially at the Departmental level. The frequent disasters lead to erosion of developmental gains and restricted options for the disaster victims. Physical safety, especially of the vulnerable groups, is routinely threatened by natural hazards. Cyclones in recent years in the State, have very clearly illustrated the need for multi-hazard prevention, response and recovery plans for natural hazards so that threat to human life and property is minimized. The State is primarily responsible for the management of natural and human-caused disasters at the state level and has a shared responsibility with the Government of India for preparedness and for identified catastrophic disasters.

Vulnerability Analysis: The vulnerability of a particular element of society is defined as the degree of loss which is would suffer as a result of a specific hazard event. The nature of vulnerability and its assessment vary according to whether the element involved represents people and social structures, physical structures, or economic assets and activities. The vulnerability of an area is determined by the capacity of its social, physical and economic structures to withstand and respond to hazard events. Certain groups of people, types of physical assets and economic activities can be particularly vulnerable or susceptible to damage. The concept of vulnerability implies a measure of risk combined with the level of social and economic ability to cope with the resulting event in order to resist major disruption or loss. Vulnerability is thus the liability of a community to suffer stress, or the consequence of the failure of any protective devices and may be defined as the degree to which a system or part of a system, may react adversely to the occurrence of a hazardous event.

Table 2.13: Taluka wise Multi Hazard Vulnerability (Levels of Severity)

Taluka	Cyclone	Flood	Landslides & Mining	Earthquake	Chemical	Soil Erosion	Nuclear and Radiological	Drought
Pernem	H	H	L	L	L	L	L	L
Bardez	H	H	M	L	L	L	L	L
Tiswadi	H	L	L	L	L	L	L	L
Bicholim	L	H	H	L	L	L	L	L
Sattari	L	L	H	L	L	L	L	L
Ponda	L	L	L	L	H	L	L	L
Dharbandora	L	L	L	L	L	L	L	L
Murmugao	H	L	L	L	H	L	L	L

Salcete	H	L	M	L	L	L	L	L
Quepem	L	L	H	L	L	L	L	L
Sanguem	L	L	H	L	L	L	L	L
Canacona	H	H	M	L	L	L	L	L

<div align="right">Source: DMP AH&VS</div>

Multi Hazard Risk Assessment

In Goa however transport accidents are quite frequent, though no statistics were available with the Government of Goa to validate these claims. However, there have been rare casualties that have occurred due to the accidents of the Hazchem vehicles, for instance an accident that occurred in 1992-93 wherein a Hazchem tanker carrying Chlorine met with an accident leading to a leakage of the toxic gas and affecting some residents who were around the place of the accident including the firefighting personnel who had to be hospitalized. There has also been an instance where in a tanker fell into a field that was being cultivated and as a result of the leakage of the Chemical which was corrosive in nature the land became infertile for cultivation.

Due to strict implementation of Industrial Policy and pollution control norms, the multiple hazard risk in Goa is very low. Besides rising temperatures and sea levels, climate change is increasingly leading to extreme rainfall, floods and cyclone to occur a t the same time in the country. For this, synergy of all the departments should come together towards mitigation and risk reduction.

Goa is exposed to several climate risks like loss of land due to erosion, loss of life, livelihood, the outbreak of disease, damage to buildings, drainage, and other infrastructure. It is also exposed to sea-level rise, storms, high-speed wind, altered runoff, changed wave pattern and sea temperature in addition to the other threats like rainfall and temperature profile changes. The characteristic of states other natural and geographical features like Rivers, Khazan Lands, soil type, and moisture and flora and fauna will result in unique or varied results in different climate scenarios.

The Canacona flash flood is one such event experienced by the state of Goa on 2nd of October, 2009. It was found that these flash floods were directly related to about 271 mm of rain that fell in a short span of 7 hours, resulting in flooding of Talpona and Galjibag Rivers. Due to continuous rainfall in the monsoon season, the soil on slopes was saturated. As a result, on steep slopes with altitude above 300 m, the cascading water led to mudslides. At altitudes of about 50 m or more, agricultural and horticultural areas were submerged and cattle were washed away. At lower altitudes (about 50 m or less), where the topography is flatter, accumulation of water submerged buildings, and as the water made its way towards the sea, the flow destroyed houses and commercial establishments, particularly those that were weak (mud houses, for example). There are no records to suggest the precedence of such a rainfall scenario in the past. It is interesting to note that the flooding on 2 October 2009 was unprecedented in recorded history, but the total daily precipitation on that day is not. Hence, it implies that similar rainfall can have different risk profiles depending upon the month in which it occurs.

Cyclone vulnerability

Only coastal belt of Goa is vulnerable to Cyclones. When cyclones and resulting floods occur, the loss of infrastructure, life of livestock, fodder crops and irrigation infrastructure for the same, due to severe inundation and cyclonic damages is significant in the coastal belt of Goa. It also affects the animals directly and indirectly. Probability of electrocution due to snapping of overhead electrical conductor wires is very high.

Flood vulnerability

Floods in Goa have caused loss to the human lives, livestock, damaged homes and caused crop destruction over the decades. Infrastructure damage due floods is well recorded. The Valvanti, Chapora, Kushawati and Talpona rivers have well-defined stable courses; their natural and manmade banks are capable of carrying flood discharges except when the water is let out from the overflowing dams of Tillari and Anjunem. Because of lacklustre attitude of the community, unplanned growth, lack of maintenance of natural tanks and improper upkeep of drainage systems, floods have been construed as natural although in reality they are human-induced. Traditionally, flood problem in Goa had been confined to the spilling of smaller rivers and the submersion of marginal areas in Pernem, Bicholim, Sattari, Bardez, Canacona, Quepem and Sanguem. However, the drainage problem in the municipal areas of the State has deteriorated in the last couple of decades, thereby multiplying the destructive potential of increasing flood hazards.

Table 2.14: Flood Prone Areas North Goa: **Source:** DDMA North Goa

BARDEZ TALUKA		
Sr. No.	Name of the Saza / Village	Place
1	**Nadora**	Juvemwaddo (Island), Wadivaddo, Madad waddo, Kodxe waddo
2	**Revora**	Bank of Chapora river at Revora, Tankwaddo at Revora
3	**Camurlim**	Bank of Chapora river at Camurlim, Tarwaddo, Barvanwaddo
4	**Colvale**	Khajinwaddo, Tarwaddo, Chicalim, Part of Voizavaddo

TISWADI TALUKA		
Sr. No.	Name of the Saza /Village	Place
1	**St Cruz**	Cacra, St. Cruz Near Four Pillar
2	**St. Estevam**	Akhada, Jua
3	**Chorao**	Chodan
4	**Goltim Navelim**	Divar
5	**Curca-Bambolim-Talaulim**	Nauxim, Santana
6	**Cumbharjua**	Gawant
7	**Azossim Mandur**	Mandur
8	**Panaji**	Altinho, Mala, Panaji, Kamara Bhat, Taleigao

BICHOLIM TALUKA		
Sr. No	Name of the Saza/ Village	Place
01	**Harvalem**	Supachepudh
02	**Bicholim**	Gaonkarwada, Pirachikond, Katarwada
03	**Sal**	Near Mahadev Bhumika temple Khalchawada Sal
04	**Latambarcem**	Bhatwadi Nanora
05	**Amona**	Mestwada, Kharwada
06	**Sanquelim**	Maulinguem South, Sanquelim Municipal Market, Muzavarwada
07	**Virdi**	Ghadiwada Gaonkarwada Virdi
08	**Gauthan**	Khalchawada Gauthan
09	**Pilgao**	Bagwada Pilgao
10	**Pale**	Bhamai
11	**Surla**	Deulwada (near siddheshwar temple surla)
12	**Karapur**	Codal, Vithalapur
13	**Ona Maulingae**	Saterkarwada,Paltadwada
14	**Curchirem**	Kelmelkarwada
15	**Naveli**	Madhlawada Maina, Pavlar Naveli
PERNEM TALUKA		
Sr. No.	Name of the Saza /Village	Place
1	**Dhargal**	Shirgal
2	**Ibrampur**	Ibrampur, Hedus
3	**Casarvornem**	Casarvornem
4	**Chandel**	Chandel
5	**Allorna**	Hassapur, Allorna Talarna, Bailapar, Khutwal

6	**Ozori**	Sangavwada

SATTARI TALUKA		
Sr. No.	**Name of the Saza /Village**	**Place**
1	**Pissurlem**	NIL
2	**Nagargao**	NIL
3	**Mauxi**	NIL
4	**Keri**	Ghoteli
5	**Guleli**	Kankire, Melauli, Dhamse
6	**Valpoi**	Velus, Nanus
7	**Bhironda**	Savarshe, Padeli
8	**Morlem**	Gimaiwada
9	**Sanvordem**	Sonal
10	**Cotorem**	Khadki,
11	**Poriem**	Near Bhumika Temple
12	**Dongurli**	NIL
13	**Honda**	NIL

Table 2.15: Flood Prone Areas of South Goa: **Source:** DDMA South Goa

Taluka	V.P. Vulnerable	Areas Vulnerable	Households likely to be affected	Expected time of floods	Expected time of Ending	Duration
Salcete						
Salcete	Paroda-Mullem	Zuna Bazar & Paroda Bazar	04	As per weather forecast	-	-
	Cuncolim	Cuncolim	04	As per weather forecast		-
Mormugao						
Mormugao	Nil	Nil	Nil	Nil	Nil	Nil
Ponda						
Ponda	Usgao - Ganjem	Sonarbag, Kantor, Godegal, Parsol, Tankwada, Mharvapaz, Tiral, Meditembi, Kerwada, Gonkarwada, Panchwda.	301	During High Tide	After 48 hours	Two day
	Betora - Nirankal	Saterimol, Zamblimol, Kumbharwada, Codar	57	During High Tide	After 48 hours	Two day
	Betqui- Candola	Bagwada, Wadiwada, Gaonkarwada, Jalmiwada, Kurduwada, Jaidwada	50	During High Tide	After 48 hours	Two day
	Savoi- VeremVaghurme	Madakwada, Kawangal, Vaghurme, Kanakwada, Bandwada,	86	During High Tide	After 48 hours	Two day
	Volvoi	Sateribhat, Inambhat, Kamatwada, Deulwada, Fondchebhat, , Metwada, Haliwada	55	During High Tide	After 48 hours	Two day

	Curti-Khandepar	Kadsal, Murdi, Gauthan, Nallakond	62	During High Tide	After 48 hours	Two day
	Borim	Near Sakav at Paniwada	-	-	-	-
Quepem						
Quepem	Nil	Nil	Nil	Nil	Nil	Nil
Sanguem						
Sanguem	1) Sanguem Municipality	1) Dando, 2) Nandurle, LIS(Quinamol) Along river bank	One	In the Month of July, Incase of Incessant rains for 2 to 3 days	4 to 5 hrs after rain recedes	4 to 5 Hrs
	2) Uguem Panchayat	Along river bank	Nil	In the Month of July, iIncase of Incessant rains for 2 to 3 days	4 to 5 hrs after rain recedes	4 to 5 Hrs
	3) Bhati Panchayat	Valshe bridge and along Valshe river banks, Potrem & Valkini	Nil	In the Month of July, iIncase of Incessant rains for 2 to 3 days	4 to 5 hrs after rain recedes	4 to 5 Hrs
	4) Kalay Panchayat	Khutkarwada, Pimpalquina, Devnamol & Duckercond	Nil	In the Month of July, iIncase of Incessant rains for 2 to 3 days	4 to 5 hrs after rain recedes	4 to 5 Hrs
Canacona						
Canacona	Shristal	Bhatpal&Arthafond	App.10 Nos	July, August, September & October.	12 Hours	3 Days
Canacona	Loliem	Maik, Iddar, Mashem	App.10 Nos	July, August, September & October.	12 Hours	3 Days
	Poinguinim	Colsor, Talpana, Galgibag, Sodolxem, Mudkud	App.30 Nos	July, August, September & October.	12 Hours	24 Hours
	Nag-Pal (Municipality)	Kindlem, Margan, Paneyfond	App.15 Nos	July, August, September & October.	12 Hours	24 Hours
Dharbandora						
Dharbandora	V.P Dharbandora	Daukon,	25	In the month of July/ August	July/ August	One day
	V.P. Sacordem	Aglot	25	In the month of July/ August	July/ August	One day

Table 2.16 The Landslide Prone areas in Talukas of North Goa District **Source:** DDMA North Goa

Sr. No.	Taluka	Disaster prone areas Vulnerable to Landslide with Survey Number and Location
1	Tiswadi	**1. Altinho, Panaji:** Chalta No. 1 PT Sheet No. 123 Chalta No. 1, 2, 41, 34, 45, PT Sheet No. 122 **2. Maruti Gad, Panaji:** Chalta No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 12 13, 14, 15, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, PT Sheet No. 105
2	**Bardez**	Nil
3	**Bicholim**	1. Mulgao, Sy. No. 116 & 117 2. Naroa road from Deulwada Naroa to Pilgao village. Sy. No. 151.
4	**Pernem**	1. Kiranpani at Paliem Sy. No. 218/0 2. Vaidongar at Parcem Sy. No. 55/1, 75/4 3. Mahakhajan at Dhargal road Sy. No. 10/1, 2, 3
5	**Sattari**	1. Chorla Bealgaum Road Sy. No. 80/0 Charavane Village Satre

Table 2.17: The Landslide Prone areas in Talukas of South Goa District **Source:** DDMA North Goa

Taluka	VP/ Municipality vulnerable	Areas vulnerable	Households likely to be affected	Expected time	Intervention needed
		SALCETE			
Salcete	Raia	House of Mrs. Fransquina Mascarenhas, H.No.1306/A, Damon(E) Raia	one	June to August	Retaining wall to be constructed
	Velim	1. Rangallim Velim 2.Behind the house of Caitano Pinto (Zoriwado)	NIL	NIL	Retaining wall constructed
		3.Behind the house Santan Pinto (Zoriwado)			
		MORMUGAO			
Mormugao	Municipality Vasco	1) Opp Goa Shipyard Vaddem	Opp Goa Shipyard Vaddem Approx 11	June to August	Retaining wall to be constructed
	Municipality Vasco	2)Behind Shalom Abode Vollant Vasco	01 house & residency building	June to August	Retaining wall to be constructed
	Municipality Vasco	3) Kamat Residency Near Lake Maimollem	Building and Road affected	June to August	Retaining wall to be constructed
	Municipality Vasco	4) Merces Vaddem & Maimollem	Approximately 04 houses affected	June to August	Retaining wall to be constructed
Mormugao	Municipality Mormugao	1) Bharatline & Desterro	Approximately	June to August	Retaining wall to be constructed

			15 houses affected		
	Municipality Mormugao	2) Bogda	Approximately 15 houses affected	June to August	Retaining wall to be constructed
	Municipality Mormugao	3) Rumdawada	Approximately 25 houses affected	June to August	Retaining wall to be constructed
	Municipality Mormugao	4) Jetty & Sada	Approximately 20 houses affected	June to August	Retaining wall to be constructed
	Municipality Mormugao	5) Harbour	Approximately 18 houses affected	June to August	Retaining wall to be constructed
	PONDA				
	NIL	NIL	NIL	NIL	NIL
	QUEPEM				
	NIL	NIL	NIL	NIL	NIL
	SANGUEM				
	NIL	NIL	NIL	NIL	NIL
	CANACONA				
	NIL	NIL	NIL	NIL	NIL
	DHARBANDORA				
	NIL	NIL	NIL	NIL	NIL

Drought vulnerability

While drought is an insidious hazard of nature, it originates from a deficiency of the precipitation that persists long enough to produce a serious hydrologic imbalance. Drought should be considered relative to some long-term average condition of balance between precipitation and evapo-transpiration (i.e., evaporation and transpiration) in a particular area. Fortunately, the State of Goa has average rainfall of around 125 inches per annum thereby safeguarding the State from possibility of drought situation in near future.

Heat waves vulnerability

A heat wave is a climatological extremity involving abnormally higher temperature relative to the normal during months of April-May. The highest temperature recorded in Goa in summer is around 40 degrees centigrade. Till date no casualty is recorded in Goa due to Heat wave. However, the rise in average temperatures during summer is seen in last decade. Heat wave advisory is seen at **Annexure IV.**

Hazard seasonality matrix:

Based on long period data of recurrence, the seasonality matrix of hazardous phenomena in Goa is given in **Table 2.18:**

Table 2.18: Hazard Seasonality Matrix

Hazard Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flood						■	■	■	■	■		
Cyclone				■	■				■	■		
Landslide						■	■	■				
Heatwave/Sunstroke/Sunburn			■	■	■							
Coastal Erosion					■	■				■	■	
Gusty Winds					■						■	■
Lightning				■	■					■	■	
Epidemics							■	■	■	■	■	■
Earthquake	■	■	■	■	■	■	■	■	■	■	■	■

Tsunami											
Anthropogenic hazards											

Table 2.20: Hazard Profile of Goa

Sr. No.	Hazard	Vulneability
1.	Earthquake	The State of Goa falls under **Seismic Zone III** (Moderate Damage Risk Zone as per MSK VII) under the Seismic Zonation Map of India.
2.	Floods	All Low-lying areas of the State are prone to floods. Upper catchments of all the tributaries of the Mandovi and Zuari rivers are prone to flash floods.
3.	Landslides	Approximate 15% of the land area of India is susceptible to landslide out of which **0.09 million sq. km** come under Western Ghats and Konkan hills including Goa.
4.	Windstorm	Occasional wind storms in different parts of the State in the pre-monsoon season resulting tree fall destroying roof-tops and crops.
5.	Fires/Forest fire	All densely populated habitations across the State are prone to fire incidents. As per Directorate of Fire & Emergency Services Goa, the trend of the fire incident has increased to **285% since 2003.** In the year **2023, 4,108 No.** of fire incidents were reported in the State. In addition, rate of forest fires has also increased in the State especially during the dry spells in Summer season.
6.	Rail & Road Accidents	The areas in the vicinity of the Konkan and Western Rail lines are vulnerable to railway accidents across North and South Goa. Besides, the State is experiencing the increasing trend to road accidents. As per the monthly report issued by the Directorate of Transport for the month of September 2023, **227** road accidents were reported, out of which 14 were Fatal Accidents (North Goa – 06 and South Goa –08).
7.	Cloudbursts/ Thunderstorms/ Lightening	The whole State of Goa is vulnerable to Cloudbursts/Thunderstorms/Lightening especially during the Monsoon season.
8.	Human induced disasters	Both North and South Goa districts are vulnerable to human induced disasters including but not limited to drowning incidents; landslides (mining areas), boat capsizing, aircraft accidents, terrorism/stampede/riots.

Chapter-3
Coherence and Mutual Reinforcement of Three Post-2015 Global Frameworks for DRR

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

3.1 Background

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

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

Disaster Risk Reduction Post-2015

Post 2015, there has been a dynamic shift from the approach of *Managing Disasters to Managing Risk.* The three landmark global agreements viz. – **the Sendai Framework for Disaster Risk Reduction 2015-30 (SFDRR), Sustainable Development Goals (SDG) and the Paris Agreement (CoP 21)** set the stage for future global action on Disaster Risk Reduction (DRR), sustainable development and climate change.

3.2 Sendai Framework of Actions for Disaster Risk Reduction 2015-2030

The Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) was adopted at the Third United Nations World Conference on Disaster Risk Reduction held in Sendai, Japan in March 2015. The SFDRR is document which outlines **04 priorities for action to achieve 07 targets**, which in turn would lead to one outcome that is- *substantial reduction of disaster risk and losses in lives, livelihoods, health, economy of persons, businesses, communities and countries.*

3.2.1 The Four Priorities for Action: -

The four priorities for action under the Sendai Framework are:

    1. Understanding Disaster Risk

    2. Strengthening Disaster Risk Governance to Manage Disaster Risk

    3. Investing in Disaster Risk Reduction for Resilience

    4. Enhancing Disaster Preparedness for Effective Response and to "Build Back Better" in Recovery, Rehabilitation and Reconstruction

India is a signatory to the Sendai Framework for a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. India will make its contribution in achieving the seven global targets set by the Sendai Framework (Fig 3-1):

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

The Seven Global Targets are: -

(A) SUBSTANTIALLY REDUCE:

1. Global Disaster Mortality: Substantially reduce global **disaster mortality by 2030**, aiming to lower the average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015

2. Number of People affected: Substantially reduce the **number of affected people globally by 2030**, aiming to lower the average global figure per 100,000 in the decade 2020-2030 compared to the period 2005-2015

3. Economic Loss in Relation to GDP: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030

4. Damage to Critical Infrastructure and Service Disruption: 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

(B) SUBSTANTIALLY INCREASE:

5. Number of countries with DRR Strategies: Substantially increase the **number of countries with national and local disaster risk reduction strategies by 2020**

6. International Cooperation to Developing Countries: Substantially enhance **international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030**

7. Multi-Hazard Early Warning Systems: Substantially increase the **availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.**

3.3 Sustainable Developmental Goals

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in September 2015 as a universal call *to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030*.

The 17 SDGs are integrated- that is, they recognize that action in one area will affect outcomes in others, and that development must balance social economic and environmental sustainability. They recognize that ending poverty and other deprivations must go hand in hand with strategies that improve health and education, reduce inequality, and spur economic growth- all while tackling climate change and working too preserve our oceans and forests. In strong commitment by all stakeholders to implement the global goals.

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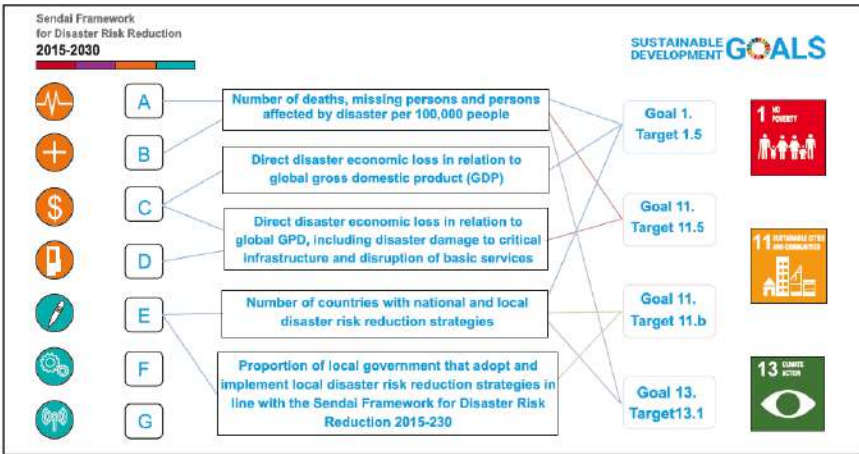
Figure 3-3: Coherence and mutual reinforcement of SDGs and Sendai Framework

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

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

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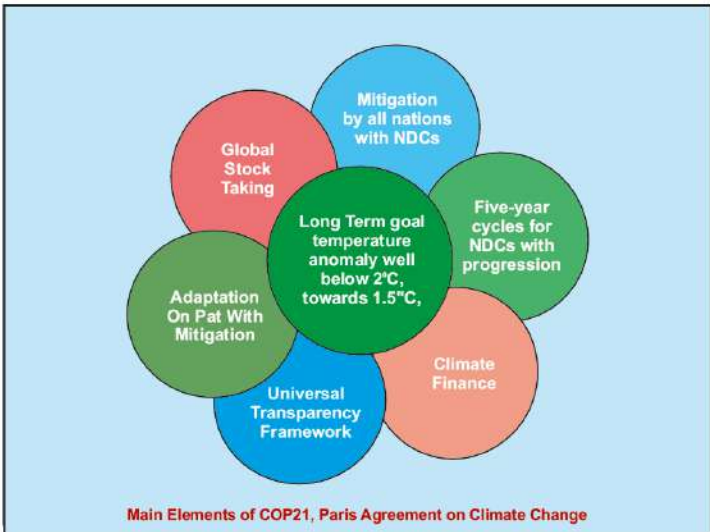
Figure 3-4: Main elements of the COP21, Paris Agreement on Climate Change

The major goals adopted in the agreement are:

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

ii) Aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change

iii) Accepting the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and

iv) To undertake rapid reductions of emissions in accordance with the best available science adaptation seek to address (Fig. 3-5). The regions already exposed to climate-related hazards and effects will be at greater risk due to a projected increase in the frequency and/or intensity of those hazards and effects because of global climate change.
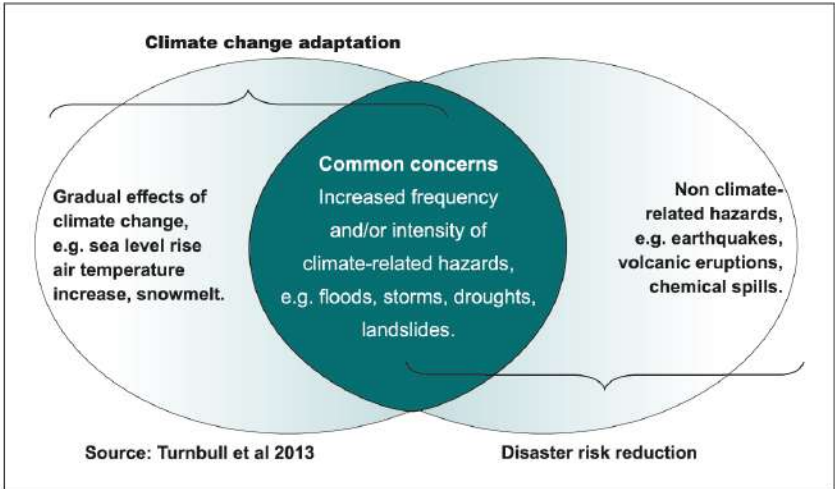
Figure 3-5: Common concerns of climate change adaptation and disaster risk reduction

The agreement aims to strengthen the ability of countries to deal with the impacts of climate change.

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

3.5 Coherence and Mutual Reinforcement—Thematic Area for DRR

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

Effective reduction of losses and risks from natural hazards and climate extremes requires integrated actions at different levels of governance. One of the greatest challenges is of creating institutional convergence that integrates global goals emanating from these agreements. Disaster risk reduction (DRR) and Climate Change Adaptation (CCA) are part of key agendas being considered in all these recent global agreements. All three agreements share a common aim of making development sustainable. Strong commitment to ambitious goals and accelerated implementation of these international agreements must be a global priority. Given the complementarities between the post - 2015 agendas, leveraging the total impact of these instruments creates shared value. Efforts must be deployed to ensure that each of them do not build in "policy risks" or, contradictory policies, that generate more - rather than less - risk in development. Taken together, the different priorities, targets and actions in the three frameworks constitute a more comprehensive resilience agenda than when implemented independently without mutual reinforcement because building resilience requires action that spans the multiple domains of development, humanitarian initiatives, responding to climate change and disaster risk reduction.
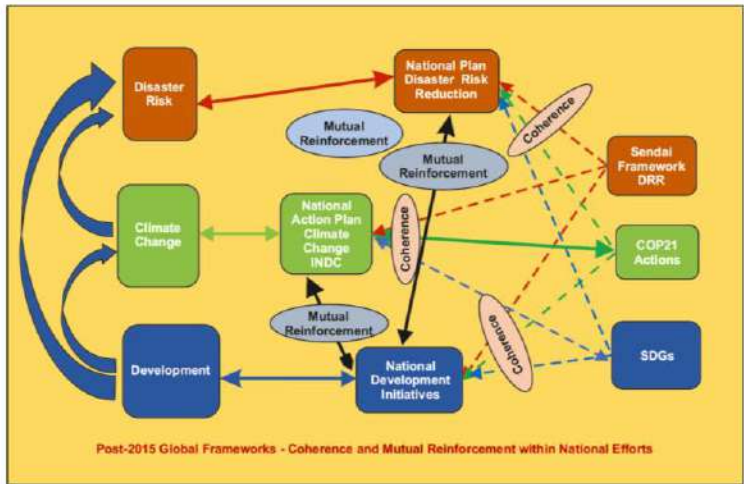
Figure 3-6: Post-2015 Global Frameworks—Coherence and Mutual Reinforcement within National Efforts

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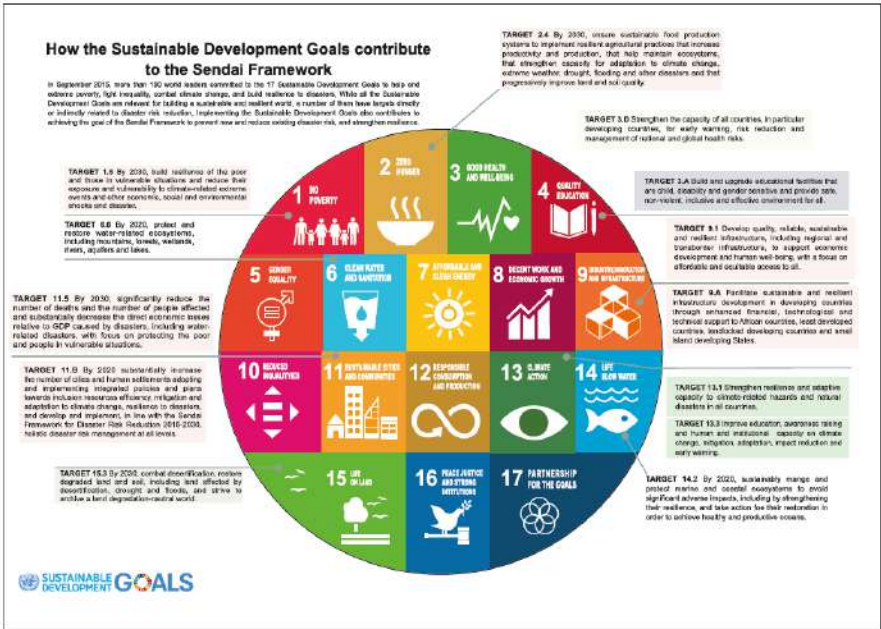
Figure 3-7: Envisaging coherence and Mutual Reinforcement of SDGs and Sendai Framework

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

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

	Sendai – Global Targets	**Sustainable Development Goals**	**COP21 – Paris Agreement on Climate Change**	**National Initiatives Relevant to DRR**
1.	Substantially reduce global disaster mortality by 2030 (2020- 2030 compared to 2005-2015)	SDG 1, 2, 11, 13	• Changes in the pattern of extreme events require enhanced disaster resilience and adaptation • Addressing GACC risks is crucial for eliminating poverty and reducing economic losses from disasters	Multiple schemes and initiatives for DRR, economic development, GACC mitigation and adaptation.
2.	Substantially reduce the number of disaster-affected people by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 11, 13	Stresses the need for accelerated action to build resilience through risk-sensitive planning and implementation of DRR	• Allocation of resources and funds for disaster prevention and to develop capacities for DRR • Strengthening of the DRR at all levels • Promoting disaster resilient development • Mainstreaming DRR and adaptation to GACC in development
3.	Substantially reduce direct disaster economic loss	SDG 1, 11	The Paris Agreement aims to hold global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C, recognizing that this would significantly reduce the risks and impacts of climate change	National commitment to DRR evident from the PM Ten Point Agenda for DRR National commitments for mitigation of and adaptation to GACC as per Intended Nationally Determined Contributions (INDC)
4.	Substantially reduce damage to critical	SDG 1, 4, 9, 11,	Global adaptation goals for enhancing adaptive capacity, strengthening resilience and reducing	Enhance the resilience of national health systems by

			vulnerability to ensure adequate adaptation response in the context of the global temperature goal	integrating DRR into primary, secondary and tertiary health care, and by promoting and enhancing training capacities in the field of disaster medicine. The substantial reduction of disaster damage to critical infrastructure and disruption of basic services is essential to ensure healthy lives and promote well-being.
	infrastructure and disruption of basic services (health, education, etc.)			
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	NAPCC for mitigation of and adaptation to GACC • National Mission on Sustainable Agriculture (NMSA) • National Initiative on Climate Resilient Agriculture (NICRA)
6.	Substantially increase international cooperation to complement national actions	Close international cooperation to achieve SDGs	Firm commitments by countries to the global response to GACC based on INDCs and international cooperation for achieving the COP21 goals	India is 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	National investments to improve the early warning and information systems in different sectors and for multi-hazards.

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

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

14.6   Prime Minister's 10 Point Agenda towards Disaster Risk Reduction.

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

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

Chapter-4
Social Inclusion in Disaster Risk Reduction

4 Social Inclusion in Disaster Risk Reduction

4.1 Background

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

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

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

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

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

4.2 Gender Perspective and DRR

4.2.1 Gender-based Vulnerabilities

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

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

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

There is a tendency to leave out women from accessing relief and recovery as they do not have control over resources and institutions (Parkinson 2011). Women headed households, single women, and widows find it difficult to access information and necessary financial help for recovery and reconstruction. Following a disaster, there are many situations in which there is likelihood of women becoming victims of domestic and sexual violence. There are cases women avoiding using shelters for fear of being sexually assaulted. Women are more likely to suffer from malnutrition because they have specific nutritional needs when they are pregnant or breast feeding. During drought, in food scarcity situations, women are the first ones to compromise on their food intake. They are usually overburdened with many household tasks such as fetching drinking water and firewood walking long distances. Women and girls are usually denied the opportunity to acquire lifesaving skills such as swimming because of gender bias rendering them less capable of coping with hazards. Their traditional gendered role as caretakers and nurturers intensifies in post disaster situations having to take care of the injured and sick when they themselves are injured.

During post-disaster planning, relief and recovery needs of women and girls tend to be overlooked because the disaster management is almost entirely male dominated with hardly any participation of women. They are often ignored during compensation proceedings. While most women do not possess formal ownership of either movable or immovable properties (land or assets), even those who have ownership find it difficult to complete the formalities due to various pressures at home and the lack of gender sensitivity in the proceedings. Their losses usually remain undervalued and uncompensated. It is necessary to adequately understand how the disaster risks tend to be amplified by the pre-existing social vulnerabilities and socio-economic stress. Often, unknowingly, due to social conditioning and
gendered roles, women tend to demand less in the reconstruction process. Many barriers inhibit women's participation in the decision-making and rebuilding processes. Yet, disasters do provide

opportunities for improving women's status by altering the gender relations and by facilitating social and behavioural changes. Post disaster recovery presents opportunities to empower women. Despite these formidable challenges, amidst gender bias and inequality, some of the reconstruction programs undertaken in India have tried to empower women, taking advantage of the window of opportunity opened by the disaster.

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

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

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

4.2.2 Sexual and Gender Minorities

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

4.3 Scheduled Castes and Scheduled Tribes
Certain castes and tribes – the scheduled castes and tribes – are recognized in the Indian Constitution as historically disadvantaged people and listed in two Schedules of the constitution for affirmative policies and actions. The First Schedule lists 1,108 castes across various states and the Second Schedule 744 Tribes for affirmative policies and actions. The castes listed are known as

Scheduled Castes (SC) and the tribes listed are known as Scheduled Tribes (ST). As per 2011 Census, the SC and ST comprise about 16.6% (20.14 Cr) and 8.6% (10.43 Cr), respectively, of India's population.

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

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

4.3.1 Scheduled Castes

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

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

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

4.3.2 Scheduled Tribes

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

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

4.4 Children

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

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

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

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

4.5 Elderly

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

of life, and better health care. This phenomenon, called population ageing, is a demographic trend all over the world.

According to national Census 2011, there are nearly 104 million elderly persons (aged 60 years or above); 53 million females and 51 million males. Both the share and size of elderly population is increasing over time. From 5.6% in 1961 the proportion has increased to 8.6% in 2011 (men 8.2%, women 9.0%). In terms of rural and urban distribution, 71% of the elderly are in rural and 29 % is in urban areas. As per Census 2011, the sex ratio among elderly is 1033 women per 1000 men. The life expectancy at birth is 69.3 years for females and 65.8 years for males. At 60 years of age, the average remaining length of life is likely to be about 18 years (16.9 for men and 19.0 for women). At age 70, it was less than 12 years (10.9 for men and 12.3 for women). The old-age dependency ratio is 14.2%, as per Census 2011 (females 14.9%, males 13.6%). Most common disability among the aged persons was locomotor disability and visual disability. According to Helpage India, during disasters the elderly are usually the last in the line, likely to be lost in the crowd, and highly vulnerable49. The greater vulnerability of the elderly compared to others during disasters needs to get more attention in all phases of disaster risk management. The elderly needs to be treated as priority group by proper design in the disaster management plans. The DRR planning needs to pay special attention to psychological vulnerabilities, impaired physical mobility, diminished sensory awareness, poor health conditions as well as weak social and economic limitations that severely limit the capacity of the elderly to prepare for disasters, hinder their adaptability and constrain their ability to respond.

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

1. **In need:** Older people have specific requirements which must be understood and responded to within all DRR activities.
2. **Invisible:** Older people's vulnerabilities and capacities are often overlooked; the collection of data on people's age and sex is essential to ensure older people and other people at risk are visible and supported in DRR.
3. **Invaluable:** Older people have years of knowledge, skills and wisdom which are invaluable assets in DRR and must be acknowledged, valued and engaged by supporting older people to participate in DRR.

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

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

4.6 Persons with Disabilities (PWD)

Disability is a contextual and evolving concept. The UN Convention on the Rights of Persons with Disabilities (UNCRPD) states in its first article: "Persons with disabilities include those who have long - term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others".

The Convention, in its articles 11 and 32, requires that persons with disabilities benefit from and participate in disaster relief, emergency response and disaster risk reduction strategies. The Adoption of the Dhaka Declaration on Disability and Disaster Risk Management, in December 2015, acknowledges: "the importance of linking disability inclusive Disaster Risk Management (DRM) with the Sustainable Development Goals (SDGs) on the understanding that inclusion builds the resilience of the whole of society, safeguards development gains and minimizes disaster losses".

The population of PWD in India, as per census 2011, is 2.68 Cr, which is 2.2% of the population. Of these 56% are males and 44% are females. In the total population, the male and female population are 51% and 49% respectively. Majority of the PWD (approx. 69%) live in rural areas, which is nearly same the share of rural population. A global survey by UNISDR50 in 2013 among 5,717 persons living with disabilities in 137 countries and eight non-self-governing territories examined why the number of the dead and injured PWD are disproportionally high in conflict, disasters and other emergency situations. The survey showed that 72.9% of PWDs have no personal preparedness plans. PWDs across the world say they are rarely consulted about their needs. The survey found that in the event of a sudden disaster, only 20% of PWD could evacuate immediately without difficulty, while the majority would have some level of difficulty or not be able to evacuate at all. A Handicap International study in 2015 (HI 2015) found that 75% of people with disabilities believe they are excluded from humanitarian responses to emergencies like natural disasters and conflict.

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

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

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

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

The DRR efforts must take up social inclusion as challenge recognizing its complex and diverse nature. A social inclusion strategy must identify a series of practical objectives and actions that can significantly decrease or eliminate social exclusion in all aspects of DRR. The DRR efforts need to design local strategies to promote inclusion. All agencies involved in DRR – government, non-government or international – must make special efforts to properly assess the needs of all the

marginalized sections and particularly vulnerable groups and to ensure full compliance with prescribed standards for assistance. Care must be taken to ensure that the vulnerability mapping exercises are able to identify properly all relevant factors. Efforts must be made to facilitate the realization of rights and entitlements of all socially excluded sections. A potential path forward in promoting social inclusion is to encourage community participation as inclusion depends crucially on active involvement of diverse sections of society.

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

4.8 Responsibility Framework—Social Inclusion

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

State Agencies and their Responsibilities		
Sub-Thematic Area for DRR	**State (Lead Agencies)**	**Responsibility – State**
1. **Gender**	**Lead Agencies:** DSJE, DWCD **Agencies with major roles:** SDMA, DMD$ **Supporting Agencies:** *All Agencies Associated with DRR directly or indirectly*	• Ensure that special efforts are made to make DR R gender inclusive and to ensure participation of women • Ensure that there are no discriminatory practices that marginalise sexual and gender minorities at any stage of DRR, • Recognise the additional vulnerabilities of sexual and gender minorities such as trans-genders • HRVCA - Risk Assessment to take care of women and transgender vulnerabilities • Use of Information and Data Management to support gender sensitive approach - DDMA and SDMA • 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 directives to make them gender sensitive Training, Awareness, Mock drills, Vocational Training / Skill development • Empowering, especially leadership in DRR • Curriculum Development with gender sensitive • approach • Specific knowledge products • Promoting insurance

			• Gender audit of DRR measures with the assistance of the State Women's Commission • Ensure joint ownership in the name of husband and wife of houses reconstructed and assets
2.	**Scheduled Castes (SC) & Tribes (ST)**	**Lead Agencies:** DSJE, DTWD **Agencies with major roles:** SDMA, DMD **Supporting Agencies:** *All Agencies Associated with DRR directly or indirectly*	• H RVCA – Risk Assessment to specifically include SC/ST vulnerabilities (locational, existing discriminatory practices, is any, creating hindrances in DRR, access to information, access to risk reduction resources) • Protecting the tribal identity, traditions and customs in post disaster situations in different phases of DRR • Ensure steps taken for DRR do not cause irreversible damage to the community's culture, tradition, habitat and ecosystem • Use of Information and Data Management to support relevant issues - DDMA and SDMA • Convergence between concerned departments in schemes meant for SC/ST for DRR • Shelters/ Temp Shelters/ Relief Camps – non-discriminatory • Ensuring enabling environment for participation • Review and amendment of existing regulations, norms and directives to address requirements of implementing DRR in SC/ST settlements (e.g. retrofitting, social housing, hazard resistant • construction) • Training, Awareness, Mock drills, Vocational Training / Skill development • Empowering, especially leadership in DRR • Curriculum development with focus on issues of SC/ST communities • Specific knowledge products • Promoting insurance products/ campaigns

			• Include non-discriminatory implementation of DRR in Social audit
3.	**Children**	**Lead Agencies:** DWCD, EDD, SCPS **Agencies with major roles:** SDMA, DMD$, HD **Supporting Agencies:** *All Agencies Associated with DRR directly or indirectly*	• Make special arrangements for disaster preparedness and safety of various children's institutions[11] • 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 associated with protection of child rights and safety, including those connected with juvenile justice such as police, CWC, JJB, CARA and DCPU • Promote community-based care and protection of • the affected children. • SCPS should initiate steps to monitor post-disaster threats to children and take counter measures along with the nodal agency at the state for child rights and protection

---

[11] This includes all private and public institutions dedicated for children –foster care centres, kindergartens, pre-schools, facilities for care of children with special needs, orphanages, children's homes, shelter homes, etc. and all institutions designated for the care and protection of children under Juvenile justice system.

4.	**Elderly**	**Lead Agencies:** HFWD, DSJE **Agencies with major roles:** SDMA, DMD$ **Supporting Agencies:** *All Agencies Associated with DRR directly or indirectly*	• Sensitizing local communities about additional vulnerabilities of the elderly persons in the communities and promote neighbourhood 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 DRR • Preparing lists of all the elderly persons living without adequate support, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support • In the risk season or after early warnings, take measures to ensure that the elderly is informed and prepared • Involve elderly in disaster preparedness and planning to the extent they can contribute • Assess medical and health support needs of the elderly in each area and maintain stocks of crucial items • Special attention to the protection of property and assets of the elderly after evacuation or post disaster situations
5.	**Persons With Disabilities (PWD)**	**Lead Agencies:** DSJE **Agencies with major roles:** SDMA, DMD$, HFWD **Supporting Agencies:** *All Agencies Associated with*	• 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 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

| | DRR directly or indirectly | • Linking organisations working for the welfare of PWD with community initiatives for DRR
• Preparing lists of all PWD, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support
• In anticipation of a hazard or after early warnings, take measures to ensure that all PWDs are properly informed and prepared
• Involve PWDs in disaster preparedness and planning as equal participants
• Special attention to the protection of property and assets of the PWDs after evacuation or post disaster situations |

Chapter-5
Mainstreaming Disaster Risk Reduction

5 Mainstreaming Disaster Risk Reduction

5.1 Background

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

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

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

For over two decades, there has been increasing attention on the need to 'mainstream' disaster risk reduction into development. This prompted many nations address risks from natural hazards within their development frameworks in various ways and at different levels - spanning the legislative, institutional, sectoral strategies and financial planning (Benson and Twigg, 2007). Development do not necessarily reduce disaster risk. It can unwittingly create new risks or exacerbate the existing ones, with disasters likely to be both a cause and a product of development. The experiences from across the world have highlighted the crucial importance of social inclusion in DRR. Social exclusion adversely affects both development and the capacity to cope with disasters. In addition to the special emphasis on making DRR socially inclusive, the mainstreaming of DRR must also make social inclusion one of the intrinsic features.

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

5.2 Mainstreaming—Sub Thematic Areas for DRR

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

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

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

5.3 Improving the Awareness and Understanding of Risk

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

5.4 Legal Support and Disaster Governance

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

5.5 Disaster Risk Transfer

A comprehensive disaster risk management strategy, actively involving stakeholders at all levels of government as well as the private sector, local communities and civil society, is required to implement the legislative framework and to provide coordination and monitoring mechanisms and arrangements. Individual disaster risk reduction actions and programs need to be located within this strategy, rather than treated as discrete, individual measures. Moreover, the strategy needs to indicate specific entry points and mechanisms for mainstreaming disaster risk reduction concerns into both the broader development agenda and the design and implementation of individual development initiatives. The emphasis now is on managing risks going beyond disaster and emergency management, which tends to be concerned mainly with management of disaster events rather than risk. The risk management processes are continuous and embedded within the broader development framework. There are various options for financing disaster risk management, i.e., Disaster Risk Financing Instruments (DFRI).

DRFI are commonly classified as ex post (e.g., budget reallocations, loan conversations, borrowing) or ex ante (accumulated reserves, precautionary savings, contingent credit, risk transfer/insurance). Insurance is a type of ex ante financing, in which an at-risk party cedes all or some of its risk exposure to a third party in return for a premium payment. However, none of these are standalone or universal solutions for DRR. For example, insurance is not a sufficient instrument for achieving effective disaster risk management and disaster risk reduction at a societal level. At –risk parties, whether individuals, businesses or governments, must decide when insurance is appropriate and what other tools to use when it is not. It must be noted that not all perils can be insured against. Various risk financing instruments must be integrated within an overall DRR strategy, enabling policies and supporting legal framework.

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

5.6 Ensuring Social Inclusiveness in Disaster Risk Management

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

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

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

reinforcement that it can be implemented only by making it integral to the mainstreaming. To realise it, however, there is need to go beyond the conventional coordination and planning mechanisms. From the perspective of DRR, some indicative areas where a beginning can be made are:

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

5.8 Institutional Arrangements and Capacity Development for Disaster Risk Management

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

5.9 Intra-Government Coordination and Integration

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

5.10 Budget Allocations

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

implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socioeconomic policies such as safety nets and risk transfer mechanisms, as part of a holistic approach. While there are certain budgetary allocations to partially address requirements of relief (e.g., National Disaster Response Fund, State Disaster Response Fund), the mainstreaming of DRR requires each department of the State/ to make adequate provision for DRR as an integral part of the main budget by ensuring that all the major activities have incorporated DRR. Goa State Disaster Management Authority (SDMA) constitutes of State Departments including Fire & Emergency Services, Goa Police, PWD, Electricity, WRD. Government does not allocate separate funds for Disaster Management to these Line Departments. However, as per Sub Sections (1) and (2) of Section 49 of the Disaster Management Act, 2005:

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

(2) The prevision of sub-section (I) shall, mutatis mutandis, apply to departments of the Government of the State.

5.11 Changes in Project Appraisal

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

5.12 Setting Targets, Timeframes and Indicators

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

priorities set in the NDMP in terms of short, medium and long-term goals. What needs to be done by the centre, state and UTs are described in a broad manner in the chapter on the responsibility framework for building disaster resilience.

5.13 Implementation

Mainstreaming is the internalisation of risk awareness and incorporation of risk reduction measures into the main or the overall policies and programmes within and outside government. The NDMP can only provide broad perspective on mainstreaming DRR. Each ministry, department, state and agencies must review current programmes to include DRR to the extent possible cost effectively within their main budget and ensure comprehensive appraisal of all new initiatives (policies, plans, programmes, projects, etc.) based on the perspectives provided in the NDMP. DRR is a common theme among the post-2015 global frameworks and NDMP emphasises the benefits of building coherence and mutual reinforcement among all national efforts associated with these frameworks, which involves many elements going beyond the NDMP into the domain of larger developmental efforts. The implementation of mainstreaming depends on how these considerations have been woven into the main activities as integral to them and not as separate components under the DMP of each. Therefore, it should be noted that NDMP as a standalone document cannot provide details of how different central ministries and state governments will be mainstreaming DRR, which will be through tight integration of DRR in their respective main plans. The NDMP provides in different sections and sub-sections, Thematic Areas and Sub-Thematic Areas relevant to mainstreaming of DRR.

Chapter-6
Building Disaster Resilience – Responsibility Framework: Part-A, Prelude

6

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

6.1 Introduction

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

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

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

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

The SDMP 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):

I. Conforming to the national legal mandates – the DM Act 2005 and the NPDM 2009
II. Participating proactively to realise the global goals as per agreements to which India is a signatory – Sendai Framework for DRR, SDGs and COP21 (Paris Agreement) – consistent with the international consensus for achieving mutual reinforcement and coherence of these frameworks
III. Prime Minister's Ten Point Agenda for DRR articulating contemporary national priorities
IV. Social inclusion as a ubiquitous and cross-cutting principle
V. Mainstreaming DRR as an integral feature

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

6.2 Thematic Areas for DRR

The DMP, incorporates key principles enunciated in the DM Act, National Policy, the three major post-2015 global frameworks, the PM's Ten Point Agenda, a special focus on social inclusion and an emphasis on mainstreaming. The guiding principles of Sendai Framework states that disaster risk reduction requires responsibilities to be shared by different divisions of governments and various agencies. The effectiveness in disaster risk reduction will depend on coordination mechanisms within and across sectors and with relevant stakeholders at all levels. For each hazard, the approach used in this national plan incorporates into the planning framework the key themes enunciated in the Sendai Framework and additional ones based on a broader approach to DRR elaborated earlier. These are grouped under the following six Thematic Areas for DRR:
1. Understanding Risk
2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development
6. Climate Change Risk Management
Separate chapters (3, 4, and 5) have been devoted to the discussion of three crosscutting Thematic Areas—a) coherence and mutual reinforcement for DRR of the post-2015 global frameworks, b) social inclusion and c) mainstreaming DRR.

6.2.1 Understanding Risk

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

6.2.2 Inter-Agency Coordination

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

6.2.3 Investing in DRR – Structural Measures

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

6.2.4 Investing in DRR – Non-Structural Measures

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

6.2.5 Capacity Development

Capacity development is a recurring theme in all DRR efforts. The Sendai Priority-2 (Strengthening DRR governance to manage DR) and Priority-3 (Investing in DRR for resilience) are central to capacity development. The capacity development includes training programs, curriculum development, large - scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises.

The capabilities to implement, enforce, and monitor various disaster mitigation measures must be improved at all levels from the local to the higher levels of governance. It is also strengthening the DRR governance at all levels to better manage risk and to make the governance systems more responsive.

6.2.6 Climate Change Risk Management

Climate change significantly alters the geographic spread, frequency and intensity of hydro metrological 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-metrological hazards, which need to be kept in mind while examining the time frames and actions listed under this Thematic Area for DRR.

Chapter-7
Building Disaster Resilience – Responsibility Framework: Part-B

7 Building Disaster Resilience – Responsibility Framework: Part-B

The chapter provides a complex and extensive nature of the task of building disaster resilience presented in a concise form along with the necessary detailed responsibility framework. The previous chapter provides a prelude to this chapter, which may be referred for brief discussion on the broader aspects related to the subject of this chapter. In order to manage the disaster risks and build resilience, the involvement of multiple agencies at different levels from the local administrative bodies and communities to the State Authority, departments and agencies is the prerequisite. It is equally important that the different agencies at State, district and local level must carry out not only their own responsibilities but also work in a well-coordinated way with several others. The success of disaster risk management plans lies in necessarily identifying the various stakeholders/agencies and clearly specifying their roles and responsibilities for a timely, coordinated and effective response during disaster situations. All the relevant Authorities from local to State level, must institutionalise programmes and activities at the department levels to enhance the inter-departmental and inter-agency coordination and networking. The authorities/agencies must also rationalise and augment the existing regulatory framework and infrastructure. This chapter covers the roles and responsibilities of the State and District Level Authorities, Agencies, Departments to mitigate the impacts of the risks/threats posed by below listed State Specific Hazards notified by the Government of Goa in to two categories:

Category A: Natural Disasters:
1. Gusty Winds;
2. Heavy Rains;
3. Thunder & Lightning Strikes/Cloudbursts;
4. Floods;
5. Landslides;
6. Biological Hazards;
7. Heatwave;
8. Tsunami;
9. Earthquakes;

Category B: Human Induced Disasters
1. Fires;
2. Drowning incidents;
3. Landslides (Mining Areas);
4. Industrial hazards;
5. Boat Capsize;
6. Road/Railway/Aircraft Accidents;
7. Terrorism/Stampede/Riots

Usually in response to requests for assistance, primarily the State Agencies shall play a supportive role in most disasters and emergencies to the disaster-affected Districts. However, depending upon the demand of the situation, in certain disasters, the State Agencies will play a pro –active role. In the light of trends at the National level, the State Agencies will constantly work for to upgrade the DM systems and practices in the domains of DM planning, preparedness, and capacity building. For each State Specific Hazard, in the sub-sections that follow, themes for action are presented in a separate responsibility framework for each of the six Thematic Areas (TA) for DRR and related Sub-Thematic Areas.

7.1 Cyclone, Gusty Winds and Heavy Rains

7.1.1 Understanding Disaster Risk

Cyclone, Gusty Winds and Heavy Rains		Understanding Disaster Risk
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning	SDMA/RD$^\$$, IMD DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Support and coordination • Sponsor studies, research and documentation • Promote studies on socio-economic impacts of cyclone and wind hazards **Short Term (T1)** Constitute State Level Coastal Advisory Committees as per need **Medium Term (T2)** Studies on socio-economic on coping capabilities and impacts
2. Zoning/ Mapping	SDMA/RD$_\$$, DSLR, DDMA	**Recurring/ Regular (RR)** Carry out the mapping and related studies
3. Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	SDMA/RD$^\$$, DDMA, SLRTI, , DSJE, PRIs, DoUD	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans, and for development planning **Short Term (T1)** Constitute/ strengthen the mechanism for consultation with experts and stakeholders
4. Dissemination of warnings, data, and information	SDMA/RD$_\$$, DDMA, PRIs, DoUD, IMD	**Recurring/ Regular (RR)** • Dissemination of warnings to all (including fishermen), down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Warnings using all types of options, types of technologies, and media • Monitoring compliance by various network operators and service providers **Short Term (T1)**

			Establishing seamless interface between national and state networks **Medium Term (T2)** • Ensure facilities and infrastructure for the implementation of adequate access of information to communities at risk • Deployment of communication equipment
5.	**Disaster Data Collection and Management**	SDMA/RD$^\$$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.1.2 Inter-Agency Coordination

Cyclone, Gusty Winds and Heavy Rains			Inter-Agency Coordination
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	**Response**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	**Warnings, Information, Data**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)**

	Sub-Thematic Area for DRR	Department/Agency	Responsibility
			Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4.	**Non-structural measures**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring
5.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.1.3 Investing in DRR – Structural Measures

Cyclone, Gusty Winds and Heavy Rains			Investing in DRR – Structural Measures
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Establishment/ strengthening of Emergency Operation Centres**	SDMA/RD$, DoUD, PRIs	**Recurring/ Regular (RR)** Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood
2.	**Multi-Purpose Cyclone Shelters**	SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk **Medium Term (T2)** Construction of multi-purpose shelters in coastal villages/habitations prone to frequent cyclones **Long Term (T3)** Ensure compliance with relevant building codes
3.	**Social Housing Schemes**	SDMA/RD$, DDMA, PRIs, DoUD, DRD, PRD	**Short Term (T1)**

			Review all housing schemes to ensure that appropriate multi-hazard safety norms, including cyclone-resistant features are incorporated in all social housing schemes **Medium Term (T2)** • Ensure that multi-hazard, especially cyclone-resistant features are incorporated in planning and execution of social housing schemes • Ensure compliance with relevant building codes **Long Term (T3)** Carry out retrofitting of social housing without multi- hazard, especially cyclone-resistant features
4.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation
5.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.1.4 Investing in DRR – Non-Structural Measures

Cyclone, Gusty Winds and Heavy Rains			Investing in DRR – Non-Structural Measures
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	• **Laws** • **Regulations**	SDMA/RD$, Environment/ Forest Dept., DoF	**Recurring/ Regular (RR)** • Ecologically sound land-use zonation • Regulating aquaculture, and groundwater extraction

	• **Enforcement mechanisms**		• Strengthen land-use planning
	• **Techno-Legal Regimes**	SDMA/RD$, CADA, CZMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Consider shoreline erosion, risk to structures, monitoring shoreline changes paying attention to the preservation of natural barriers
	• **Institutional Arrangements**		
	• **Codes for disaster risk reduction**		
	• **Compliance monitoring**	SDMA/RD$, Forest Dept., DOUD, DRD, CZMA, DDMA, PRIs, DoUD	**Short Term (T1)** • Notification of coastal zones for different purposes as per CRZ guidelines and techno-legal framework of town and country planning rules; enforcement and monitoring
		SDMA/RD$, DDMA, PRIs, DoUD, Environment/ Forest Dept.	**Recurring/ Regular (RR)** All coastal states and UTs will undertake the spread, preservation and restoration/regeneration of bio-shields
		SDMA/RD$, DDMA, IRD, PRIs, DoUD	**Recurring/ Regular (RR)** Promote private participation
2.	**Public Private Partnerships**	SDMA/RD$, DDMA	**Short Term (T1)** Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk **Medium Term (T2)** Construction of multi-purpose shelters in coastal villages/habitations prone to frequent cyclones **Long Term (T3)** Ensure compliance with relevant building codes
3.	**Risk Transfer**	FD*, SDMA/RD$, PAGG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property
4.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.1.5 Capacity Development

Cyclone, Gusty Winds and Heavy Rains		Capacity Development
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Training**	SDMA/RD$, DDMA, GIPARD, Technical Training Institutes, DRD, Police Training Academies, DAH&VS	**Recurring/ Regular (RR)** Training and orientation programs for state govt. staff, and other direct stakeholders such as: civil society, media-persons, elected representatives, professionals for veterinary care and support to disaster affected animals
	SDMA/RD$, DDMA, RD, GIPARD, ATI	**Recurring/ Regular (RR)** Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, protection of disaster-affected animals
2. **Curriculum Development**	EDD, Professional Bodies and Councils in States	**Medium Term (T2)** Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management
	HFWD, EDD	**Medium Term (T2)** Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals
	State Education Boards	**Medium Term (T2)** Introducing basic DM concepts in curriculum
3. **Awareness Generation**		**Recurring/ Regular (RR)** • Carry out mass media campaigns

		SDMA/RD$, DDMA, SDRF/DF&ES, CDEF, Goa Police	• Promote attitude and behaviour change in the awareness campaigns/ IEC **Long Term (T3)** • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
4.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**		**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	**Vocational Training/Skill Development**	SDMA/RD$, DDMA, DSDE	**Recurring/ Regular (RR)** • Conduct training programmes • Creating ToT teams for different trades relevant to cyclone-resistant construction
6.	**Empowering women, marginalised communities, and persons with disabilities**	SDMA/RD$, DWCD, DSW, DTW, DEPwD, GIPARD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7.	**Community-Based Disaster Management**	SDMA/RD$, DDMA, GIPARD, PRIs, DoUD	**Recurring/ Regular (RR)** Training for PRI, SHG, NCC, NSS, youth, local community organizations **Short Term (T1)** Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.1.6 Climate Change Risk Management

Cyclone, Gusty Winds and Heavy Rains		Climate Change Risk Management
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Research, Forecasting, Data Management, Zoning, Mapping**	SDMA/RD$, AGD, AHD, FIHD, WRD, FD, SLRTI	**Recurring/ Regular (RR)** Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** Document state-specific GACC impacts and coping mechanisms **Long Term (T3)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
	SDMA/RD$, DDMA, GIPARD, ATI	**Recurring/ Regular (RR)** Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, protection of disaster-affected animals
2. **Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, FD, AGD, FIHD, WRD DDMA, PRIs, DoUD, SLRTI	**Long Term (T3)** • Promote state-specific studies on vulnerabilities, capacities and risks under GACC impact scenarios • Assess GACC risks of vulnerable and marginalised sections
3. **Climate Change Adaptation (CCA)**	SDMA/RD$, FD*, RD, Agriculture Dept., WRD DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation

		Medium Term (T2)
		Develop local adaptation strategies and pilot projects
		Long Term (T3) • Sponsor and promote state-specific efforts and local efforts • Promote appropriate combinations of Green and Blue infrastructure approach • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2 Floods

7.2.1 Understanding Disaster Risk

Floods		Understanding Disaster Risk	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**	
1. **Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning**	SDMA/RD$, IRD., WRD, SDMA, DDMA, SLRTI, PRIs, DoUD	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts for flood management • Support local information systems and update data for better flood management **Short Term (T1)** • Implementing and monitoring of flood preparedness, river basin and reservoir management plans including updating rule curves, improve system of water release from reservoirs • Identification of priority flood protection and drainage improvement	

			Medium Term (T2) Studies on land use and hydrological changes relevant to flood management in river basins and reservoir command areas **Long Term (T3)** Execution of flood protection and drainage improvement schemes
2.	**Zoning/ Mapping and classification flood prone areas**	SDMA/RD$, IRD, SLRTI, WRD, SDMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts
3.	**Research and Development**	SDMA/RD$, IRD, WRD, SDMA, DDMA, SLRTI	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor/ carry out state-specific efforts in all these areas; support local efforts
4.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, DDMA, RD, IRD, DSJE	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
5.	**Dissemination of warnings, data, and information**	SDMA/RD$, IRD, WRD, IPRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Inter-state data and information sharing where applicable • Coordination and cooperation with the central agencies • Ensure facilities and infrastructure for the implementation of adequate access to communities at risk • Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Warnings using all types of options, types of technologies, and media • Monitoring compliance by various network operators and service providers
6.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments

			Short Term (T1)
			Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.2 Inter-Agency Coordination

Floods		**Inter-Agency Coordination**	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$, IRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	**Response**	SDMA/RD$, IRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	**Warnings, Information, Data**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4.	**Non-structural measures**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.3 Investing in DRR – Structural Measures

Flood		Investing in DRR – Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Establishment/ strengthening of Emergency Operation Centres**	SDMA/RD$, DoUD, PRIs	**Recurring/ Regular (RR)** • Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood
2.	**Flood control measures such as construction of embankments and levees**	SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** • Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk **Medium Term (T2)** • Construction of multi-purpose shelters in coastal villages/habitations prone to frequent floods • Proper monitoring and maintenance of river embankments **Long Term (T3)** • Ensure compliance with relevant building codes
3.	**Social Housing Schemes**	SDMA/RD$, DDMA, PRIs, DoUD, DRD, DOUD, PRD	**Medium Term (T2)** • Ensure that multi-hazard, especially cyclone-resistant features are incorporated in planning and execution of social housing schemes in flood prone areas
4.	**Multi-purpose Flood Shelters**	SDMA/RD$, DDMA, PRIs, DoUD	**Medium Term (T2)** • Ensure availability of shelters, undertake proper maintenance, and make arrangements to support the people shifted to temporary shelters
5.	**Waterways and drainage systems for roads, highways, and expressways**	SDMA/RD$, SPWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination and cooperation with the central agencies and ensure proper alignment and design in all state projects
6.	**Enhancing the safety of dams and reservoirs**	SDMA/RD$, DDMA, RD, IRD, WRD	**Recurring/ Regular (RR)** • Carry out measures to increase safety, reduce risks from flooding

			• Undertake pre- and post-monsoon inspections of dams and reservoirs • Monitor the implementation of safety enhancements in accordance with norms
7.	**Desilting/ dredging of rivers to improve flow; drainage improvement; floodwater diversion through existing or new channels**	IRD, WRD, SDMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Implementation as per norms
8.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.4   Investing in DRR – Non-Structural Measures

Flood	Investing in DRR – Structural Measures		
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	• **Regulation and enforcement of laws, norms, regulations, guidelines including** • **Regulation for reservoir management** • **Integrated Water Resources Management (IWRM)**	SDMA/RD$, IRD, WRD, SDMA, DDMA, RD, DOF	**Recurring/ Regular (RR)** • Implementing land-use regulation for low lying areas as per flood control norms • Regulation of inhabitation of low-lying areas along the rivers, nallas and drains • Implementing flood management action plan • Support and cooperate with central agencies; Sponsor state-specific efforts; support local efforts; Cooperate with central efforts **Short Term (T1)** • Enforcing building codes and regulations

			• Review and modification of operation manuals for all major dams/ reservoirs • Prevention and removal of encroachment into the waterways and natural drainage systems **Medium Term (T2)** • Implementing regulatory framework for flood plain zoning and flood inundation management • Implementing flood plain zoning regulations **Long Term (T3)** Implementation of IWRM in major river basins and their sub-basins within each state/UT
2.	**Regulations to promote flood resilient buildings and infrastructure**	SDMA/RD$, DDMA, RD, Local bodies	**Medium Term (T2)** Revise and implement the relevant rules in flood prone areas
3.	• **Wetland conservation and restoration** • **Catchment Area Treatment/ Afforestation**	SDMA/RD$, FD, Local Bodies	**Short Term (T1)** Discourage reclamation of wetlands, natural depressions **Medium Term (T2)** Action plan managing wetlands and natural drainage systems for flood moderation **Long Term (T3)** Implementation of watershed management including catchment area treatment and afforestation programmes
4.	**Public Private Partnerships**	SDMA/RD$, DDMA, DDMA	**Recurring/ Regular (RR)** Promote private participation in disaster management facilities
5.	**Risk Transfer**	DOF*, SDMA/RD$, SDMA, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi- hazard insurance for life and property **Short Term (T1)**

		Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.5 Capacity Development

Flood		Capacity Development
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Training**	SDMA/RD$, DDMA, SDRF Engineering Training Institutes, SIRD, Police Training Academies,	**Recurring/ Regular (RR)** • Training and orientation programs for state govt. staff, professionals for veterinary care and support to disaster-affected animals • Training for CDEF, community, and volunteers
	SDMA/RD$, DDMA, RD, GIPARD, PRIs, DoUD	**Recurring/ Regular (RR)** • Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, protection of disaster affected animals • Training for CDEF, community, and volunteers
2. **Curriculum Development**	Professional Bodies and Councils in States	**Medium Term (T2)** • Update curriculum for undergraduate engineering courses to include topics relevant for cyclone Risk Management
	Health Department	**Medium Term (T2)** • Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma /UG/ PG levels for Health Professionals
	Boards of Education	**Medium Term (T2)** • Improving curriculum periodically using new technologies
3. **Awareness Generation**	SDMA/RD$, WRD, IRD, SDRF, SDRF/DF&ES, CDEF, Police, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management

			• Promote attitude and behaviour change in the awareness campaigns/ IEC • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals **Medium Term (T2)** • Promote use of insurance/ risk transfer • Promote Community Radio
4.	Mock Drills/Exercises		**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	**Vocational Training/Skill Development**	SDMA/RD$, DDMA, RD, DSDE	**Recurring/ Regular (RR)** • Conduct training programmes • Develop ToT teams for different trades relevant to cyclone-resistant construction
6.	**Empowering women, marginalised communities, and persons with disabilities**	SDMA/RD$, DSJE, RD, GIPARD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7.	**Community-Based Disaster Management**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, local community organizations

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.6 Climate Change Risk Management

Floods		Climate Change Risk Management	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**

1.	**Research, Forecasting / Early Warning, Data Management, Zoning, Mapping**	SDMA/RD$, FD, IRD, WSD*, AGD, FIHD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** Document state-specific GACC impacts and coping mechanisms **Long Term (T3)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, Irrigation Dept. / WRD	**Recurring/ Regular (RR)** • Undertake HRVCA as part of preparing and periodic revision of DM plans • Develop strategies for structural and non-structural measures based on HRVCA **Medium Term (T2)** Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	SDMA, IRD/WRD*, FD, DRD, DSJE, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** Develop local adaptation strategies and pilot projects **Long Term (T3)** • Sponsor and promote state-specific efforts and local efforts

			• Promote appropriate combinations of Green and Blue infrastructure approach • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.3 Urban Floods

7.3.1 Understanding Disaster Risk

Urban Floods		Understanding Disaster Risk	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1. **Mapping/ Zoning, Estimation of Possible Inundation levels, monitoring networks**		SDMA/RD₅, SRSAC, DDMA, PRIs (peri-urban), DoUD	**Recurring/ Regular (RR)** • Develop land use planning based on multi-hazard disaster risk assessment • Place land-use planning maps in public domain • Undertake adequate studies, evaluations, and planning considering land use constraints to prevent flooding • Coordinate with the central agencies and implement recommendations • Undertake HRVCA as part of preparing and periodic revision of DM plans • Ward level assessment • Constitute/ strengthen the mechanisms for consultation with experts and stakeholders **Medium Term (T2)** Set up EOCs by the DoUD connected to the ARG network **Long Term (T3)** Develop capacities to make quantitative forecasts and simulate inundation levels under various scenarios
2. **Information Systems, Monitoring, Forecasting, Early Warning**			
3. **Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**			
4. **Disaster Data Collection and Management**		SDMA/RD₅, all depts	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss Assessments **Short Term (T1)** Disaster Damage and Losses 2005- 2015 baseline

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

7.3.2 Inter-Agency Coordination

Urban Floods		Inter-Agency Coordination	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall Disaster Governance**	SDMA/RD$, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	**Response**	SDMA/RD$, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	**Warnings, Information, Data**	SDMA/RD$, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4.	**Non-structural measures**	SDMA/RD$, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.3 Investing in DRR – Structural Measures

Flood	Investing in DRR – Structural Measures
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**

		Department/Agency	Responsibility
1.	**Civil Works**	SDMA/RD$, DOUD, DoUD, PRIs (peri-urban)	**Short Term (T1)** All road re-levelling works or strengthening/ overlay works to be carried out by milling the existing layers of the road so that the road levels will not be allowed to increase **Medium Term (T2)** • Upgrade the existing drainage and storm water systems • Managing drainage systems • Protection of Water Bodies • Ensure protection of Water Bodies and its restoration/ revival **Long Term (T3)** • Bus and Metro Terminals, Railway stations and Airports to be made flood-proof by providing efficient drainage for a much higher rainfall intensity • All future road and rail bridges in cities crossing drains to be designed such that they do not block the flows resulting in backwater effect • Remove encroachments and take strict action against the • encroachers as per the byelaws/ regulations
2.	**Establishment/ strengthening of Emergency Operation Centres**	SDMA/RD$, DOUD, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** Ensure round the clock operations of EOCs during the flood season • with adequate human resources to respond to urban flood
3.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, DOUD, DoUD, PRIs (peri-urban)	**Medium Term (T2)** Collaboration with technical agencies and implementation

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.3.4 Investing in DRR – Non-Structural Measures

Urban Flood	Investing in DRR – Structural Measures	
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. Preparation of comprehensive Urban Storm Drainage Design Manual (USDDM)	SDMA/RDs, DDMA, DOUD	**Recurring/ Regular (RR)** Take initiatives and collaborate with central agencies
2. Preparation of Storm Water Drainage System Inventory	SDMA/RDs, DoUD, PRIs (peri-urban)	**Long Term (T3)** Coordinate with MHUA in preparing the inventory through DoUD
3. Operation and Maintenance of Drainage Systems	SDMA/RDs, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** Adequate budget to be provided to take care of the men, material, equipment and machinery for O&M of drainage systems on a periodic basis
4. Environmental Impact Assessment	SDMA/RDs, DoUD, FD, PRIs (peri-urban)	**Short Term (T1)** Ensure strict compliance with the guidelines and land-use planning consistent with sound storm water management **Medium Term (T2)** Minimise loss of ecologically important areas and natural wetlands
5. • Techno-Legal Regime • Land use planning • City/Town Planning	SDMA/RDs, DoUD, PRIs (peri-urban)	**Short Term (T1)** • Ensure strict compliance of Techno-Legal Regime especially of land use through DoUD • Strengthen land-use planning **Medium Term (T2)** • Incorporate water sensitive urban design considerations into land use planning • Incorporate the topography and specific terrain elements such as hilly, coastal, etc. in the land use plan to minimise flooding allowing free flow of storm water along natural contours
6. Constitution of Urban Flooding Cell for Integrated UFDM	SDMA/RDs, DOUD	**Short Term (T1)** Nodal Department to constitute Urban Flooding Cell at State level and a DM Cell to be constituted at the DOUD level for managing urban flooding at local level

7.	**Public Private Partnerships**	**DOUD, SDMA, DDMA**	**Long Term (T3)** Promote private participation in disaster management facilities
8.	**Risk Transfer**	**DOF*, SDMA/RD$, DAG**	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.5 Capacity Development

Urban Flood			Capacity Development
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1	**Education and Training**	**DOUD, PRIs (peri-urban), SDRF**	**Recurring/ Regular (RR)** Trainings for urban flood rescue and management for CDEF, community, volunteers and others **Short Term (T1)** • Upgrade equipment and skills of SDRF/DF&ES for UFDM • Enlist professionals for veterinary care and support to disaster-affected animals **Medium Term (T2)** State Governments will encourage their school boards to develop similar content in their school curriculum
2	**Awareness Generation**	**SDMA/RD$, DDMA, SDRF, SDRF/DF&ES, CDEF, Police, DOUD, PRIs (peri-urban)**	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management **Medium Term (T2)**

			• Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of • disaster-affected animals
3	Documentation	SDMA/RD$, DDMA, DOUD, State ATI	**Recurring/ Regular (RR)** Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning
4	Empowering women, marginalised communities, and persons with disabilities	SDMA/RD$, DDMA, GIPARD, and other state - level institutions	**Short Term (T1)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
5	Community-Based Disaster Management	SDMA/RD$, SDRF, RD, DDMA, DOUD, GIPARD	**Recurring/ Regular (RR)** Promotion, guidance, support, training for CDEF, community, volunteers **Short Term (T1)** Strengthen ability of communities to manage and cope with disasters based on a multi- hazard approach **Medium Term (T2)** Training for RWA, SHG, NCC, NSS, Youth, Ward Committees, local community organizations
6	Mock Drills/Exercises	SDMA/RD$, DDMA, DOUD, SDRF, SDRF/DF&ES, CDEF, Police	**Recurring/ Regular (RR)** Joint planning and execution of emergency drills

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.2.6 Climate Change Risk Management

Floods			Climate Change Risk Management
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Research, Forecasting / Early Warning, Data Management, Zoning, Mapping**	SDMA/RD$, IRD, WSD*, FD, SDMA, AGD, FIHD, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, IRD, WRD, SLRTI	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans • Develop strategies for structural and non-structural measures based on HRVCA **Medium Term (T2)** Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	SDMA/RD$, IRD, WSD*, FD, DRD, DDMA, DoUD, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** Develop local adaptation strategies and pilot projects **Long Term (T3)** • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.4 Seismic/Earthquakes

7.4.1 Understanding Disaster Risk

Seismic/Earthquakes		Understanding Disaster Risk	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	• **Earthquake Monitoring Services** • **National Seismological Network** • **Real Time Seismic Monitoring Network (RTSMN)** • **Earthquake Hazard and Risk Assessment (EHRA)**	SDMA/RD$, DDMA, RD	**Recurring/ Regular (RR)** Share information widely
2.	**Scientific Seismic Zonation**	SDMA/RD$, DOUD, SPWD, DOUD, DDMA	**Recurring/ Regular (RR)** Ensuring implementation, enforcement, compliance and monitoring; Awareness creation
3.	**Seismic Micro-zonation**	SDMA/RD$, DDMA, SLRTI	**Long Term (T3)** Carry out need assessment from end users, conduct micro-zonation studies, prioritize important urban areas for micro-zonation, do professional review before adoption
4.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, DSJE, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)**

			Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
5.	**Disaster Data Collection and Management**	SDMA/RD$, All depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.4.2 Inter-Agency Coordination

Seismic/Earthquakes			Inter-Agency Coordination
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	**Response**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	**Non-structural measures**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.4.3 Investing in DRR – Structural Measures

Seismic/Earthquakes		Investing in DRR – Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Social Housing Schemes**	SDMA/RD$, DDMA, PRIs, DoUD, DRD, DOUD, PRD	**Recurring/ Regular (RR)** • Ensure that earthquake resistant features are incorporated in planning and execution of social housing schemes • Ensure compliance with relevant building codes
2.	**Strengthening and seismic retrofitting of prioritized lifeline structures and buildings**	SDMA/RD$, SPWD, RD, DDMA, PRIs, DoUD	**Medium Term (T2)** Implementation strengthening and seismic retrofitting as per recommendations of safety audits in all govt. departments, agencies, public utilities, schools, colleges, community halls, etc.
3.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, DDMA, PRIs, DoUD, SPWD	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.4.4   Investing in DRR – Non-Structural Measures

Seismic/Earthquakes		Investing in DRR – Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Regulations and model codes for town planning, civil works and public infrastructure**	**SDMA/RD$, DOUD, DRD, SPWD, DDMA, PRIs, DoUD**	**Medium Term (T2)** • Adopt suitable byelaws for rural and urban areas, put model codes (e.g., NBC 2016) into practice and ensure proper compliance • Micro-zonation for seismic risk reduction **Long Term (T3)**

			Ensure strict compliance with code implementation through relevant Departments and agencies
2.	• **Structural safety audit of lifeline structures and buildings** • **Prioritization of lifeline structures and buildings for strengthening and seismic retrofitting**	**SDMA/RD$, DOUD, SPWD, DDMA, PRIs, DoUD**	**Recurring/ Regular (RR)** Carry out safety audit of lifeline buildings and critical infrastructure **Medium Term (T2)** Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals
3.	**Licensing and certification of professionals**	**Relevant Departments**	**Medium Term (T2)** Implement licensing of engineers through appropriate legal framework and institutional mechanism
4.	**Public Private Partnerships**	**SDMA/RD$, DDMA**	**Recurring/ Regular (RR)** Promote private participation in disaster management facilities
5.	**Risk Transfer**	**DOF*, SDMA/RD$, DAG**	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi- hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.4.5 Capacity Development

Seismic/Earthquakes			Capacity Development
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1	**Training**	SDMA/RD$, SDRF, RD, EDD, SIRD, DDMA	**Recurring/ Regular (RR)** Carry out regular trainings of CDEF, community and volunteers **Medium Term (T2)** • Carry out the national effort to build the requisite number of trained personnel to handle seismic safety in India

			Trainings in search and rescue for CDEF, community, and volunteers
2	**Curriculum Development**	SDMA/RD$, SDMA, RD, HD, EDD, DDMA	**Medium Term (T2)** DM related aspects to be included in undergraduate and professional courses
3	**Awareness Generation**	SDMA/RD$, IPRD, RD, GIPARD, ATIs, SDRF, SDRF/DF&ES, CDEF, Police, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC **Medium Term (T2)** • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
4	**Mock Drills/ Exercises**		**Recurring/ Regular (RR)** Monitoring Emergency Preparedness of Departments **Short Term (T1)** Joint planning and execution of emergency drills
5	**Documentation and Dissemination**	SDMA/RD$, DDMA, PRIs, DoUD, ATI	**Recurring/ Regular (RR)** Popularization and distribution of documentation in local languages
6	**Empowering women, marginalised communities, and persons with disabilities**	SDMA/RD$, GIPARD, SLRTI, DDMA, PRIs, DoUD	**Medium Term (T2)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7	**Community-Based Disaster Management**	SDMA/RD$, DDMA, DOUD	**Recurring/ Regular (RR)** Promotion, guidance, support, training for CDEF, community, volunteers **Short Term (T1)**

			Strengthen ability of communities to manage and cope with disasters based on a multi- hazard approach

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5 Tsunami

7.5.1 Understanding Disaster Risk

Tsunami		Understanding Disaster Risk	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Research and Development Efforts**	SDMA/RD$, DDMA	**Recurring/ Regular (RR)** Develop detailed computerized maps and databases of vulnerable areas along the coast for planning and coordination of DM activities
2.	**Zoning/ Mapping**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Ensure support to the Central Government agencies in zoning/ mapping and carry out at their level
3.	**Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning**	SDMA/RD$, DDMA, SLRTI	**Recurring/ Regular (RR)** Support, cooperation for data, collection and updates
4.	**Dissemination of warnings, data, and information**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)**

			• Dissemination of warnings to all (including fishermen), down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
5.	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	SDMA/RD$, DSJE, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
6.	Disaster Data Collection and Management	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5.2 Inter-Agency Coordination

Tsunami			Inter-Agency Coordination
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	Overall disaster governance	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development in the coastal areas
2.	Response	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies

3.	**Warnings, Information, Data**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4.	**Non-structural measures**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5.3 Investing in DRR – Structural Measures

Cyclone, Gusty Winds and Heavy Rains		Investing in DRR – Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Strengthening of lifeline structures and high priority buildings**	SDMA/RD$, SPWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Implementation as per recommendations of safety audit
2.	• **Shelters from storm surges and tsunamis** • **Construction of large-scale submerged sand barriers** • **Periodical dredging of the inlets and associated water bodies so as to absorb the influx during tsunami** • **Construction of submerged dykes (one or two rows along the stretch of the coast) so as to decrease the impact due to the incoming tsunami and inland dykes to safeguard vital installations**	SDMA/RD$, SPWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Implementation in compliance with relevant building codes/ standards/ technical guidance
3.	**Hazard resistant construction, strengthening, and retrofitting of all**	SDMA/RD$, SPWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation

	lifeline structures and critical infrastructure		

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5.4 Investing in DRR – Non-Structural Measures

Cyclone, Gusty Winds and Heavy Rains		Investing in DRR – Non-Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Mainstreaming DM into Development Planning**	SDMA/RD$, Finance Dept., DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Include DM concerns all schemes and proposals by various ministries as per norms
2.	**Regulation and enforcement of relevant laws**	SDMA/RD$, FD, DDMA, PRIs, DoUD	**Short Term (T1)** • Ensure compliance with coastal environment protection laws and regulations such as the CRZ • Regulating aquaculture, and groundwater extraction **Medium Term (T2)** • Ecologically sound land-use zonation • Discourage inappropriate/ risky use of coastal areas
3.	**Techno-Legal Regime**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Ensure implementation of standards through all departments/ institutions **Medium Term (T2)** Develop suitable byelaws for rural areas (for both engineers and non-engineered buildings) considering local conditions
4.	**Non-structural shore stabilization measures and bio-shields**	SDMA/RD$, FD, DDMA	**Medium Term (T2)** • Developing sand dunes along the coast with sea weeds or shrubs or casuarinas trees for stabilization of the sand dunes • Raising the ground level (above the design water level) with natural beach sand

			Long Term (T3) • Development of coastal forest (green belt) by planting casuarinas or coconut trees along the coastline to cover minimum of about 500m width of the beach • Establishment of bio-shields (e.g., mangrove plantations, as a natural defence) for communities residing along the estuaries
5.	**Safety audits and evaluation of all lifeline structures and important facilities**	SDMA/RD$, DDMA, PRIs, DoUD	**Long Term (T3)** • Detailed assessment of tsunami hazard to the structure and foundation and the benefits of strengthening • Carry out structural safety audit of all lifeline structures and important facilities
6.	**Public Private Partnerships**	SDMA/RD$, DDMA	**Recurring/ Regular (RR)** Promote private participation in disaster management facilities
7.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5.5 Capacity Development

Tsunami			Capacity Development
	Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
		Department/Agency	**Responsibility**
1.	**Training and Capacity Development of Professionals**	**SDMA/RD$, SDRF, RD, SIRD, DDMA**	**Recurring/ Regular (RR)** Training and orientation programs for State Govt. staff/ emergency response officials, CDEF, Community, and other volunteer groups
		SLRTI	**Recurring/ Regular (RR)** Training of the Trainers to impart knowledge related to tsunami mitigation measures to various target groups

2.	Curriculum Development	SDMA/RD$, EDD, DDMA	**Short Term (T1)** Include DM in the educational curricula and develop adequate technical expertise on various subjects related to DM including Tsunami
3.	Awareness Generation	SDMA/RD$, DDMA, SDRF, SDRF/DF&ES, CDEF, Police	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Inform people about care and protection of disaster-affected animals
4.	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure		**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	Mock Drills/ Exercises	SDMA/RD$, DDMA, SDRF, SDRF/DF&ES, CDEF, Police	**Recurring/ Regular (RR)** Joint planning and execution of emergency drills (Central, State, Local and Community)
6.	Empowering women, marginalised communities, and persons with disabilities	SDMA/RD$, GIPARD, SLRTI, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7.	Community-Based Disaster Management	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, CDEF, local community organizations, volunteers

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.5.6 Climate Change Risk Management

Tsunami		Climate Change Risk Management	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Research, Forecasting, Early Warning Information System, Zoning, Mapping**	SDMA/RD$, AGD., AHD, FIHD, WRD, FD, SLRTI	**Recurring/ Regular (RR)** Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, FD, AGD, FIHD, WRD DDMA, PRIs, DoUD, SLRTI	**Medium & Long Term (T2, T3)** • Promote state-specific studies on vulnerabilities, capacities and risks under GACC impact scenarios • Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	SDMA/RD$, FD*, Agriculture Dept., WRD DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short Term (T1)** Develop local adaptation strategies and pilot projects

			Medium Term & Long Term (T2, T3) • Sponsor and promote state-specific efforts and local efforts • Promote appropriate combinations of Green and Blue infrastructure approach • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6 Landslides

7.6.1 Understanding Disaster Risk

Landslides			Understanding Disaster Risk
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Hazard Zoning, mapping, geological, and geotechnical Investigations in regions prone to landslides and snow avalanches**	SDMA/RD$_s$, State DGM, SRSAC, DDMA	**Recurring/ Regular (RR)** Support to and cooperation with central agencies
2.	**Research and Development**	SDMA/RD$_s$, DGM, SRSAC, DDMA	**Recurring/ Regular (RR)** Support to and cooperation with central agencies
3.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$_s$, DSJE, PRIs, DoUD	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
4.	**Dissemination of warnings**	SDMA/RD$_s$, SPWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Ensure facilities and infrastructure for the implementation of adequate access to communities at risk • Dissemination of warnings to all, down to the last mile – remote, rural or urban; • Regular updates to people in areas at risk
5.	**Monitoring, Warning Systems, and Dissemination**	SDMA/RD$_s$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Support and collaboration in implementation
6.	**Disaster Data Collection and Management**	SDMA/RD$_s$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.2 Inter-Agency Coordination

Tsunami			Inter-Agency Coordination
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
5.	**Overall disaster governance**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
6.	**Response**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
7.	**Warnings, Information, Data**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
8.	**Non-structural measures**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.3 Investing in DRR – Structural Measures

Tsunami			Investing in DRR – Structural Measures
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	Protection of Human	SDMA/RD$, State DGM, SPWD	**Recurring/ Regular (RR)**

	Settlements and other infrastructures		Improving infrastructure, roads, and land stabilization work
2.	Protection of Heritage Structures	SDMA/RD$, State DGM, SRSAC, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Support and collaboration
3.	Multi-Hazard Shelters	SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** Identification safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk **Medium Term (T2)** • Construction of multi-purpose shelters in high risk areas at safe sites away from hazard-prone locations • Proper maintenance of roads in risk-prone areas

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.4 Investing in DRR – Non-Structural Measures

Tsunami		Investing in DRR – Non-Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Site selection for Human Settlements in Landslide and Snow Avalanche Prone Areas**	SDMA/RD$, State DGM, DDMA, Local Authorities	**Medium Term (T2)** • Detailed land-use zonation incorporating landslide and snow avalanche risks as applicable • Adopt suitable byelaws for rural and urban areas • Enforce/ promote model codes (e.g., NBC 2016 and updated standards) into practice • Ensure proper compliance
2.	**Regulations and building codes**	SDMA/RD$, DOUD, DDMA, Local Authorities	**Recurring/ Regular (RR)** • Ensure implementation and adherence to codes and guidelines **Medium Term (T2)** • Adopt the techno-legal framework for ensuring compliance with land use zoning and landslide/avalanche safety issues

			• Adopt land use zoning, building byelaws and model code (e.g., NBC 2016) legislation with suitable modification for reducing risk
3.	**Licensing and certification of professionals**	SDMA/RD$ and all relevant Departments	**Recurring/ Regular (RR)** Implement licensing of engineers through appropriate legal framework and institutional mechanism
4.	**Public Private Partnerships**	SDMA/RD$, DDMA	**Recurring/ Regular (RR)** Promote private participation in disaster management facilities
5.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.5 Capacity Development

Tsunami		Capacity Development	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training**	SDMA/RD$, State DGM, SRSAC, SDRF, ATIs, SIRD, GIPARD, SLRTI	**Recurring/ Regular (RR)** • Support and collaboration to national agencies • Training and skill upgrades for search and rescue for CDEF, community, and volunteers • Conduct regular training programmes for professionals including those for care and protection of disaster affected animals
2.	**Curriculum Development**	SDMA/RD$, EDD	**Medium Term (T2)** Include information on landslides and snow avalanches in the curriculum
3.	**Awareness Generation**	SDMA/RD$, SDRF/DF&ES, IPRD, DDMA, PRIs, DoUD, CDEF, Police	**Recurring/ Regular (RR)** • Carry out mass media campaigns

			• Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Inform people about care and protection of disaster-affected animals
4.	**Mock Drills/ Exercises**	SDMA/RD$, DDMA, SDRF, SDRF/ DF&ES, CDEF, Police, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	**Documentation**	SDMA/RD$, GIPARD, SLRTI, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Constitute multi-institutional and multi-disciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate
6.	**Empowering women, marginalised communities, and persons with disabilities**	SDMA/RD$, GIPARD, SLRTI, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
7.	**Community-Based Disaster Management**	SDMA/RD$, SDMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, CDEF, local community organizations

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.6 Climate Change Risk Management

Tsunami	**Climate Change Risk Management**

	Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
		Department/Agency	**Responsibility**
1.	**Research, Forecasting, Early Warning Information System, Zoning, Mapping**	SDMA/RD$, IRD, WRD, SDMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Support national risk reduction efforts related to GACC • Coordination with central agencies **Short Term (T1)** • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** • Document state specific GACC impacts and coping mechanisms • Promote local weather-based insurance mechanisms and agricultural practices. **Long Term (T3)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, IRD, DSJE, SLRTI	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** Data collection related to landslides **Medium Term (T2)** • Develop State specific strategies • Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	SDMA/RD$, FD, SDMA, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies

			• Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short Term (T1)** Develop local adaptation strategies and pilot projects **Medium Term (T2)** • Sponsor and promote state-specific efforts and local efforts **Long Term (T3)** • Implementation of GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.7 Drought

This section relies on the guidelines published by NDMA on drought management listed in Annexure-I and the manual[54] prepared by the MAFW (2016).

7.7.1 Understanding Disaster Risk

Drought			Understanding Disaster Risk
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Vulnerability Maps**	SDMA/RD$, SDMC, DDMA, SAUs in collaboration with central agencies	**Recurring/ Regular (RR)** • Annually, after the end of the South-West monsoon, carry out comprehensive assessment of water availability for drinking and irrigation in all the dryland farming/drought-prone areas in the state to demarcate blocks and preferably villages • Prepare maps of areas likely to face water deficit before onset of next monsoon (demarcate blocks and preferably villages)

			• Undertake village-wise assessment of water storage in the vulnerable blocks
2.	**Assessment, Monitoring, Forecasting, Early Warning**	SDMC, SDMA/RD$, AGD, IRD, Water Supply Dept., SAUs in collaboration with central agencies, DDMA	**Recurring/ Regular (RR)** • Coordinate with central agencies in the compilation, for refining forecast accuracy for the region, and analysis of all the drought, water deficit, and crop related data • Ensure functioning of DMC with requisite facilities and staff to continuously monitor water availability in the drought-prone blocks after likelihood of drought. Is high. • Separately, at the end of SW and NE monsoon, as applicable, prepare and update a robust database of micro-level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio-economic factors • Separately, at the end of SW and NE monsoon, prepare crop advisory for blocks that are likely to face water deficit • Separately, at the end of SW and NE monsoons, prepare comprehensive water conservation, re-distribution, and management plan for the areas in the state that are likely to experience water deficit
3.	**Drought Declaration**	SDMA/RD$, SDMC, SAU, AGD, IRD, WRD, DDMA	**Short Term (T1)** • Monitor key indicators for drought declaration with the support of relevant Central/ State agencies/ Dept. • State Govt. to issue a formal declaration of drought affected areas after which Collector will notify the district and talukas affected and initiate drought response measures • Notify drought - Kharif by 30 October; Rabi by 31 March • Early season drought: In August as per recommended criteria
4.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, DSJE, SAU, AGD, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** • Undertake HRVCA as part of preparation/ revision of DMP • Estimate vulnerability of crops to rainfall uncertainties **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders

5.	**Research**	SDMA/RD$_\$$, SAUs in collaboration with CRIDA, NRAA	**Recurring/ Regular (RR)** Conduct research through the university system to cope with water deficit, to manage crops with less water, improve water conservation programs, enhance the productivity of dryland/ rainfed farming
6.	**Disaster Data Collection and Management**	SDMA/RD$_\$$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.7.2 Inter-Agency Coordination

Drought			Inter-Agency Coordination
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$_\$$, AGD, DRD, PRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	**Response**	SDMA/RD$_\$$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	**Warnings, Information, Data**	SDMA/RD$_\$$, AGD, DRD, PRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4.	**Non-structural measures**	SDMA/RD$_\$$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.7.3 Investing in DRR – Structural Measures

Drought			Investing in DRR – Structural Measures
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Storage Facilities**	SDMA/RD$, DDMA, Forest Dept., Water Supply Dept., PRIs, DoUD, WRD, DRD, PRD, RD	**Recurring/ Regular (RR)** • Drinking water storage and distribution facilities • Fodder storage facilities to maintain fodder banks • Rainwater harvesting systems – individual and community
2.	**Water Conservation Structures**	SDMA/RD$, DDMA, PRIs, DoUD, WRD, DRD, PRD, AHD, RD, IRD	**Recurring/ Regular (RR)** • Water harvesting and storage structures • Check dams, reservoirs with excess capacity • Groundwater recharge augmentation systems
3.	**Social Housing Schemes**	SDMA/RD$, DDMA, PRIs, DoUD, WRD, DRD, PRD, AHD, RD, IRD	**Recurring/ Regular (RR)** Ensure rainwater harvesting and storage in the social housing schemes especially in drought prone areas

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.7.4 Investing in DRR – Non-Structural Measures

Drought			Investing in DRR – Non-Structural Measures
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**

1.	**Mitigation Measures**	SDMA/RD$_S$, DDMA, PRIs, DoUD, WRD, DRD, PRD, AHD, RD, IRD, SAU, FD	**Recurring/ Regular (RR)** Coordinate the efforts of the central agencies in implementing mitigation measures **Short Term (T1)** • Promote private participation in disaster management facilities • Improve the implementation of watershed development programmes **Medium Term (T2)** • Risk management for dryland/ rainfed farmers through agricultural extension, and financial institutions based on assessments at the end of monsoon (SW or NE as applicable) • Drought-Proofing
2.	**Promote water conservation, harvesting, efficient irrigation, afforestation**	SDMA/RD$_S$, DDMA, PRIs, DoUD, WRD, DRD, PRD, AHD, RD, IRD, SAU, FD	**Recurring/ Regular (RR)** • Promote water efficient irrigation systems (sprinklers, drip, etc.) • Promote protective irrigation through micro irrigation systems • Provide advice to farmers to cope with drought, crop management under drought conditions, and efficient water management • Training in water and soil moisture conservation • Promote village-level information systems for natural resource Management • Afforestation and other options using economically useful vegetation
3.	**Agricultural credit, agricultural inputs, finance, marketing, and crop insurance**	SDMA/RD$_S$ and all relevant Departments	**Recurring/ Regular (RR)** • Need-based credit • Promote financial inclusion • Monitor the availability of credit and other financial support from banks and other financial institutions to farmers in drought-prone areas • Ensure the insurance programmes reach the target audiences (especially dryland/rain-fed farmers) and dependent agricultural labour • Marketing support

			• Ensuring availability of quality agricultural inputs
4.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.5 Capacity Development

Drought			Capacity Development
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training and Capacity Building**	SDMA, GIPARD, SIRD, SLRTI, SDMC, SDRF, DDMA, PRIs, DoUD	**Short Term (T1)** • Formulate and implement national training and capacity building programme for drought management, especially, better water conservation, integrated water management (surface and ground water), and cropping systems • Implement different training programmes for officials at various levels, elected representatives, community leaders, CDEF, civil society organizations, animal welfare organizations **Medium Term (T2)** • Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques (crop, animal care, integrated water resources – surface and ground water) • Professionals for veterinary care and • support to drought-affected animals
2.	**Curriculum Development**	SDMA/RD$, SAU, EDD, SBSE	**Recurring/ Regular (RR)**

			• Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture and veterinary courses offered by state institutions • Include drought mitigation in secondary and higher secondary school curriculum
3.	**Awareness Generation**	SDMA/RD$, IPRD, RD, DDMA, PRIs, DoUD, SAU	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Inform people about care and protection of disaster-affected animals
4.	**Empowering women, marginalised communities, and persons with disabilities**	SDMA/RD$, DDMA, PRIs, DoUD, AGD, AHD, WRD, DRD, PRD, IRD, SAU, FD, DSJE	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
5.	**Drought Management Plans**	SDMA/RD$, DDMA, PRIs, DoUD, AGD, AHD, WRD, DRD, PRD, IRD, SAU, FD	**Short Term (T1)** Ensure development of state, district, block, taluka and village drought management plans
6.	**Mainstreaming drought management in developmental plans**	SDMA/RD$, DDMA, PRIs, DoUD, AGD, AHD, WRD, DRD, PRD, IRD	**Recurring/ Regular (RR)** All state govt. departments/ agencies will mainstream disaster management efforts in their developmental plans

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.6.6 Climate Change Risk Management

Tsunami		Climate Change Risk Management
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**
		Department/Agency	**Responsibility**

	Sub-Thematic Area for DRR	Department/Agency	Responsibility
1.	**Research, Forecasting, Early Warning Information System, Zoning, Mapping**	SDMA/RD$, IRD, AGD, WRD, DDMA, PRIs, DoUD, SLRTI, FD	**Recurring/ Regular (RR)** Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short Term (T1)** • Document state specific GACC impacts and coping mechanisms • Take initiatives to promote drought resistant crops • Promote local weather-based insurance mechanisms and agricultural practices. **Medium Term (T2)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, IRD, DSJE, SLRTI	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** • Impact assessment, economic and social risks under GACC and reporting • Assess GACC risks of vulnerable and marginalised sections **Medium Term (T2)** Creation of databank and hazard, risk & vulnerability mapping at local level.
3.	**Climate Change Adaptation (CCA)**	SDMA/RD$, FD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and Public Awareness

	• Capacity building and utilising traditional knowledge to build eco-system. **Short Term (T1)** Develop local adaptation strategies **Medium Term (T2)** • Implement various water and soil conservation programmes consistent with anticipated GACC impacts • Adaptation and mitigation strategies under DM plan for ensuring food security. **Long Term (T3)** • Sponsor state-specific efforts; support local efforts • Develop climate resilient infrastructure. • Implement efficient water management and monitoring systems as part of CCA in the drought prone areas. • Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.8 Thunderstorm, Lightning, Dust, Squall and Strong Winds

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

Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
	Department/Agency	**Responsibility**
7.8.1 Understanding Disaster Risk	SDMA/RD$*	**Recurring/ Regular (RR)** • Preparing State Action Plan and its implementation • Prepare detailed departmental SoPs by concerned department • Data Collection

		Short Term (T1) Compiling the baseline data of 2005- 2015
7.8.2 Inter-Agency Coordination	SDMA/RD$*, DDMA, IPRD, PED*, AGD*	**Recurring/ Regular (RR)** • To disseminate the information received from IMD to public at large • Promote installations of lightning arresters and Doppler Radars • Create a network of community based early warning systems • Ensure specific message and information, dissemination to public at large through print/electronic/social and other mass media at local level • Ensure Push SMS by various telecom service operators to all active mobile connections • Activate all concerned DISCOM office/officers • To ensure power cuts and restoration of power supply and also provide emergency power supply to critical facilities • Activate the district administration with line departments as soon as specific warning is received. • Following and quickly implementing the instructions of central/State govt. • Designate a nodal officer for emergency response • Institutionalised multi-agency coordination with clear role and responsibility • Rescue and evacuation operations in coordination with the administration, NGOs and volunteers. • Emergency medical response • Other necessary related actions • Nodal officer's act as the contact person for each dept. / agency • Monitor State/District level plan • Collect updated data / information and plan for review/updating
7.8.3 Investing in DRR – Structural measures	SDMA/RD$, DDMA, DoUD, PRIs	**Recurring/ Regular (RR)** • Inter-agency coordination and review and update precautionary measures and procedures • Ensure building bye laws and make it mandatory or all ground floor plus two and taller buildings to install lightning conductors/arresters • Promote install of lightning conductors / arresters in schools, industries, and Government and private buildings

		• A drive to be undertaken to check the structural strength of hoarding and old structures
7.8.4 Investing in DRR – Non-Structural measures	SDMA/RD₅*, DOUD, DRD, IPRD, PED, SPWD, HFWD, AGD*, AHD FD	**Recurring/ Regular (RR)** • Inter-agency coordination and implementation • Prepare Assessment, preparedness and mitigation measures report and implement • Review and update precautionary measures and procedures • Public awareness and education for early warning response • Identify vulnerable places • Follow alerts/warning, advisory, • Disseminate Dos and Don'ts for general public and enable access to safe places. • Protecting property/infrastructure and environment from fire damage • Ensuring strict adherence to fire safety norms • To ensure essential services and facilities at vulnerable places • Setup alternative or emergency communication systems • To ensure early restoration of electricity supply to essential services during emergencies and restoration of electric supply at the earliest • To ensure functional stat e of all electrical equipment and maintain the service or replace equipment from time to time • Ensure road connectivity and access to vulnerable areas • Ensure appropriate medical staff, and facilities at place of incident • Strengthen health centres with a network of paramedical professionals • Ensure stock piling of life-saving drugs, de-toxicants, anaesthesia, availability of Halogen tablets in vulnerable areas • Assessment of damage from weather events • Collecting post disaster data from field and reporting to state/national level • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** • Establishment of public information / facilities. • Construction of thunderstorm safe crop storage shelters for farmers

		• Ensuring adherence to fire safety norms • Protecting of property/infrastructure and the environment from fire damage • Risk Transfer arrangements – implementation including crop and animal insurance
7.8.5 Capacity Development	SDMA/RD$, SDRF, SIRD, SLRTI, IPRD	**Recurring/ Regular (RR)** • Training programme for all concerned department officials/ volunteers, CDEF, community, and volunteers • Conduct training programmes and drills on usage of various fire protection equipment and preventive systems • Creation of public awareness • Extensive IEC campaigns to generate public awareness through print, electronic and social media • Ensure Push SMS by various telecom service operators to all active mobile connections.
7.8.6 Climate Change Risk Management	SDMA/RD$, DDMA, PRIs, DoUD.	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short –Term (T1)** Develop local adaptation strategies and pilot projects **Medium -Term (T2)** • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.9 Cloudburst

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

Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
	Department/Agency	**Responsibility**
7.9.1 Understanding Disaster Risk	SDMA/RD$, FD, AGD, AHD, DRD, DOUD, SLRTI, PRI, DOUD, SPWD, DDMA	**Recurring/ Regular (RR)** • Compile and maintain data on events like cloud bursts and hailstorms – location, event information, impacts, etc. **Short Term (T1)** • Identify settlements located on sites prone to landslides/ unstable slope • Prepare list of settlements and households facing very high risk • Mapping landslide-prone areas and identification of unsafe sites for human settlements • Compiling the baseline data of 2005- 2015 **Medium Term (T2)** • Landslide Hazard Zonation (LHZ) using different kinds of spatial data (aerial photographs, satellite imagery) employing the technological improvements in remote sensing that greatly improve the mapping accuracy • Amalgamation of local/indigenous knowledge of landslide-prone areas
7.9.2 Inter-Agency Coordination	SDMA/RD$, DDMA,	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development • Organising and coordinating the immediate response • Coordinate with central agencies • Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring
7.9.3 Investing in DRR – Structural	SDMA/RD$, DRD,	**Recurring/ Regular (RR)**

measures	DOUD, SLRTI, PRI, DOUD, SPWD, DDMA	Undertake slope stabilization measures on a regular basis **Short Term (T1)** Integrated approach to slope stabilization combining bioengineering (plants, trees) and mechanical structures for slope stabilisation **Medium Term (T2)** • Develop additional drainage for quick and safe flow of storm water • Repair and maintain natural drainage systems, rivulets, etc. to ensure unhindered flow of storm water
7.9.4 Investing in DRR – Non-Structural measures	All departments, DoUD, PRIs	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** • Review of existing regulations and amending them in accordance with safer building • Amend town and city plans to reduce risks • Risk Transfer Policy Framework **Medium Term (T2)** • Apply concept of multi-level safety to settlements and the expansion of towns/cities – prevention, spatial planning, organization and emergency management
7.9.5 Capacity Development	SDMA/RD$, SDRF, FD, AGD, AHD, DRD, DOUD, SIRD, SLRTI, PRI, DOUD, SPWD, DDMA	**Recurring/ Regular (RR)** • Enhancing capabilities of DOUD/PRIs to prepare and cope with events like cloudbursts and hailstorms • Basic training on coping up with hailstorm for CDEF, community, and volunteers • Training on various aspects of coping with cloudburst, hailstorms, search and rescue • Training on post-hailstorm management in agriculture • Basic training on coping with cloudburst and hailstorm

		• Training on various aspects of coping with cloudburst, hailstorms, search and rescue • Promoting culture of awareness, alertness and preparedness • Awareness generation programs for public, utilities, DoUD, PRIs, and industries • IEC materials and ensure wider disseminate to general public through all medium • Information on safety, care and protection of disaster-affected animals • Promote use of insurance/ risk transfer
7.9.6 Climate Change Risk Management	SDMA/RD$, DDMA, FD, AGD, AHD, DRD, DOUD, SLRTI, PRI, DOUD, SPWD, SLRTI.	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor state-specific efforts; support local efforts • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short –Term (T1)** Develop local adaptation strategies and pilot projects **Medium -Term (T2)** • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10 Heat Wave

This section is based on the NDMA guidelines[57] for preparation of Heat-wave Action Plan (HAP) listed in Annexure-I.
7.10.1 Understanding Disaster Risk

Heat Wave			Understanding Disaster Risk
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning and Zoning/ Mapping**	SDMA/RD₅, DRD, DOUD, DWSD, EDD, PD, FD, AHD, HD, WCD, PRI/DOUD, DDMA, SLRTI	**Recurring/ Regular (RR)** Maintaining preventive measures as per norms **Short Term (T1)** • Vulnerability Assessment and Establishing Heat-Health Threshold Temperatures • Strengthening and maintaining monitoring and data logging systems for temperature, humidity, etc. required for threshold for heat wave alerts. **Medium Term (T2)** Establish and maintain community-based network for sharing alerts **Long Term (T3)** Modify or customise warnings according to thresholds suitable for the State/UT
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD₅, FD, DSJE, PRI/ DOUD, DDMA, SLRTI	**Recurring/ Regular (RR)** • Updating HRVCA • Identification and listing of Identifying the vulnerable population/ communities/ settlements • Identification of groups requiring special attention **Short Term (T1)** • Constitute/ strengthen the mechanisms for consultation with experts and stakeholders • Conduct audit of equipment and human resource requirements
3.	**Dissemination of warnings, data, and information**	SDMA/RD₅, FD, SLRTI, PRIs/ DoUD, DDMA	**Short Term (T1)** • Create awareness preventive measures • Extensive IEC campaigns to create awareness through print, electronic and social media

			Medium Term (T2) Specific messages for highly vulnerable groups such as elderly, young children, outdoor workers and slum residents
4.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10.2 Inter-Agency Coordination

Heat Wave			Inter-Agency Coordination
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, HD, WCD, PRIs, DOUD, DDMA	**Recurring/ Regular (RR)** • Ensure the local administration (city/district) can understand and meaningfully use all the heatwave-related information from various agencies and health authorities – central and state • Team preparation and coordination – officials and agencies are well prepared for the heatwave season • Coordinate with IMD regarding forecasts, early warning and alert system based on drought severity **Short Term (T1)**

			• Appointing a State Nodal Agency and Officer • Preparing/Adapting Heat Wave Action Plan • Implementation as per specific conditions in the state **Medium Term (T2)** Develop a clearly defined interagency emergency response plan with roles and information flows clearly marked out **Long Term (T3)** • Ensuring coherence and mutual reinforcement of DRR, CCA and development • Partnering local institutions with national institutions / experts • Adapting HAPs developed in other countries /cities, monitoring and evaluating implementation and impact on mortality and morbidity
2.	**Preparation and Response**	SDMA/RD₅, DRD, DOUD, DWSD, EDD, PD, FD, AHD, HD, WCD, PRD, DOUD, PRIs, DDMA	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies • Implementing heat action plan • Establishing First Aid/ Medical Aid facilities in key locations • Identify vulnerable places and provide drinking water points at those places and worksites; also, ORS • Avoiding outdoor games/sports activities • Livestock preparedness during hot weather - ensuring that the livestock has sufficient shade and water on hot days **Short Term (T1)** • Heat treatment wings in hospitals • Establishing medical assistance facilities at places of mass gathering **Medium Term (T2)** • Implement a system of heat alerts to trigger early morning shifts for schools and offices/Rescheduling school and office timings during heat-wave season

			• To construct cool shelters, bus stands, etc. that offer shelter from heat wave
3.	**Warnings, Information, Data**	SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, HD, WCD, PRD, DOUD, PRIs, DDMA	**Recurring/ Regular (RR)** • Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk • Follow the alerts/warning • Do's-and-Don'ts" during a heat wave should be available in local languages and disseminated through media. **Short Term (T1)** Collecting Data/Information necessary for review/update of the plan

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10.3 Investing in DRR – Structural Measures

Heat Wave		**Investing in DRR – Structural Measures**	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Heat wave shelters and other measures**	SDMA/RD$, Forest Dept., PRIs, DoUD, DDMA	**Short Term (T1)** • Strengthening/mainstreaming the network medical assistance facilities • Temperature forecasts and heat alerts will be sent as bulk messages on mobile phones, local electronic media • Electronic screens at busy traffic intersections and market places • Effective transportation • Promote cool roofs and heat reducing integrated development
2.	**Social Housing Schemes**	SDMA/RD$, FD, PRIs, DoUD, DRDA, DDMA	**Short Term (T1)**

			Ensure incorporation of protection from heat wave in multi-hazard resistant features in the planning and execution of social housing schemes in heat wave prone areas
3.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure**	SDMA/RD$, FD, PRIs, DoUD, DRDA, DDMA	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10.4 Investing in DRR – Non-Structural Measures

Heat Wave		Investing in DRR – Non-Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Techno-Legal Regimes**	FD, PRIs, DoUD, DOUD, DRD, DDMA, PRIs, DoUD	• Laws and Regulations • Institutional arrangements • Improving the forest coverage and green areas • Promote use of building materials that provide protection from heat • Promote designs to reduce heat island effects in urban areas • Facilitate integrated development plans that can cope better with heatwave conditions
2.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10.5 Capacity Development

Heat Wave			Capacity Development
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training**	SDMA/RD$, SDRF, RD, DRD, DOUD, DWSD, EDD, PD, FD, SIRD, SLRTI, AHD, HD, WCD, PRI/ DOUD, DDMA	**Recurring/ Regular (RR)** • Train key officials regarding pre, during and post heat-wave season activities • Training for CDEF, community, and volunteers • Training for deployment of Rapid Medical Response Teams • Training on heat-wave specific health care for vulnerable groups
2.	**Curriculum Development**	SDMA/RD$, SDMI, EDD, SLRTI, DDMA	**Short Term (T1)** Inclusion of heat wave and similar issues in various curriculum
3.	**Awareness Generation**	SDMA/RD$, DOUD, RD, HD, DDMA	**Recurring/ Regular (RR)** • Promoting awareness, alertness and preparedness • Training programs for public, PRIs/DoUD • Carry out mass media campaigns in heat-wave prone areas • Create awareness of coping with heat wave and HAP
4.	**Mock Drills/Exercises**	SDMA/RD$, DOUD, RD, SDRF, SDRF/DF&ES, CDEF, Police, DDMA	**Recurring/ Regular (RR)** • Identify and resolve communication gaps between participating departments, partners and the public • Joint execution of emergency drills with local bodies to address heatwave emergencies in relevant areas
5.	**Vocational Training/Skill Development**	SDMA/RD$, DSDE, DDMA	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development for coping with heat wave emergencies

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.10.6 Climate Change Risk Management

Heat Wave	Climate Change Risk Management

	Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
		Department/Agency	Responsibility
1.	**Research, Forecasting, Data Management, Zoning, Mapping**	SDMA/RD$, DOUD, DRD, HD, SLRTI	**Recurring/ Regular (RR)** • Support and coordination • Research on local threshold and climate change adaptation • Improving the dissemination information on of GACC and adaptation
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$*, DOUD, DRD, HD, DSJE, SLRTI	**Recurring/ Regular (RR)** Incorporate updated info on GACC in HRVCA while preparing or periodic revision of DM plans **Short Term (T1)** • Assess heat wave risk and vulnerability due to GACC • Update heat-wave vulnerability maps based on projected GACC impacts **Medium Term (T2)** • Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	SDMA/RD$, HFWD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Short Term (T1)** Develop local adaptation strategies and pilot projects **Medium Term (T2)** Sponsor and promote state-specific efforts and local efforts **Long Term (T3)** • Implementation of GACC adaptation programs

		• Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.11 Chemical (Industrial) Disasters

7.11.1 Understanding Disaster Risk

Chemical (Industrial) Disasters		Understanding Disaster Risk	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Information Systems, Monitoring, Research**	SDMA/RD$, INDD, SPCB, DISH, DDMA	**Recurring/ Regular (RR)** Support and coordination
2.	**Zoning/ Mapping**	SDMA/RD$, INDD, SPCB, DISH, DDMA	**Medium Term (T2)** • Industrial zones on basis of hazard potential and effective disaster management for worst case scenarios for MAH Units • Separate zoning for siting of MAH units • Carry out the mapping and related studies in collaboration with central agencies/ technical organizations
3.	**Monitoring**	SDMA/RD$, INDD, SPCB, DISH, DDMA	**Recurring/ Regular (RR)** Monitoring compliance with safety norms for HAZCHEM and proper disposal of hazardous waste
4.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, DSJE, DISH, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders

| 5. | **Disaster Data Collection and Management** | SDMA/RD$, All Depts. | **Recurring/ Regular (RR)**
Systematic data management of data on disaster damage and loss assessments
Short Term (T1)
Disaster Damage and Losses 2005-2015 baseline |

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.11.2 Inter-Agency Coordination

Chemical (Industrial) Disasters		Inter-Agency Coordination
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Overall disaster governance**	SDMA/RD$, INDD, SPCB, DISH, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR
2. **Response**	SDMA/RD$, INDD, SPCB, DISH, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3. **Warnings, Information, Data Dissemination**	SDMA/RD$, INDD, SPCB, DISH, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4. **Non-structural measures**	SDMA/RD$, INDD, SPCB, DISH, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.11.3 Investing in DRR – Structural Measures

Chemical (Industrial) Disasters		Investing in DRR – Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	• **Shelters, evacuation, and support facilities** • **Multiple routes for reliable access and escape** • **Decontamination facilities**	SDMA/RD$, INDD, SPCB, DISH, DDMA, PRIs, DoUD, IBTA	**Short Term (T1)** • Identification of shelters with basic facilities like drinking water and first aid for chemical exposure • Ensuring water storage facilities and sources for water for accident containment and firefighting operations **Medium Term (T2)** • Providing wide roads and multiple routes in the industrial area to allow quick access by first responders and to ensure escape pathways • Establish decontamination facilities for off-site emergencies of MAH units

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.11.4 Investing in DRR – Non-Structural Measures

Chemical (Industrial) Disasters		Investing in DRR – Non-Structural Measures	
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	• **Laws Regulations, Techno-Legal regimes** • **Enforcement, Compliance and Monitoring** • **Institutional Arrangements**	SDMA/RD$, DDMA, SPCB, DISH, FD, INDD, PRIs, DoUD, IBTA	**Medium Term (T2)** • Formulate/ strengthen rules, norms, and laws such as factories rules consistent with that of ensuring greater safety in hazardous industries and to reduce likelihood of disasters • Review land use norms for the siting of hazardous industries • Empower factory inspectorates to take legal actions for noncompliance of MSIHC Rules • Review rules to grant compensation to chemical accident victims to improve them in favour of victims • Amend land use norms to ensure greater safety and to ensure buffer zones without human settlements in close proximity of

			hazardous industries • Strengthen the conduct of safety audits and enforcement of disaster prevention norms
2.	**Public Private Partnerships**	SDMA/RD$, DDMA, IBTA	**Medium Term (T2)** • Promote private participation in off-site disaster management facilities • Provide legal support for Mutual Assistance Groups among industries within clusters • Encourage private participation in enhancing off-site disaster response and Risk Management
3.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.11.5 Capacity Development

Chemical (Industrial) Disasters			Capacity Development
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training**	SDMA/RD$, SDRF, SIRD, SPCB, INDD, DDMA, PRIs, DoUD, IBTA, SLRTI	**Recurring/ Regular (RR)** Training and orientation programs for state govt. staff, and other stakeholders such as CDEF, community, and volunteers
		SDMA/RD$, GIPARD, ATI DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** Training programs of youth such as NSS, NYS, Scouts and Guides, and

			NSS in DRR
			Short Term (T1) Incorporating disaster response, search and rescue in in the training programs of youth such as village volunteers, civil society, village/ward level leaders
2.	**Curriculum Development**	Professional Bodies and Councils in States, IBTA	**Recurring/ Regular (RR)** Add more specializations and electives on HAZCHEM and chemical disaster management
		HD, DDMA	**Short Term (T1)** Implement the recommendations of reviews in all educational institutions in the state/UT
		State Education Boards	**Short Term (T1)** Introducing basic DM concepts and precautions related to HAZCHEM
3.	**Awareness Generation**	SDMA/RD$_\$$, IPRD, SDRF, SDRF/DF&ES, CDEF, Police, DDMA, PRIs, DoUD, IBTA	**Short Term (T1)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management **Medium Term (T2)** • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Strengthening network of civil society organizations for awareness generation about DRR and DM • Focus on safety and compliance with SOP at workplace for workers • Information on safety, care and protection of disaster-affected animals
4.	**Mock Drills/Exercises**	SDMA/RD$_\$$, INDD, SDRF, SDRF/DF&ES, CivDef, Police, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	**Empowering women, marginalised, and**	SDMA/RD$_\$$, GIPARD, SLRTI, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity

	persons with disabilities		development covering all aspects of disaster management at the state, district, and local levels
6.	**Community-Based Disaster Management**	SDMA/RD$, DDMA, PRIs, DoUD, IBTA	**Recurring/ Regular (RR)** • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for PRI, SHG, NCC, NSS, Youth, local community organizations

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.12 Nuclear and Radiological Emergencies

7.12.1 Understanding Disaster Risk

Nuclear and Radiological Emergencies		Understanding Disaster Risk	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Monitoring and warning network Strengthening Radiation Monitoring**	SDMA/RD$, DDMA	**Short Term (T1)** Follow and support the safety and regulatory requirements
2.	**Setting up reliable and dedicated communication network**	SDMA/RD$	**Short Term (T1)** To extend logistics
3.	**Establish monitoring mechanism to prevent illicit movement of radioisotopes**	SDMA/RD$	**Short Term (T1)** Coordination with and support to central agencies
4.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.12.2 Inter-Agency Coordination

Nuclear and Radiological Emergencies		Inter-Agency Coordination	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Overall disaster governance**	SDMA/RD$, DHS, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR
2.	**Response**	SDMA/RD$, DHS, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)**

			Organising the immediate response and seeking assistance of central agencies
3.	**Warnings, Information, Data Dissemination**	SDMA/RD$, DHS, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at Risk
4.	**Non-structural measures**	SDMA/RD$, DHS, DDMA, PRIs, DoUD	**Short Term (T1)** Adapting the norms/ codes as per State's requirement, enforcement, monitoring

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.12.3 Investing in DRR – Structural Measures

Nuclear and Radiological Emergencies		Investing in DRR – Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Shelters**	SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** • Identification safe buildings and sites to serve as temporary shelters near nuclear installations • Construction of multi-purpose shelters near nuclear installations • Ensure compliance with relevant building codes
2.	• **Decontamination centres** • **Strengthen protection systems of nuclear facilities**	SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Coordination with and support to central agencies

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.12.4 Investing in DRR – Non-Structural Measures

Nuclear and Radiological Emergencies		Investing in DRR – Non-Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**

1.	**standards and other safety and regulatory documents**	SDMA/RD$	**Short Term (T1)** To follow the requirements
2.	**Improve regulatory cover**	SDMA/RD$	**Recurring/ Regular (RR)** To enforce compliance
3.	**Public Private Partnerships**	SDMA/RD$, DDMA	**Recurring/ Regular (RR)** Promote private participation in disaster management facilities
4.	**Risk Transfer**	DOF*, SDMA/RD$, PAGG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi- hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indir ect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.12.5 Capacity Development

Nuclear and Radiological Emergencies			**Capacity Development**
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training**	SDMA/RD$, SDRF/DF&ES, DDMA, CDEF, PRIs, DoUD,	**Recurring/ Regular (RR)** Training of state police , CDEF, community, and volunteers
		SDMA/RD$, DDMA, PRIs, DoUD,	**Recurring/ Regular (RR)** To follow and comply
2.	**Curriculum Development**	SDMA/RD$, DoE	**Short Term (T1)** Inclusion of heat wave and similar issues in various curriculum
3.	**Awareness Generation**	SDMA/RD$, SDRF/DF&ES, CDEF, Goa Police, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and be tter risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC

			• Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on safety, care and protection of disaster affected animals
4.	**Mock Drills/Exercises**		**Recurring/ Regular (RR)** Joint planning and execution of emergency drills
5.	**Developing Capability for response**	SDMA/RD$	**Short Term (T1)** Develop State and district plans
		SDMA/RD$, DDMA, PRIs, DoUD, Goa Police	**Short Term (T1)** Follow the MHA, DAE guidelines Acquire detection capabilities.
		SDMA/RD$	**Short Term (T1)** Prepare own plans in line with the national plan
		SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** To follow and ensure compliance
6.	**Prepare comprehensive plan on medical management**	SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** To follow and ensure compliance
		SDMA/RD$, DDMA, PRIs, DoUD	**Medium Term (T2)** To establish tertiary care hospitals for treatment of radiation injuries Establish primary and secondary care hospitals of adequate capacity at select cities.
7.	**Preparedness**	SDMA/RD$, DDMA, Goa Police	**Short Term (T1)** To equip the health and police dept. appropriately
		SDMA/RD$, DDMA	**Short Term (T1)** To help identify the locations and ensure that evacuation plans are in place
		DDMA, PRIs, DoUD	**Short Term (T1)** Provision for food, water, medicines and other relief materials should be made at the shelters for the affected public
		DDMA, PRIs, DoUD	**Short Term (T1)** To provide support for setting up of mobile radiological laboratories

		SDMA/RD$, DDMA, PRIs, DoUD	**Short Term (T1)** To maintain the data district wise

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13 Biological and Public Health Emergencies (BPHE)

7.13.1 Understanding Disaster Risk

Biological and Public Health Emergencies (BPHE)			Understanding Disaster Risk
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning and Zoning/ Mapping**	HFWD*, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI/DOUD, SLRTI, DDMA	**Recurring/ Regular (RR)** Maintaining preventive measures as per norms **Short Term (T1)** Strengthening integrated health surveillance systems **Medium Term (T2)** Establishing and maintain community-based network for sharing alerts Strengthening IDSP **Long Term (T3)** State should, modify or adapt IMD's warning system according to thresholds applicable in the State
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	SDMA/RD$, FD, DSJE, PRI/ DOUD, DDMA, SLRTI	**Recurring/ Regular (RR)** • Updating HRVCA • Identification and listing of Identifying the vulnerable population/ communities/ settlements • Identification of groups requiring special attention • Conduct audit of equipment and human resource requirements **Short Term (T1)** • Constitute/ strengthen the mechanisms for consultation with experts and stakeholders

			Short Term (T1) • Create awareness preventive measures • Extensive IEC campaigns to create awareness through print, electronic and social media
3.	Dissemination of warnings, data, and information	HFWD*, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI, DOUD, SLRTI, DDMA	**Medium Term (T2)** Specific messages for highly vulnerable groups such as elderly, young children, outdoor workers and slum residents
4.	Disaster Data Collection and Management	SDMA/RD$, SDMA, all depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13.2 Inter-Agency Coordination

Biological and Public Health Emergencies (BPHE)		
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. Overall disaster governance	HFWD, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI, DOUD, DDMA	**Short Term (T1)** • Implementation as per specific conditions in the State • Team mobilization and coordination - officials and agencies • Involving local administration **Medium Term (T2)** • Coordinate with the state MOES (IMD) office regarding forecasts, early warning and alert system based on colour codes corresponding to different thresholds • Develop a clearly defined interagency emergency response plan with roles and information flows clearly marked out

			Long Term (T3) • Partnering local institutions with national institutions / experts • Adapting HAPs developed in other countries/cities, monitoring and evaluating implementation and impact on mortality and morbidity
2.	**Preparation and Response**	HFWD*, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI, DOUD, DDMA	**Short Term (T1)** • Rapid health assessment and provision of laboratory support • Institution of public health measures to deal with secondary emergencies as an outcome of biological emergencies
3.	**Warnings, Information, Data**	HFWD*, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI/DOUD, SLRTI, DDMA	**Short Term (T1)** • Follow the alerts/warning • "Do's-and-Don'ts" should be available in local languages and widely disseminated • Dissemination of warnings to all, down to the last mile – remote, rural or urban • Regular updates to people in areas at risk **Medium Term (T2)** Collecting Data/ Information necessary for review/ update of the plan

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13.3 Investing in DRR – Structural Measures

Biological and Public Health Emergencies (BPHE)		Investing in DRR – Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Strengthening Response**	HFWD*, SDMA/RD$, DRD, DOUD, DWSD,	**Short Term (T1)** • Establishing adequate decontamination systems, critical care Intensive Care Units (ICUs) and isolation wards with pressure control and lamellar flow systems

		EDD, PD, FD, AHD, WCD, PRI/DOUD, SLRTI, DDMA	• Adequate Personal Protective Equipment (PPE) for all the health workers associated with the responding to biological emergencies **Medium Term (T2)** • Strengthening/mainstreaming the network medical assistance facilities • Equipping Medical First Responders (MFRs)/Quick Reaction Medical Teams (QRMTs) with all material logistics and backup support **Long Term (T3)** • Upgradation of earmarked hospitals to cope with Chemical, Biological, Radiological and Nuclear (CBRN) emergencies • Communication and networking system with appropriate intra-hospital and inter-linkages with state ambulance/transport services, state police departments and other emergency services • Mobile tele-health services and Mobile Hospitals
2.	**Upgrading Medical Facilities**	HFWD*, SDMA/RD$, DRD, DOUD, WCD, PRI, DOUD, DDMA	**Medium Term (T2)** Specialised health care and laboratory facilities to address biological emergencies/incidents **Long Term (T3)** • Establishing and strengthening quarantine facilities • Creating at least one public health laboratory in each district

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13.4 Investing in DRR – Non-Structural Measures

Biological and Public Health Emergencies (BPHE)		Investing in DRR – Non-Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**

			Recurring/ Regular (RR)
1.	**Techno-Legal regimes**	HD, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI, DOUD, DDMA	Strengthen institutional arrangements **Medium Term (T2)** Enact/ amend any Act, Rule or Regulation, if necessary, for better implementation of BPHE programmes
2.	**Biosafety and Biosecurity Measures and Environmental Management**	HD, SDMA/RD$, AHD, PRI, DOUD, SLRTI, DDMA	**Recurring/ Regular (RR)** Strict compliance with biosafety and biosecurity provisions • Environmental monitoring to prevent outbreaks
3.	**Risk Transfer**	DOF*, SDMA/RD$, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13.5 Capacity Development

Biological and Public Health Emergencies (BPHE)		Capacity Development
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Human Resource Development & Training**	HFWD*, SDMA/RD$, SDRF, RD, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI, DOUD, SIRD, SLRTI, DDMA	**Recurring/ Regular (RR)** Training support for CDEF, community, and volunteers **Medium Term (T2)** • Training for surveillance • Training for deployment of Rapid Medical Response Teams • Training for All Health and allied healthcare professions, AYUSH doctors and practitioners, community health workers, ASHA, MPWS, ANM and aanganwadi workers. **Long Term (T3)** Organising community awareness programmes for first aid and general triage

2.	**Knowledge management & Curriculum Development**	HFWD*, SDMA/RD$, DRD, DOUD, EDD, FD, AHD, SLRTI, PRI, DOUD, DDMA	**Recurring/ Regular (RR)** • Incorporating basic knowledge of BPHE management through the educational curricula • Proper education and training of personnel • Conduct continuing medical education programmes and workshops at regular intervals • Defining the role of public, private, and corporate sector for their active participation and their sensitisation
3.	**Awareness Generation**	HFWD*, SDMA/RDs, IPRD, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI/DOUD, SLRTI, SIHFW, DDMA	**Recurring/ Regular (RR)** Promoting awareness, alertness and preparedness • Training programs for public, PRIs/ DoUD • Community awareness programme for first aid • Dos and Don't's to mitigate the effects of medical emergencies caused by biological agents • Awareness about the importance of personal hygiene • With due consideration to the social, ethnic and religious issues involved, utmost care will be exercised in the disposal of dead bodies.
4.	**Mock Drills/Exercises/ CBDM**	HFWD*, SDMA/RDs, FD, RD, DDMA, SDRF, SDRF/DF&ES, CDEF, Police, PRI, DOUD	**Recurring/ Regular (RR)** • Defining the role of the community as a part of the disaster management • Testing of various elements of the hospital emergency preparedness through table top exercises, and mock drills • Identify and resolve communication gaps between participating departments, partners and the public • Joint execution of emergency drills with local bodies
5.	**Hospital Preparedness**	HFWD*, SDMA/RDs, DRD, DOUD, DWSD, WCD, DDMA	**Recurring/ Regular (RR)** Preparation of DMP by all the hospitals including those in the private sector **Medium Term (T2)**

			Developing a mechanism to augment surge capacities to respond to any mass casualty event following a biological emergency **Long Term (T3)** Specialised health care and laboratory facilities
6.	**Applied research**	HFWD*, SDMA/RD$, DRD, DOUD, DWSD, EDD, PD, FD, AHD, WCD, PRI/DOUD, SLRTI	**Long Term (T3)** Strengthening of scientific and technical institutions for knowledge management and applied research and training in management of CBRN emergencies
7.	**Empowering women, Marginalised communities, SC/ST, and persons with disabilities**	WCD*, HFWD, SDMA/RD$, DRD, DOUD, PRI, DOUD, DDMA	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development for coping with BPHE

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.13.6 Climate Change Risk Management

Biological and Public Health Emergencies (BPHE)		Climate Change Risk Management
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Research, Forecasting, Early Warning, Data Management, Zoning, Mapping**	HFWD*, SDMA/RD$, DOUD, AGD, DWSD, EDD, PD, FD, AHD, SLRTI	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor and support state specific and local efforts
2. **Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	HFWD*, SDMA/RD$, SDMA, AGD, RD, WRD, DSJE, SLRTI	**Recurring/ Regular (RR)** Undertake HRVCA as part of preparing and periodic revision of DM plans **Medium Term (T2)** Assess GACC risks of vulnerable and marginalised sections
3. **Climate Change Adaptation (CCA)**	HFWD*, SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state specific efforts and local efforts

		for GACC mitigation and adaptation
		Short –Term (T1)
		Develop local adaptation strategies and pilot projects

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.14 Fire Hazard

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

Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
	Department/Agency	**Responsibility**
7.14.1 Understanding Disaster Risk	SDMA/RD$, DF&ES, DITC, GSPCB, DoUD, PRIs, DDMA, SLRTI, Other Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** • Applying the classification system for hazardous industries in rural and urban areas based on norms laid down by the SFAC for fire services • Vulnerability analysis of densely population clusters prone to high risk of fire • Disaster Damage and Losses 2005-2015 baseline **Medium Term (T2)** • Mapping of hazardous sites that pose fire and explosion risks • Assess and fix the requirement of equipment and manpower • Identifying areas prone to forest fires and take preventive measures
7.14.2 Inter-Agency Coordination	SDMA/RD$, DF&ES, DITC, GSPCB, DoUD, PRIs, DDMA, SLRTI, Other Depts.	**Recurring/ Regular (RR)** • Preparation and implementation of fire safety and prevention plans in all built environments • Ensure the functioning of agencies to ensure proper compliance of fire safety norms

7.14.3 Investing in DRR – Structural measures	SDMA/RD$^\$$, DF&ES, DITC, GSPCB, DoUD, PRIs, DDMA, SLRTI, Other Depts.	**Medium Term (T2)** • Identify the gaps in existing capabilities – equipment and infrastructure • Address gaps in infrastructure and equipment needs, upgrade equipment including personal protective equipment • Action plan for modernization and meeting future needs • Strengthening and standardizing response mechanisms **Long Term (T3)** • Procurement of equipment for firefighting, urban search and rescue as per the requirement • Establish fire stations/ posts up to the sub-divisional level to the block level • Enhance the multi hazard response capabilities considering local hazards and vulnerabilities
7.14.4 Investing in DRR – Non-Structural measures	SDMA/RD$^\$$, DF&ES, DITC, GSPCB, DoUD, PRIs, DDMA, SLRTI, Other Depts.	**Recurring/ Regular (RR)** • Strict implementation and strengthening of fire safety rules • Strict procedures for fire safety certification should be followed before issuing building use permissions • Ensure frequent inspection for fire safety system and equipment in public utilities • Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** • Enactment of Fire Act and other legal measures as per recommendations of SFAC and other official bodies • Promotion of building codes as per NBC 2016, especially parts relating to fire and life safety and other relevant sections • Institutional reform and major changes in organizational set up • Legal regime for mandatory fire clearance from SDRF/DF&ES for different types of buildings, colonies, industries and other installations • Risk Transfer Policy Framework
7.14.5 Capacity Development	SDMA/RD$^\$$, GIPARD, SDRF/DF&ES, SDRF, CDEF,	**Recurring/ Regular (RR)**

| | DoUD, PRIs, DDMA, DRD, SLRTI | • Advanced training on disaster management CDEF, community, and volunteers
• Promoting culture of awareness, alertness and preparedness
• Awareness generation programs for public, utilities, DoUD, PRIs, and industries
• IEC materials and ensure wider disseminate to general public through all medium
• Information on safety, care and protection of disaster-affected animals
• TOT programs on various aspects such as firefighting, managing collapsed structure, and search and rescue

Medium Term (T2)
• Address the capability gaps – human and institutional
• Strengthening and standardizing response mechanisms |

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15 Forest Fire Hazard

7.15.1 Understanding Disaster Risk

Forest Fire Hazard		Understanding Disaster Risk
Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
	Department/Agency	**Responsibility**
1. **Observation Networks, Information Systems, Monitoring, Research, Forecasting & Early Warning and Zoning/ Mapping**	FD*, SDMA/RD$, SLRTI, PRIs/ DoUD, DDMA	**Recurring/ Regular (RR)** Maintaining preventive measures as per norms **Short Term (T1)** • Mapping of human settlements in fire-prone forest areas • Monitoring fire-prone forest areas • Identify areas prone to forest fires and monitor them closely in the months when fires usually occur

			Medium Term (T2) • Establish and maintain community based networks for early detection and reporting to the nearest authorities • Promoting community-based forest monitoring system **Long Term (T3)** • Establishing and maintain arrangements to communicate effectively with people living within and near forests • Establish and maintain a system of mutual aid among nearby fire services and forest offices for sharing/ pooling of resources
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	FD*, SDMA/RD$, DSJE, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** • Updating HRVCA • Identification and listing of population clusters prone to forest fire risk • Identification of population clusters within forests requiring urgent attention • Conduct audit of equipment and manpower requirements **Short Term (T1)** Constitute/ strengthen the mechanisms for consultation with experts and stakeholders
3.	**Dissemination of warnings, data, and information**	SDMA/RD$, FD, SLRTI, PRIs/ DoUD, DDMA	**Short Term (T1)** Create awareness for forest fire prevention as most fires are caused by humans, deliberately or inadvertently **Medium Term (T2)** Establishing reliable system to pass on the correct information on fire situation to communities and responders
4.	**Disaster Data Collection and Management**	SDMA/RD$, All Depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments

			Short Term (T1)
			Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15.2 Inter-Agency Coordination

Forest Fire Hazard			Inter-Agency Coordination
	Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
		Department/Agency	Responsibility
1.	Overall disaster governance (Forests are in the concurrent list)	FD*, SDMA/RD$, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR • Ensuring coherence and mutual reinforcement of DRR, CCA and development
2.	Response	FD*, SDMA/RD$, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3.	Warnings, Information, Data Dissemination	FD*, SDMA/RD$, PRIs/ DoUD, DDMA	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15.3 Investing in DRR – Structural Measures

Forest Fire Hazard			Investing in DRR – Structural Measures
	Sub-Thematic Area for DRR	State Agencies and their Responsibilities	
		Department/Agency	Responsibility

1.	**Strengthening forest-fire fighting systems**	FD*, SDMA/RD$, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** • Strengthening various forest fire prevention measures • Communication network of wireless system • Effective transportation • Specialised equipment to fight forest fires • Improved fire-resistant clothing • Strengthening the network of watch towers • Expanding fire detecting systems
2.	**Social Housing Schemes**	FD*, SDMA/RD$, PRIs, DoUD, DRDA, DDMA	**Recurring/ Regular (RR)** Ensure incorporation of fire and multi- hazard resistant features in the planning and execution of social housing schemes in the settlements within and adjacent to forests.
3.	**Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure near forest area and in forest villages**	FD*, SDMA/RD$, PRIs, DoUD, DDMA	**Recurring/ Regular (RR)** Collaboration with technical agencies and implementation

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15.4 Investing in DRR – Non-Structural Measures

Forest Fire Hazard		Investing in DRR – Non-Structural Measures	
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Techno-Legal regimes**	FD*, SDMA /RD$, DRD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Strengthen the laws and regulations for forest fire prevention and control • Improve the institutional arrangements for forest fire prevention and control • Promote use of insurance/ risk transfer
2.	**Risk Transfer**	DoF*, SDMA/RD$	**Recurring/ Regular (RR)**

			Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property
			Short Term (T1)
			Policy Framework

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15.5 Capacity Development

Forest Fire Hazard			Capacity Development
Sub-Thematic Area for DRR		**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Training**	FD*, GIPARD/DSDE, SDMA/RD$, DDMA, , SDRF/DF&ES	**Recurring/ Regular (RR)** Training and orientation programs for state govt. staff, and other stakeholders such as: CDEF, civil society, volunteers, elected representatives. **Short Term (T1)** Incorporating prevention and management of forest fires in the training programs of village volunteers
2.	**Curriculum Development**	FD*, DHE, GIPARD, GU/ SCERT	**Short Term (T1)** Update curriculum relating to forestry management courses and training programmes to include topics relevant to forest fire prevention and control
3.	**Awareness Generation**	FD*, SDMA /RD$, DoIP, DDMA	**Recurring/ Regular (RR)** • Promoting awareness, alertness and preparedness • Training programs for public, PRIs/DoUD • Carry out mass media campaigns in forest fire prone areas • Create awareness of forest fire prevention and control • Strengthening network of community involvement in forest fire reporting, prevention and assistance to controlling

			Recurring/ Regular (RR)
4.	**Mock Drills/Exercises**	FD*, SDMA/RD$, DDMA, SDRF/DSDRF/DF&ES, CDEF, Goa Police	• Involving forest communities'/ forest village committees, JFM committees • Joint execution of emergency drills with local bodies – urban and rural in areas prone to forest fires
5.	**Vocational Training/Skill Development**	GIPARD/DSDE*, SDMA/RD$, DDMA	**Recurring/ Regular (RR)** • Conduct training programmes • Creating ToT teams for different trades relevant to fire-resistant construction in forest fire prone areas for different types of housing and infrastructure
6.	**Empowering women, marginalised communities, and persons with disabilities**	DSW*, FD, SDMA, GIPARD, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

7.15.6 Climate Change Risk Management

Forest Fire Hazard			Climate Change Risk Management
	Sub-Thematic Area for DRR	**State Agencies and their Responsibilities**	
		Department/Agency	**Responsibility**
1.	**Research, Forecasting, Early Warning, Data Management, Zoning, Mapping**	FD*, SDMA/RD$, DDMA, GU, DSLR	**Recurring/ Regular (RR)** • Support and cooperate with central agencies • Sponsor and support State specific and local efforts
2.	**Hazard Risk Vulnerability and Capacity Assessment (HRVCA)**	FD*, DoE & CC, GSCCC, SDMA/RD$, WRD, GU	**Recurring/ Regular (RR)** Incorporate GACC information in DM plans/ reviews **Medium Term (T2)** Assess GACC risks of vulnerable and marginalised sections
3.	**Climate Change Adaptation (CCA)**	FD*, DoE & CC, GSCCC, SDMA/RD$, DDMA, PRIs, DoUD	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies

			• Sponsor and promote state specific efforts and local efforts for GACC mitigation and adaptation **Short Term (T1)** • Strengthen ecological monitoring of forests to improve the understanding of risks from GACC • Develop local adaptation strategies and pilot projects **Medium & Long Term (T2, T3)** • Sponsor and promote state specific efforts and local efforts • Implementation of GACC adaptation programs • Integrate adaptive measures in social protection programmes for the vulnerable groups
4.	**Vocational Training/Skill Development**	GIPARD*, SDMA/RD$, DDMA	**Recurring/ Regular (RR)** Incorporating gender sensitive and equitable approaches in capacity development for coping with heat wave emergencies

Notes: (#) Every department or agency of the State Government not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The Department or Agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) RD—Revenue Department: The State Government Department acting as the Nodal Department for disaster management in the State.

Chapter-8
Preparedness and Response

8   Preparedness and Response

8.1 Background

Response measures are those taken immediately after receiving early warning from the relevant authority or in anticipation of an impending disaster, or immediately after the occurrence of an event without any warning. The primary goal of response to a disaster is saving lives, protecting property, environment, and meeting basic needs of human and other living beings after the disaster. Its focus is on rescuing those affected and those likely to be affected by the disaster. The UNISDR (2016) defines response as:

Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

8.2 Institutional Framework

The section will lay emphasis on functions and responsibilities of Departments and agencies that have a key role to play in disaster response as per current guidelines. The plan will be updated periodically to reflect any changes in the key roles envisaged to Departments and agencies. It is pertinent to mention that no single agency or department can handle a disaster situation of any scale alone. Therefore, different departments must work together to manage the disaster with an objective to reduce its impact. Section 39(d) of the DM Act, 2005 mandates that It shall be the responsibility of every department of Government of a State to respond effectively and promptly to any threatening disaster situation or disaster in accordance with the State plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee. Sections 22{2(g)(h)} of the DM Act, 2005 have clearly laid down various duties relating to DM to be performed by various agencies.

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

a) Line Departments of Government of a State with disaster-specific responsibilities for State-level coordination of the response and mobilization of all the necessary resources

b) Central agencies with disaster-specific responsibilities for Early Warning Systems and alerts

c) National Disaster Response Force (NDRF)

d) State Disaster Response Force (SDRF)

Currently a State Emergency Operation Centre (SEOC) is functional in the Secretariat Porvorim Goa and coordinates with District Emergency Operation Centres for daily situation reporting. It will be connected to the following control rooms:

• All agencies designated to provide hazard-specific early warnings

• District Emergency Operations Centre (DEOC)

• NDRF

• SDRF/DF&ES

• Goa Police

8.3 State Level Early Warning System

The State Government takes inputs from the following GOI designated and State specific agencies **(Table 8 -1)** to monitor the onset of different natural disasters, set up adequate Early Warning Systems (EWS), and disseminate necessary warnings/ alerts regarding any impending hazard, for all those hazards where early warning and monitoring is possible with the currently available technologies and methods. These agencies provide inputs to the Goa SDMA, which will issue alerts and warnings through various communication channels. The agencies responsible for EWS will maintain equipment in proper functioning order and conduct simulation drills to test their efficacy. On their part, the relevant Departments of the State Government and District Administration shall disseminate such alerts and warnings on the ground through all possible methods of communications and public announcements.

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

Hazard	Agency
Cyclone	India Meteorological Department (IMD)/ Meteorological Centre, Panaji Goa
Floods	Central Water Commission (CWC)/WRD
Landslides	Geological Survey of India (GSI)
Heat Wave	India Meteorological Department (IMD)/ Meteorological Centre, Panaji Goa
Fire	DF&ES
Forest Fire	FSI
Drought	Crop Weather Watch Group (CWWG)
Earthquake	India Meteorological Department (IMD)
Epidemics	MHFW Ministry of Health and Family Welfare (MHFW)/DHS
Tsunami	India National Centre for Oceanic Information Services(INCOIS)

Goa SDMA uses the Common Alert Protocol-CAP which is a location based Integrated Platform for dissemination of Disaster Warnings/Alerts especially Red Alerts to the public as SMS, Browser and Mobile App. notifications. Besides, Print and Electronic Media, e-mail, WhatsApp groups, Social media platforms such as X (formerly Twitter) and Facebook, SMS to Fishermen, Websites are also used for dissemination of the Warnings/Alerts.

As per instructions of National Disaster Management Authority, Government of India, Government has issued a **Press Release on 05ᵗʰ April 2024** to popularize the usage of __SACHET Application__ launched by among general masses to stay updated with the location based live weather forecast, necessary do's and don'ts on all disasters including Heatwave and an emergency button **(Dial 112)** to seek any emergency support. Other Important Applications included in the Press release which have been recommended by Ministry of Home Affairs, Government of India that the public can make use of include: **Mausam** (Weather Forecast), **Meghdoot** (Agricultural Forecast) and **Damini** (Lightening Alert).

Early Warning Dissemination System (EWDS):

Government has installed 37 Early Warning Dissemination System-EWDS Towers along the coastal line of Goa including 14 Concrete Spun Towers (15 and 20 Meters), 12 BSNL Towers on Beach Locations and 11 Monopoles on MPCS (5 Meters):

List of Tower Locations

MPCS With 5 meter Monopole

Sr. No	Tower Height	Location	Lat	Long
		North Goa		
1	5	MPCS Junaswada	15°40'16.25"N	73°42'48.90"E
2	5	MPCS Pilerne	15°31'57.41"N	73°47'38.16"E
3	5	MPCS Porvorim	15°31'22.38"N	73°49'47.03"E
4	5	MPCS Altino	15°29'10.44"N	73°49'24.10"E
		South Goa		
5	5	MPCS Chicalim	15°23'20.45"N	73°51'03.46"E
6	5	MPCS Chapoli	15°01'24.22"N	74°02'38.28"E
7	5	MPCS Cuelim	15°21'28.84"N	73°54'09.84"E
8	5	MPCS Sancole	15°22'35.89"N	73°52'49.75"E
9	5	MPCS Mahalwada	14°58'26.20"N	74°04'15.8"E
10	5	MPCS Nagarcem	15°00'41.72"N	74°02'03.83"E
11	5	MPCS Aquem	15°16'10.14"N	73°58'10.08"E

Concrete Spun towers (15/20 Meters)
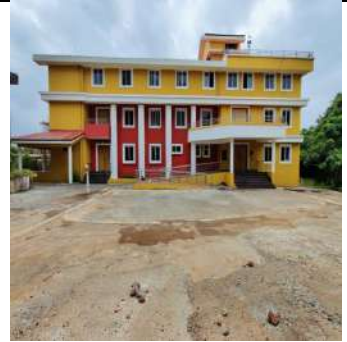
Sr. No	Tower Height	Location	Lat	Long
		North Goa		
1	20	Baga	15°33'43.31"N	73°45'0.10"E
2	15	Vagator	15°35'58.24"N	73°44'2.06"E
3	15	Morjim	15°37'12.43"N	73°44'0.96"E
4	20	Anjuna	15°35'8.80"N	73°44'19.09"E
		South Goa		
5	20	Colva	15°16'37.5" N	73°54'57.8" E
6	20	Benaulim	15°17'31.31" N	73°54'32.68" E
7	20	Majorda	15°18'45.00"N	73°54'5.00"E
8	15	Betalbatim	15°15'18" N	73°55'13" E
9	15	Arossim	15°20'05" N	73°53'37" E
10	20	Agonda	15°1'57.97" N	73°59'26.99" E
11	15	Rajbag	14°59'21.66"N	74°2'15.27"E
12	20	Varca	15°13'59.31"N	73°55'35.29"E
13	15	Cutbona Fisheris	15° 9'20.00"N	73°57'16.00"E
14	15	Galgibag Parking	14°57'53.00"N	74° 2'57.00"E

Multi-Purpose Cyclone Shelters (MPCS):

Government has constructed **11 Multipurpose Cyclone Shelters** (MPCS) **04** in North Goa and **07** in South Goa with all basic facilities for providing temporary accommodation to the disaster affected victims.

Additionally, Government has identified **259** schools and **132** community halls as emergency centers in both North and South districts with all basic facilities.

List of MPCS Locations

Sr. No.	Address	Village	District	Coordinates	
1.	Survey No. 129/1-A in V. P. Penda De Franca of Bardez Taluka,	Porvorim	North Goa	N15°31'22.75" E73°49'46.16"	
2.	Survey No. 115/1 in Saligao village Bardez Goa	Pilerne	North Goa	N15°53'29.42" E73°79'38.72"	

3.	Junaswada under Survey No. 297/1, of **Mandrem** village in V.P. Mandrem of Pernem Taluka, North Goa	Junaswada Mandrem	North Goa	N15°67'11.91" E73°71'35.42"	
4.	Chalta No 18 of P.T Sheet no, 122 at **Althino** of Panji city in Tiswadi Taluka, North Goa	Althino	North Goa	N15°48' 61.70" E73°82'32.19"	
5.	Survey No. 53/1 of **Dabolim** in V.P Chicalim of Mormugao Taluka, South Goa	Dabolim	South Goa	15°23'22" N 73° 51'04" E	

6.	Survey No. 117/1 of Cuelim in V.P **Cuelim** of Mormugao Taluka, Sourth Goa	Cuelim	South Goa	15°21'28.84" N 73° 54' 9.84" E	
7.	Survey No. 137/17, of **Mahalwada,** V.P. Poinguinim of Canacona Taluka South Goa	Mahalwada	South Goa	14°58'26.2" N 74°04'15.8" E	
8.	Survey No. 76/1 of **Chapoli** in V. P Shristal of Canacona Taluka, South Goa	Chapoli	South Goa	15°01'27.61" N 74°02'38.61" E	

9.	Survey No. 128/2 of **Nagarcem** in the jurisdiction Council Canacona Taluka South Goa	Nagarcem	South Goa	15°00'40.82" N 74°02'03. 62" E	
10.	Survey No. 134/1 of VP **Sancoale** in Mormugao Taluka, South Goa	Sancoale	South Goa	15°23'28.46" N 73° 53'08.42" E	

11.	Chalta No 41 in the jurisdiction of Margao Municipal Council **Aquem** Salcete Taluka. South Goa	Aquem	South Goa	15°16'10.14" N 73°58'10.08" E	

8.4 Coordination of Response at State Level

The State Government will activate the IRTs at State or District level and ensure coordination with the SEOC. The SDMA will provide the technical support needed to strengthen the response system. It is essential that the first responders and relief reach the affected areas in the shortest possible time. Often, there are inordinate delays due to real constraints imposed by the location, nature of disaster and, most regrettably, due to inadequate preparedness. In many situations, even a delay of six to twelve hours will prove to be too late or unacceptable. To make matters worse, relief tend to arrive in a highly fragmented or uncoordinated form with multiple organisations acting independently of each other without a cohesive plan, without mechanisms to avoid overlaps and without proper prioritization of different aspects of relief such as shelter, clothing, food, or medicine. From an operational perspective, the challenges are similar across most hazards. Government of Goa has notified State and District Level Incident Response System as per National Level Guidelines on IRS and in consultation with National Disaster Management Authority and National Institute of Disaster Management for a robust, timely and effective response to. The Government has notified Incident Response System-IRS for the effective, efficient, and comprehensive management of all notified State

Specific Disasters (**Table 8-2**).

The Department of State Government 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 District and local administration must widely disseminate and publicise information about these arrangements as mandated in the SDMP and DDMP. Since disaster response operations are multifaceted, time -sensitive, extremely fast moving, and mostly unpredictable, it requires rapid assessment, close coordination among several departments, quick decision-making, fast deployment of human resources and machinery as well as close monitoring. To prevent delays and eliminate ambiguities regarding chain of command, the SDMP and DDMP has been clearly spell out the response organisation as per IRS. These plans shall clearly identify the personnel to be deputed various responsibilities in the IRT at various levels of administration along with proper responsibility and accountability framework. Provision for implementation of unified command in case of involvement of multiple agencies such as Army, NDRF, CAPF, and International Search and Rescue Advisory Group (INSARAG) shall be spelt out in the SDMP. From time to time the DM plan shall be tested and rehearsed by carrying out mock exercises.

8.5 Goa Fire and Emergency Services

The Directorate of Fire and Emergency Services has **16** Fire Stations and **01** Logistic Centre (Headquarters) across the State of Goa and all the personnel of various ranks are trained in Search and Rescue techniques. All the Fire Stations are equipped to attend the emergencies like

Cyclone/Floods/Heavy Rains. All the Fire Stations across the State are functional 24x7and can be deployed to attend various emergencies at short notice. The DFES can depute the SAR Team of the State to the Neighbouring State during the Emergency Period. In accordance with the initiatives taken by Government of India, the State Government shall comply for institutional reforms and organizational restructuring of F&ES in the State and shall implement the major changes for the modernization of the F&ES to make them more effective under Modernisation of Fire Services Scheme from Government of India.

Besides, Government has trained **400** Aapda Mitra volunteers including **70 Aapda Sakhi** (Female Volunteers) through Directorate of Fire and Emergency Services to assist the responding agencies during the disaster related incidents like, Floods, Drowning, Cyclone, Earthquake, Landslides, Heatwave, Fire, Tsunami, etc. All 400 Aapda Mitra Volunteers have been insured under Aapda Mitra Policy by New India Assurance Co. Ltd, Panaji and their individual policies have been issued. Purchase of Emergency Essential Resource Reserve (EERR) Equipment under the Scheme has also been completed.

8.6 Requisition of Central Assistance during Disaster Situations

Disaster management is generally the responsibility of the State Government, and hence the primary responsibility for undertaking rescue, relief and rehabilitation measures during a disaster shall be with the State Government. The State shall request the Central Government to supplement the efforts through logistic and financial support during severe disasters. As such emergencies may stretch the resources of district and State administration to the utmost therefore, as and when necessary, the State Government shall seek the assistance of Central Ministries/ Departments and agencies like the NDRF, Armed Forces, CAPF, and Specialized Ministries/ Agencies for responding to such emergencies in a timely and effective manner. Catastrophic disasters like floods, cyclones and tsunami result in large casualties and inflict tremendous damage on property and infrastructure. The State Government shall seek the Government of India assistance whenever hit hard by a severe disaster with its established flexible response mechanism for a prompt and effective delivery of essential services as well as resources.

8.7 Management of Disasters impacting more than one District

At times, the impact of disasters occurring in one District may spread over to the other one as well. Similarly, preventive measures in respect of certain disasters, such as floods, etc. may be required to be taken in one district, as the impact of their occurrence may affect another. The administrative hierarchy of the Goa consisting of State and District level arrangements presents challenges in respect of disasters impacting more than one District. Management of such situations calls for a coordinated approach, which can respond to a range of issues quite different from those that normally present themselves – before, during and after the event. The State Crisis Management Group will play a major role in handing

such multi-state disasters. The SDMA will encourage identification of such situations and promote the establishment of mechanisms for coordinated strategies for dealing with them by the departments of the State Government, District Administration and other relevant agencies.

8.8 Incident Response System

The Incident Response System (IRS) is an effective mechanism for reducing ad-hoc measures in response. It envisages a composite team with various Sections to attend to all the possible response requirements.

The IRS designates officers to perform various duties and get them trained in their respective roles. It also emphasises the need for proper documentation of various activities for better planning, accountability and analysis. This will greatly help in reducing chaos and confusion during the response phase. **Everyone will know what needs to be done, who will do it and who is in command.**

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

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

14. **Cultural Heritage Sites, their Precincts and Museums — Protection & Preservation**

15. **15. Power**

16. **Public Health**

17. **Rehabilitation and Ensuring Safety of Livestock and other Animals, Veterinary Care**

18. **Relief Employment**

19. **Relief Logistics and Supply Chain Management**

20. **Search and Rescue of People and Animals**

21. **Transportation**

Table 8-2: Notified Incident Response System at State Level

State Level Incident Response System		
IRS Position	Designation of Officers	Roles / Responsibilities
(1)	(2)	(3)
Responsible Officer (RO)	**Chief Secretary** Government of Goa	1. Overall Incharge; 2. Issue Standing Order in advance to different departments and agencies for mobilization of resources in times of emergency; 3. Activate Incident Response Team (IRT) at State Headquarter when the need arises; 4. Coordinate with the Central Government for mobilisation of Armed Forces, Air Support etc. as and when required; 5. **Link Officer appointed by the Government** shall officiate as the Responsible Officer (RO) in the absence of the permanent incumbent.
COMMAND STAFF		
Incident Commander (IC)	**Secretary** (Revenue)	1. Establish immediate priorities, including search & rescue and relief distribution strategies; 2. Brief higher authorities and request for additional resources, if required; 3. Establish appropriate Incident Response System (IRS) organisations based on the span of control and scale of the incident; 4. Establish Incident Command Post (ICP) at a suitable place and to designate concerned officers; 5. Ensure that the Incident Action Plan (IAP) is prepared; 6. Approve and authorise the implementation of IAP; 7. Ensure that planning meetings with section heads are held at regular intervals; 8. Authorise release of information to the media; 9. Recommend demobilisation of the Incident Response Team (IRT), when appropriate; 10. **Deputy Incident Commander** shall officiate as the Incident Commander in the absence of the permanent incumbent.

Deputy Incident Commander	Secretary Urban Development	1. Will carry out any kind of assignment given by the Incident Commander; 2. **Shall officiate as the Incident Commander** in the absence of the permanent incumbent; 3. **Link Officer appointed by the Government** shall officiate as the Deputy Incident Commander in the absence of the permanent incumbent;
Information & Media Officer (IMO)	Secretary (Information & Publicity)	1. Prepare and release information about the incident to the media agencies and others with the approval of Incident Commander (IC); 2. Jot down decisions taken and directions issued in case of sudden disasters when the IRT has not been fully activated and hand it over to the Planning Section (PS) on its activation for incorporation in the IAP; 3. Monitor and review various media reports regarding the incident that may be useful for Incident Planning; 4. Disseminate necessary information to all concerned; 5. **Link Officer appointed by the Government** shall officiate as the Information & Media Officer (IMO) in the absence of the permanent incumbent.
Liaison Officer (LO)	Secretary Housing	1. Maintain a list of concerned line department agencies (NGOs, etc.) and their representatives at various locations; 2. Carry out liaison with all concerned agencies including NDRF and Armed Forces and line department of State Government; 3. Keep the IC informed about the arrivals of all the Government and Non-Government agencies and their resources; 4. Help in organising briefing sessions of all Government and Non-Government agencies with the Incident Commander; 5. Maintain record of various activities performed by each authority / agency; 6. **Link Officer appointed by the Government** shall officiate as the Liaison Officer (LO) in the absence of the permanent incumbent.
Safety Officer (SO)	Secretary Health	1. Recommend measures for assuring safety of responders and hazardous unsafe situations and review at regularly; 2. Review the IAP for safety implications; 3. Review and approve the Site Safety Plan, as and when required; 4. Conduct Hazard Specific Mock drills on a regular basis for capacity building; 5. **Link Officer appointed by the Government** shall officiate as the Safety Officer (SO) in the absence of the permanent incumbent.
GENERAL STAFF		
OPERATIONS SECTION CHIEF (OSC)	Inspector General of Police Goa Police Department	1. Manage all field operations for the accomplishment of the incident objectives; 2. Deploy, activate, expand and supervise

		organisational elements; 3. Maintenance of On Duty Officers list; 4. Brief the personnel in Operation Section (OS) at the beginning of each operational period; 5. Prepare Section Operational Plan in accordance with the IAP, if required; 6. Consult the IC from the time to time and keep him fully briefed; 7. Determine the need for additional resources and place demands accordingly with planning section chief and ensure their arrival; 8. Ensure record of various activities performed by concerned authorities, units, groups and to maintain it; 9. **Link Officer appointed by the Government** shall officiate as the Operations Section Chief (OSC) in the absence of the permanent incumbent.
Staging Area Manager	**Director** (DFES)	1. Establish the Staging Area (SA) with proper layout; 2. Organise storage and despatch of resources received and dispatch them as per IAP; 3. Report all receipts and despatches to Operations Sections Chief and maintain their records; 4. Establish check in function as appropriate; 5. Ensure that communications are established with the ICP and other required locations e.g. different SAs, Incident Base, Camps, Relief Camps, etc.; 6. Maintain and provide resource status to PS and LS; 7. Demobilise Staging Area in consultation with IC; 8. **Link Officer appointed by the Government** shall officiate as the Staging Area Manager in the absence of the permanent incumbent.
Nodal Officer (Air Operations)	**Director** Civil Aviation	1. Coordinate with concerned authorities for air operations; 2. Project the type of Air support required to the appropriate authorities based on the IAP and place the demand at least 24 hours in advance or as early as possible; 3. Inform the IC and OSC about the Air movements and landing schedules in their respective areas; 4. Ensure that relevant Maps of the incident locations are available with all agencies involved in the Air Operations to give the correct coordinates etc. of the locations where Air support is required; 5. Determine the suitability of Helipads or Helibases in coordination with the Air Force authorities and the State authorities; 6. Maintain communication with Air Traffic Control and the ground support staff regarding the Air movements and other related activities;

		7. Assist the IC and the LSC in the procurement of required ATF etc.;
		8. Report on Air Operations activities to the RO;
		9. Perform any other duties assigned by the RO and IC;
		10. **Link Officer appointed by the Government** shall officiate as the Nodal Officer (Air Operations) in the absence of the permanent incumbent.
Transportation Branch Director	**Director** Transport	1. Activate and manage different Operation Groups like Road, Rail, Water and Air;
		2. Coordinate with the Logistic Section (LS) for required resources and activate Groups of his Branch;
		3. On placement of resources / requisition, Coordinate with railways, road transport, waterways and airport authorities for support as required;
		4. Ensure that Organisational Assignment List is circulated among the Group-in-charge (s) and other responders of his branch;
		5. Provide ground support to the air operations and ensure appropriate security arrangements;
		6. Report to the Operation Section Chief and Incident Commander about progress of the Transportation Branch;
		7. Prepare transportation plan as per the IAP, if required;
		8. Ensure the maintenance of the Status of hired resources, their full utilization and timely release;
		9. Ensure that the record of various activities performed by different operational groups (Road, Rail, Water and Air) are collected and sent to the Section concerned;
		10. **Link Officer appointed by the Government** shall officiate as the Transportation Branch Director (TBD) in the absence of the permanent incumbent.
All functional Groups (Road, Rail, Water and Air) of the Transport Branch-TB are managed by the Transport Branch Director-TDB. Since the air transportation is to be coordinated at the State and District levels, the TBD also needs to function in close coordination with Responsible Officer-RO, Incident Commander-IC and Nodal Officer-NO for Air Operations. He will collect the details of all related flights from the concerned NO and organise the ground support requirement. The TBD will also be responsible for the activation and expansion of various functional Groups as per the IAP.		
Group-in-Charge (Road Unit)	**Dy. SP** Traffic Police (North/South)	1. Ensure transportation of resources by Road to the affected sites;
		2. Requisition additional personnel support, if required;
		3. Attend planning meetings on the direction of OSC;
		4. Determine coordination procedures with various destinations as per IAP;
		5. Ensure proper parking locations;
		6. Resolve conflicts of the Group, if any;
		7. Update Road Operations plan as required and share them with higher authorities;

		8. In case of accidents, inform the TBD, the local police and provide assistance in investigation, if required; 9. Ensure that mechanics are available for repair of vehicles and also ensure adequate availability of Petrol, Oil and Lubricants (POL); 10. Maintain the records of all important activities related to the number of vehicles deployed, source of vehicles (i.e. Government or private), locations where vehicles are deployed along with resource details they are carrying, etc.; 11. Support and coordinate the Road Operations part of the Rail, Water and Air Operations as required; 12. Collect record of various activities performed by coordinator and other members and send to TBD or OSC; 13. Perform any other duties assigned by the TBD or OSC; **14. Link Officer appointed by the Government** shall officiate as the Group-in-Charge (Road Unit) in the absence of the permanent incumbent.
Group-in-Charge (Rail Unit)	**Regional Railway Manager** Railways	1. Work under the TBD and coordinate all Rail Operations; 2. Organise crew for Loading and Unloading; 3. Ensure safe storage and warehousing of the materials; 4. Evaluate storage locations, ensure safety and obtain guidance from the TBD, if required; 5. Coordinate with Road Operations Group for movement of resources; 6. Prepare and provide Rail Operations Summary including time of departure and arrival, destinations, resource details, etc. as and when required by the senior officers; 7. Request for additional personnel support, if required; 8. Update the TBD from time to time and seek support, if required; 9. Resolve conflicts within his Group, if any; 10. Update Rail Operations Plan; 11. Establish and maintain communications with various storage and warehousing areas, destination points and railway officers; 12. Collect record of various activities performed under IRS from Coordinator and other in-charges and send to TBD or OSC; 13. Perform any other duties assigned by OSC or TBD; **14. Link Officer appointed by the Government** shall officiate as the Group-in-Charge (Rail Unit) in the absence of the permanent incumbent.
Group-in-Charge (Water Unit)	**Captain of Ports**	1. Ensure transportation of rescue teams and relief materials by motor boats / country boats or by

	Department of Captain of Ports	any other water transport to the affected sites with communication facilities and a local guide for guidance with each team; 2. Requisition personnel support, if required; 3. Determine coordination procedures with various destinations as per IAP; 4. Supervise all Water Operations and related activities associated with the incident; 5. Evaluate and ensure docking or harbouring locations; 6. Resolve conflicts, if any; 7. Update Water Operations plan and share it with the higher authorities, including the LSC; 8. Arrange for an accident investigation team as and when required and cooperate with the appropriate investigating authorities; 9. Ensure availability of POL and other logistic support for boat operations; 10. Attend to the needs of the personnel working with him; 11. Collect record of various activities performed from Coordinator and other in-charges and send to TBD or OSC; 12. Perform such other duties as assigned by TBD or OSC; 13. **Link Officer appointed by the Government** shall officiate as the Group-in-Charge (Water Unit) in the absence of the permanent incumbent.
Group-in-Charge (Air Unit)	**Airport Director** Dabolim Airport & **Chief Operations Officer (COO),** MOPA Airport	1. Provide ground support to Air Operations as per the IAP; 2. Report to TBD the progress of Air Operations and work in close coordination with the NO, IC, OSC and TBD; 3. Ensure resources and supplies required for the Air Operations are available at the concerned locations; 4. Keep appropriate Maps in order to provide correct coordinates to the pilots and others involved in the Air Operations; 5. Requisition of additional personnel support, if required; 6. Ensure refuelling facilities are available at the landing and take-off locations; 7. Ensure that Helibase and Helipad locations are identified and approved by the appropriate authorities; 8. Determine the need for assignment of personnel and equipment at each Helibase and Helipad; 9. Ensure identification and marking of Helibases and Helipads; 10. Ensure that the communication systems are in place; 11. Update landing and take-off schedule of Aircrafts and Helicopters as informed by NO; 12. Ensure preparation of the load manifest for proper loading or unloading of relief supplies; 13. Arrange for unloading and despatch or storage of relief materials that arrive at the airports,

		helipads and helibase. In order to keep airports operational, special attention needs to be paid to unsolicited relief supplies that may arrive. They should be immediately cleared from the operational area; 14. Ensure that proper packaging and weighing facilities are in place and used for loading of relief materials; 15. Liaise with the road operations group for the road transportation needs; 16. Ensure the functionality of Aircraft rescue and firefighting service at Helibases and Helipads, security, proper lights, smoke candles/devices, weighing facilities, wind direction socks, etc. are in place; 17. Collect record of various activities performed from Helibase and Helipad-in-charge and send to TBD or OSC or IC; 18. Perform any other duties assigned by the TBD; 19. **Link Officer appointed by the Government** shall officiate as the Group-in-Charge (Air Unit) in the absence of the permanent incumbent.
Planning Section Chief (PSC)	**Principal Chief Engineer** (PWD)	2. Coordinate with the activated Section Chiefs for planning and preparation of IAP in consultation with Incident Commander; 3. Ensure that decisions taken and directions issued in case of sudden disasters when the PS has not been activated are obtained from the Information and Media Officer (Command Staff) and incorporated in the IAP; 4. Ensure collection, evaluation and dissemination of information about the incidents including weather, environmental toxicity, availability of resources etc. from concerned departments and other sources. The Joint Secretary (Home) must have a databank of available resources with their locations from where it can be mobilised; 5. Ensure that Incident Status Summary is filled and incorporated in the IAP 6. Ensure that Organisational Assignment list (Divisional / Group) is circulated among the unit leaders and other responders of his Section; 7. Plan to activate and deactivate IRS organisational positions as appropriate, in consultation with the Incident Commander and Operation Section Chief; 8. Determine the need for any specialised resources for the incident management; 9. Provide periodic projections on incident potential; 10. Report to the Incident Commander of any significant changes that take place in the incident status; 11. Compile and display incident status summary at the Incident Command Post; 12. Oversee preparation and implementation of Incident Mobilisation Plan;

		13. Maintain Duty Officers List for the day; 14. Ensure that record of various activities performed by members of Units are collected and maintained in the Unit Log; 15. **Link Officer appointed by the Government** shall officiate as the Planning Section Chief in the absence of the permanent incumbent.
Resource Unit Leader (RUL)	**Director** Planning, Statistics & Evaluation-PSE	1. Maintain and display the status of all assigned resources (Primary and Support) at the incident; 2. Compile a complete inventory of all resources available; 3. Ensure and establish Check-in function at various incident locations; 4. Update the Planning Section Chief (PSC) and Incident Commander about the status of resources received and dispatched from time to time; 5. Coordinate with the various activated Branches, Divisions and Groups of OS for checking status and utilisation of allotted resources; 6. Maintain record of various activities performed and send to Section concerned; 7. **Link Officer appointed by the Government** shall officiate as the Resource Unit Leader (RUL) in the absence of the permanent incumbent.
Situation Unit Leader (SUL)	**Collector** North & South	1. Collect, process and organise all incident information; 2. Prepare periodic future projections of the development of the incident (along with maps if required) and keep the PSC and Incident Commander informed; 3. Prepare situation and resource status reports and disseminate as required; 4. Provide authorised maps, photographic services to responders, if required; 5. Attend IAP Meeting with required information, data, documents and Survey of India maps etc.; 6. Maintain record of various activities performed and send to Section concerned; 7. **Link Officer appointed by the Government** shall officiate as the Situation Unit Leader (SUL) in the absence of the permanent incumbent.
Documentation Unit Leader (DUL)	**Under Secretary** (Home-II)	1. Ensure that all the required forms and stationary are procured and issued to all the activated sections, branches, divisions, groups and units; 2. Compile all information and reports related to the incident; 3. Review and scrutinize records and various IRS forms for accuracy and completeness; 4. Inform appropriate units of errors or omissions in their documentation, if any, and ensure that errors and omissions are rectified; 5. Store files properly for post incident analysis; 6. Maintain records of various activities performed and send to sections concerned;

		7. **Link Officer appointed by the Government** shall officiate as the Documentation Unit Leader (DUL) in the absence of the permanent incumbent.
Demobilisation Unit Leader (DEMOB)	**Under Secretary** (Home-I)	1. Prepare Incident Demobilisation Plan; 2. Identify surplus resources and prepare a tentative IDP in consultation with the PSC and give priority to demobilization of surplus resources; 3. Develop incident check-out functions for Sections, Branches, Divisions and units in consultation with all Sections and send to the PS; 4. Plan for logistics and transportation support for Incident Demobilisation in consultation with LS; 5. Disseminate Incident Demobilisation Plan-IDP at an appropriate time to various stakeholders involved; 6. Brief the PSC on the progress of Demobilisation; 7. Maintain record of various activities performed and send to Sections concerned; 8. **Link Officer appointed by the Government** shall officiate as the Demobilisation Unit Leader (DEMOB) in the absence of the permanent incumbent.
Logistics Section Chief (LSC)	**Secretary** Panchayats	1. Provide logistic support to all Incident Response effort including the establishment of Staging Area. Incident Base, Camp, Relief Camp, Helipad etc.; 2. Participate in the development and implementation of the IAP; 3. Keep RO and IC informed on related financial issues; 4. Ensure that Organisational Assignment List (Divisional/Group) is circulated among the Branch Directors and other responders of his Section; 5. Request for sanction of Imprest fund, if required; 6. Brief Branch Director and Unit Leaders; 7. Constantly review the Communication Plan, Medical Plan and Traffic Plan to meet the changing requirements of the situation; 8. Assess the requirement of additional resources and take steps for their procurement in consultation with the RO and IC; 9. Maintain on Duty Officers List for the day; 10. Ensure that record of various activities performed by members of branches and units are collected and maintained in the Unit Log; 11. **Link Officer appointed by the Government** shall officiate as the Logistics Section Chief (LSC) in absence of the permanent incumbent.

Service Branch Director (SBD)	**Director** Directorate of Health Services	1. Work under the supervision of LSC and manage all required service support for the incident management; 2. Manage and supervise various Units of the Branch like Communication Unit, Medical Unit, Food Unit and any other activated Unit; 3. Discuss with activated Unit leaders for the materials and resources required and procure the same through LS; 4. Ensure proper dispatch of personnel, teams, resources etc. as per the IAP; 5. Keep the LSC informed about the progress of Service Branch, from time-to-time; 6. Maintain record of various activities performed and send to sections concerned; 7. **Link Officer appointed by the Government** shall officiate as the Service Branch Director (SBD) in absence of the permanent incumbent.
Communication Unit Leader (CUL)	**Director** Information & Technology	1. Work under the direction of the SBD; 2. Provide Communications facility as and when required; 3. Ensure that all communications equipment available are in working condition and that the network is functional; 4. Maintain the records of all communications equipment deployed in the field; 5. Ensure setting up of a message centre to receive and transmit radio, telephone and other messages from various activated Sections, Branches, Units and higher authorities and maintain their records; 6. Prepare an alternative communication plan for execution in case of possible failure of the normal communications network; 7. Prepare a plan for integration of the communications set up of the central teams; 8. Maintain record of various activities performed; 9. Link Officer appointed by the Government shall officiate as the Communication Unit Leader (CUL) in absence of the permanent incumbent.
Medical Unit Leader (MUL)	**Under Secretary** (Health -II)	1. Work under the direction of the SBD; 2. Prepare the Medical plan and procurement of required resources as per IAP; 3. Respond to requests of the OS for medical aid, transportation and medical supplies etc. under intimation to the SBD and LSC; 4. Maintain the list of medical personnel who can be mobilised in times of need; 5. Prepare and circulate list of referral service centres to all the medical team leaders; 6. Maintain minimum level of required medicines, drug, equipment, etc. at all times; 7. Maintain record of various activities performed and send to SBD; 8. **Link Officer appointed by the Government** shall officiate as the Medical Unit Leader (MUL) in the absence of the permanent incumbent.

Food Unit Leader (FUL)	**Dy. Director** WCD	1. Work under the direction of the SBD; 2. Supply food to: a) Personnel of IRT(s) at ICP, Camps, Incident Base, SA, etc. and b) Victims at the temporary shelters, relief camps etc., 3. Determine food and drinking water requirements and their transportation, and brief the SBD and LSC; 4. Maintain an inventory of receipt and dispatch of resources; 5. Maintain record of various activities performed and send to SBD; 6. Link Officer appointed by the Government shall officiate as the Food Unit Leader (FUL) in the absence of the permanent incumbent.
Support Branch Director (SBD)	**Addl. Joint Secretary** Home	1. Work under the supervision of LSC, and supervise the function of Resource Provisioning Unit, Facility Unit and Ground Support Unit; 2. Procure and dispatch required tactical materials and resources for operations with the concurrence of the Section Chief; 3. Participate in the planning meeting of the LS; 4. Ensure that organisation assignment list concerning the Branch is circulated to all Units under him; 5. Keep the LSC informed about the progress of the work; 6. Maintain record of various activities performed and send to section concerned; 7. **Link Officer appointed by the Government** shall officiate as the Support Branch Director (SBD) in the absence of the permanent incumbent.
Resource Provisioning Unit Leader (RPUL)	**Under Secretary** GAD-I	1. Work under the supervision of Support BD; 2. Organise movement of personnel, equipment and supplies; 3. Receive and store safely all supplies required for the incident response; 4. Maintain the inventory of supplies and equipment; 5. Maintain the records of receipt and dispatch of supplies including equipment and personnel; 6. Organise repair and servicing of non-expandable supplies and equipment; 7. Participate in the planning meeting of LS; 8. Monitor the 'Kind', 'type' and 'quantity' of supplies available and dispatched; 9. Requisition additional human resource assistance, if needed; 10. Maintain record of various activities performed and sent to Support BD; 11. **Link Officer appointed by the Government** shall officiate as the Resource Provisioning Unit Leader (RPUL) in the absence of the permanent incumbent.

Facilities Unit Leader (FUL)	**Chief Engineer** (Bldg.)	1. Prepare the layout and activation of incident facilities, e.g. Incident Base, Camp(s), Relief Camp(s), ICP, etc., and provide basic amenities to the responders; 2. Report to the Sup. BD; 3. Locate the different facilities as per the IAP; 4. Participate in the planning meeting of the Section, prepare list for each facilities and its requirements in coordination with the LSC; 5. Maintain record of various activities performed as per IRS and send to Sup. BD; 6. Link Officer appointed by the Government shall officiate as the Facilities Unit Leader (FUL) in the absence of the permanent incumbent.
Ground Support Unit Leader (GSUL)	**Jt. Director** Transport	1. Work under the supervision of the Sup. BD; 2. Provide transportation services for field operations to TBD; 3. In case Air operations are activated, organize and provide required ground support through TBD; 4. Provide maintenance and repair services for all the vehicles and related equipment used for incident management; 5. Develop and implement the Incident Traffic Plan 6. Inform Resource Unit about the availability and serviceability of all vehicles and equipment; 7. Arrange for and activate fuelling requirements for all transport including Aircrafts in consultation with the Sup. BD; 8. Maintain inventory of assigned, available and off road or out of service resources; 9. Ensure safety measures within his jurisdiction; 10. Maintain record of various activities performed as per IRS and send to Sup. BD; 11. **Link Officer appointed by the Government** shall officiate as the Ground Support Unit Leader (GSUL) in the absence of the permanent incumbent.
Finance Branch Director (FBR)	**Addl. Jt. Secretary** Finance	1. Work under the LSC; 2. Attend planning meetings; 3. Prepare a list of resources to be mobilised, procured or hired in accordance with the IAP; 4. Obtain orders of the competent Authority as per financial rules and take steps for their procurement without delay; 5. Ensure that time records of hired equipment, personnel and their services are accurately maintained as per Government norms for payment; 6. Examine and scrutinize cost involved in the entire response activity including the demobilisation, analyse the cost effectiveness and keep the LSC informed; 7. Ensure that all obligation documents initiated at the incident are properly prepared, completed, verified and signed by the appropriate Section Chief and BD;

		8. Brief the LSC or IC on all incident related financial issues needing attention or follow-up; 9. Maintain record of various activities performed as per IRS and send to Sections concerned; 10. **Link Officer appointed by the Government** shall officiate as the Finance Branch Director (FBR) in the absence of the permanent incumbent.
Time unit Leader (TUL)	**Director** Directorate of Accounts	1. Maintain time recording of hired equipment and personnel and ensure that it is maintained on a daily basis and according to Government norms; 2. Examine logs of all hired equipment and personnel with regard to their optimal utilization; 3. Maintain record of the activities performed as per IRS and send to FBD; 4. **Link Officer appointed by the Government** shall officiate as the Time unit Leader (TUL) in the absence of the permanent incumbent.
Compensation/ Claim Unit Leader (CUL)	**Joint Director** Directorate of Accounts	1. Collect all cost data and provide cost estimates; 2. Prepare and maintain a list of requisitioned premises, services, resources and vehicles, etc. with correct date and time of such requisition; 3. Follow appropriate procedures for preparation of claims and compensation; 4. Maintain record of various activities performed as per IRS and send to FBD; 5. **Link Officer appointed by the Government** shall officiate as the Compensation/ Claim Unit Leader (CUL) in the absence of the permanent incumbent.
Cost Unit Leader (CUL)	**Under Secretary** Finance (Exp.)	1. Develop incident cost summaries in consultation with the FBD on the basis of Cost Analysis Report; 2. Make cost-saving recommendations to the FBD; 3. Complete all records relating to financial matters prior to demobilization; 4. Maintain record of various activities performed as per IRS and send to FBD; 5. **Link Officer appointed by the Government** shall officiate as the Cost Unit Leader (CUL) in the absence of the permanent incumbent.
Procurement Unit Leader	**Under Secretary** (GAD-II)	1. Attend to all financial matters pertaining to vendors and contracts; 2. Review procurement needs in consultation with the FBD; 3. Prepare a list of vendors from whom procurement can be done and follow proper procedures; 4. Complete final processing of all bills arising out of the response management and send document for payment with the approval of the FBD, LSC, IC; 5. Brief FBD on current problems with recommendations on outstanding issues and follow up requirements; 6. Maintain record of activities performed and send to FBD;

		7. **Link Officer appointed by the Government** shall officiate as the Procurement Unit Leader (PUL) in the absence of the permanent incumbent.

INCIDENT RESPONSE TEAM-STATE LEVEL

Responsible Officer
Chief Secretary,
Government of Goa

Nodal Officer NO
(Air Operation) Director Civil Aviation

Incident Commander (IC)
Secretary (Revenue)

Deputy Incident Commander (Dy. IC)
Secretary (Urban Development)

Safety Officer
Secretary (Health)

Liaison Officer (LO)
Secretary (Housing)

Information & Media Officer
Secretary (Information & Publicity)

Operation Section Chief (OSC)
Director General of Police

Planning Section Chief (PSC)
Principal Chief Engineer (PWD**)**

Logistic Section Chief (LSC)
Secretary (Panchayat)

Staging Area Manager (SAM)
Director(DFES)

Transportation Branch Dir. (TBD)
Director Transport

Resource Unit Leader (RUL)
Director (PSE)

Service Branch Director (SBD)
Director DHS

Support Branch, Director (SBD)
Addl./ J.S. Home

Finance Branch Director (FBD)
Addl./ J.S. Finance

- Flood
- Earthquake
- Fire
- Landslides
  Dy. Dir. (DFES)

- Health Hazard
- Epidemic
  Dy. Dir.(DHS)

- Law & Order
- Man – made
  Disaster
  Dy. IG. Police

Road Unit
Dy. SP Traffic Police
(North/South)

Rail Unit
Regional Railway Manager

Water Unit
Captain of Ports

Air Unit
Airport Director
Dabolim Airport
&
Chief Operation Officer,
MOPA Airport

Situation Unit Leader (SUL)
Collector North and South

Documentation Unit Leader (DUL)
Under Secretary (Home-II)

Demobilization Unit Leader (DLU)
Under Secretary (Home-I)

Communication Unit Leader Director (CUL)
(Information & Technology)

Medical Unit Leader (MUL)
Under Secretary (Health-II)

Food Unit Leader(FUL)
Dir. WCD

Resource Provisioning Unit Leader (RPUL)
Under Secretary (GAD-I)

Facilities Unit Leader
Chief Engineer (Bldg.)

Ground Support Unit Leader
Addl. Director Transport (North/ South)

Time Unit Leader (TUL)
Director (DoA)

Compensation Unit (CUL)
Jt. Director (DoA)

Cost Unit Leader (CUL)
Under Secretary Finance(Exp.)

Procurement Unit Leader (PUL)
Under Secretary (GAD-II)

Division (Geographical)

Single Resource

Task Force/Strike Team

249

Chapter-9
Recovery and Building Back Better

9   Recovery and Building Back Better

9.1 Scope

Recovery is defined as:

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

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

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

The Sendai Framework expects that after a disaster, the stakeholders will be prepared for BBB. Existing mechanisms may require strengthening to provide effective support and achieve better implementation. Disaster recovery tends to be very difficult and long-drawn out. The reconstruction will vary depending on the actual disaster, location, pre-disaster conditions, and the potentialities that emerge at that point of time. The NDMP provides a generalized framework for recovery since it is not possible to anticipate every likely element of building back better.

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

9.2 Approach

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

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

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

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

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

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

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

9.3 Recovery Process

Effective post -disaster recovery usually has the following three broad aspects:
a) Physical aspects of recovery, i.e. restoration and reconstruction of damaged community infrastructure, critical infrastructure, private houses and cultural heritage buildings
b) Economic aspects of recovery, i.e. livelihoods, productive activities and market services
c) Social recovery, i.e. social and psychological aspects of personal, family and community functioning and wellbeing
The key interventions under recovery programmes can be classified under four broad heads:
- Physical
- Economic
- Social
- Cross Cutting Sectors

After a disaster, a Post-Disaster Needs Assessment (PDNA) must be undertaken, which will be a government-led exercise. Depending on the disaster, this may be undertaken by the state government and through joint efforts of the central and state governments. The PDNA will also provide a platform for the international community to assist in recovery and reconstruction, where such assistance is

required. A systematic PDNA will provide a credible basis for recovery and reconstruction planning that incorporates risk reduction measures.

Typically, the PDNA comprises of a 'Damage and Loss Assessment' (DALA), a 'Human Recovery Needs Assessment' (HRNA) and a 'Recovery Framework. The DALA is quantitative in nature that can be used to value damages arising from a hazardous event, and the subsequent economic losses caused by the event. The DALA highlights the possible consequences on the growth of the economy, the external sector and the fiscal balances, as well as the impact due to decline of income and livelihoods of households or individuals. The HRNA focuses on the social impact of disasters, analysing how disasters affect local patterns of life, social structures and institutions. A HRNA includes analysis of primary data from household or other units of analysis and provides insight into the recovery and reconstruction from the viewpoint of the affected community. The Recovery Framework summarizes the recovery recommendations from the sectoral assessments within the PDNA. It outlines the short, medium and long-term priorities for the recovery including plans for financing the BBB.

The UNISDR consultative document on building back better (UNISDR 2017) in support of the Sendai Framework, states the following: Recovery is the most complex of the disaster management functions, involving the greatest number and variety of stakeholders and affecting the greatest long-term impact on a community's social and economic success. There are numerous relationships that must be formed and dependencies that must be fostered, many of which are wholly unfamiliar to the recovery stakeholders that typically operate outside of the post-disaster context. An inclusive and comprehensive disaster recovery framework serves as an agreed way forward to simplify the recovery process thereby maintaining or even improving development trajectories while ensuring adherence to Build Back Better principles.

Recovery is most successful when the wide-ranging needs of communities, organizations, and individuals are addressed in the coordinated manner that recovery frameworks enable.

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

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

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

Table 9-1: Major Steps of the Recovery Process and the Key Processes Involved

	Major Step	Process
1.	Post-Disaster Needs Assessment and Credible Damage Assessment	- Preliminary assessment reports - Compilation and transmittal of damage and loss data - Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment

		• Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts • Results monitoring and evaluation plan for recovery program • Select the most appropriate and achievable processes and methodology for conducting early and credible damage and needs assessments
2.	Developing a vision for Build-Back Better (BBB)	• High level meetings as well as broad-based, wider consultations with experts, civil society, and key Stakeholders • Build consensus among the range of stakeholders within and outside government
3.	Ensure coherence of BBB with the development programs and goals	• Discussions at top level to align the recovery vision with the government's broader, longer term development goals and growth and poverty reduction strategies
4.	Incorporating resilience and BBB in recovery vision	Consultations and background studies on: • Disaster resistant physical recovery • Options for fast economic recovery • Gender and equity concerns • Vulnerability reduction • Natural resource conservation and environmental protection • Social recovery
5.	Balancing recovery across sectors	• Balance public and private sectors BBB programs • Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities • Prioritize infrastructure reconstruction • Address the recovery of the lives and livelihoods of disaster-affected communities • Show sensitivity to the needs of the affected population • with regard to public expectations from recovery
6.	Prioritising sectors for recovery	• Determine relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications infrastructure, environment, livelihoods, tourism, social protection, health, and education.

9.4 Early, Mid and Long-term Recovery

UNISDR notes that recovery programmes, coupled with the heightened public awareness and engagement after a disaster, provide a valuable opportunity to develop and implement disaster risk reduction measures and to apply the BBB principle. It is an important component of risk reduction strategy and if implemented systematically, the recovery process prevents the affected community from sliding into further poverty and deprivation. While the DM Act 2005 mandates the government to carry out rehabilitation and reconstruction activities, it does not explicitly refer to 'recovery' as a component to be used as a part of disaster management strategy. However, the NPDM 2009 recognizes 'recovery' as one of the six elements within the disaster management continuum where it is linked to physical, social and economic assets within the overall context of 'safe development'.

The disaster recovery programmes usually proceed in three distinct stages to facilitate a sequenced, prioritized, and flexible multi-sectoral approach. Three recovery stages, in which appropriate policies and programmes tend to be planned and implemented are: a) Early, b) Mid-Term, and c) Long-Term, which are described briefly in Table 9-2

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

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

The salient provisions of the recovery framework include the following:

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

2) Coordination: There is considerable interdependence between stakeholders – government, international agencies, private sector, civil society organizations – in realizing the objectives of recovery and inter-agency coordination is extremely important

3) Public-Private Partnerships (PPP): Participation of the private sector must be leveraged for larger public good and the Public-Private Partnerships is one effective way to facilitate the private sector involvement in recovery

4) Information and Communication Technology (ICT): Effective use of ICT in recovery programme, disseminating messages among all stakeholders, and providing information on all aspects of recovery programme

5) Decision Support System (DSS): Setting up an adequate DSS that includes Management Information System (MIS), databases, deployment of spatial data management technologies

6) Pool of Expertise: Pooling of professional skills and expertise in diverse areas

7) Community Participation: Ensuring the pro-active involvement of communities, proper community outreach, empowerment, and gender equity in programme formulation and implementation

8) Monitoring and Evaluation (M&E): M&E is an important component required for promoting transparency in the recovery processes and it should include technical and social audits.

9.5 Reconstruction

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

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

9.6 Co-ordination of Reconstruction

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

9.6.1 State Government

The damage assessment and all the phases of recovery and reconstruction (early to long-term) are the responsibility of the State/UT government. Some of the key tasks are:
- Lead in and support need and damage assessment operations
- Provide relevant data regarding the severity of the disaster and assessment of individual needs
- Participate in and support public information and education programmes regarding recovery efforts and available Central/ State Government assistance
- Coordinate with the Central Government and other stakeholders for reconstruction Management.

9.6.2 Private Sector

There is a need for facilitating the involvement of private sector in disaster management and for businesses to integrate disaster risk into their management practices. There is a need to involve the private sector in the areas of:
- Technical support
- Reconstruction effort
- Risk management including covering risks to their own assets
- Financial support to reconstruction efforts
- Risk-informed investments in recovery efforts

9.6.3 Voluntary Organizations and International Aid Agencies

They may participate in the following activities:

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

9.7 Rehabilitation

9.7.1 Background

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

9.7.2 Physical Rehabilitation

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

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

9.7.3 Relocation

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

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

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

9.7.5 Revival of Educational Activities

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

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

9.7.6 Rehabilitation of the Elderly, Women, Children and PWD

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

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

9.7.7 Economic Rehabilitation

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

- Analysis of existing livelihood strategies and sustainability of businesses
- A comprehensive analysis of existing and future risks
- The vulnerabilities of the affected families' knowledge
- Access to functioning markets

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

9.7.8 Psychological Rehabilitation

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

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

9.7.9 Restoration of Damaged Cultural Heritage Sites, their Precincts and Museums

Post disaster repairs and reconstruction of damaged sites/precincts should always be undertaken based on sound documentation and assessment practices. Poor reconstruction practices cause further physical damage to heritage structures, may worsen its structural vulnerability and carries the risk of erasing the heritage features. Reconstruction and rehabilitation approaches need to consider the legislative frameworks already in place for different typologies of heritage sites and precincts. In general, the following principles should be followed:

- An approach of minimal intervention should be undertaken for sites of historic and archaeological importance and any intervention should be based on sound documentation and research. Aspects of authenticity and visual integrity should form the basis of any reconstruction, repair, and retrofitting attempt.
- As far as possible, traditional skills and technologies where they still exist should be employed in the repair and restoration of damaged structures. This helps ensure continuity of building and crafts traditions.
- Many cultural heritage sites and precincts hold strong cultural/ socio-economic associations with the local population and restoring them instils a sense of normalcy after a disaster.
- These considerations should facilitate the conservation/ reconstruction of heritage within the overall recovery plan.
- The notion of 'build back better' applied to cultural heritage must not undermine the archaeological and/ or cultural aspects, which means that retrofitting measures for improving the structural stability of cultural heritage sites, should be undertaken cautiously paying due attention to restoration of the original.
- All restoration and retrofitting of the cultural heritage must be undertaken only after carrying out due consultation among stakeholders to preserve the cultural, archaeological and heritage aspects.
- The impact of retrofitting on integrity and cultural value of heritage structures must be discussed and properly evaluated with due weightage for restoration to pre-disaster status as closely as possible
- Restoration or reconstruction of heritage after disasters should go beyond buildings and it should look at heritage livelihood, traditional trades/ crafts etc.

9.8 Fund Mobilization

9.8.1 Background

Reconstruction and rehabilitation projects after a major disaster are usually highly resource intensive.

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

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

9.8.2 Mobilizing, Disbursement and Monitoring

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

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

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

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

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

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

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

Major Step	Description

1.	Review of the Damage & Loss Assessment	Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts
2.	Developing a vision and specific time-bound goals for BBB	Develop the scope and goals of BBB Disaster resilient physical recovery Options for fast economic recovery Set phase-wise betterment targets
3.	Estimate financial requirements of the recovery programme	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	• Domestic resources: – From the state (on budget) and additional fund-raising options (off budget) – Central grants and other options – on and off the budget International including borrowing from IFI – facilitated by the central govt. • Other Sources: – Donors – Community contribution – Private sector CSR, PPP
5.	Defining and enforcing robust financial norms for the financial management	• Setting norms and rules to allocate funds for new • development, retrofitting, owner-driven reconstruction • (mainly homes), • Defining norms efficient disbursement along with the degree of flexibility needed in recovery programs • Implementing mechanisms for monitoring proper utilization • including an appropriate MIS

The funds raised through funding agencies are usually accompanied by stringent disbursement and usage restrictions. It is therefore important to monitor the disbursement of funds to ensure that none of the covenants are breached. The fund disbursal shall be monitored by:
- Prioritizing resource allocation across approved projects
- Establishing mechanisms for disbursement of funds to the beneficiaries
- Strengthening the monitoring mechanisms for fund utilization and progress of implementation

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

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

Chapter-10
Capacity Development- An Overview

10 Capacity Development – An Overview

10.1 Background

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

Capacity development covers strengthening of institutions, mechanisms, and capacities at all levels of
all stakeholders. UNISDR defines 'Capacity Development' for DRR as follows:

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

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

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

without mainstreaming of capacity building on DRR by State and District level Stakeholders for Disaster Management. Capacity building should also include creating enabling environment by making relevant provisions in existing laws, rules and regulations etc. of the State.

As capacity development entails activities on various levels, i.e. legal and institutional frameworks, systems of organisations, organisation and human and material resources, it is necessary to address challenges on all of them by implementing a mix of activities across all time frames – recurring, short, medium and long term. The reason for this is that changes at one level often require changes at other levels too, as the levels are interdependent. Therefore, the focus of many capacity development efforts for DRR must go beyond human resource development paying enough attention to organisational and institutional issues. Partnerships and collaborations are integral to institutional capacity building. In institutional capacity development, emphasis should also be on use of state-of the- art technologies to upgrade the existing system s. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the disaster resilience. Investing in capacity development is the cost-effective way to save lives, prevent or reduce losses and ensure effective recovery and rehabilitation.

The National Policy on Disaster Management-NPDM, 2009 underlines the need for a strategic approach to capacity development and notes that the active and enthusiastic participation of various stakeholders is necessary for it to be effective. The national policy notes that capacity development must address the challenge of "putting in place appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters." The capacity development being a continuous process, it must address challenges of staff turnover, task of educating new recruits, keeping pace with technical changes and incorporating the rapid advances in scientific knowledge.

The NPDM 2009 envisages capacity development in the domain of DM at all levels of government including ministries, line departments and across various autonomous institutions. It also stresses the importance of capacity development efforts to promote community -based DM efforts. The policy notes that to sustain DRR, it is necessary to undertake capacity development across the education sector covering schools to professional institutions. It recognizes that skill development in all sectors to incorporate multi-hazard resistant features along with strengthening of relevant licensing, certification, and standards.

10.2 SIDM, SDRF and Other Institutions

The State shall establish SIDM on the lines of NIDM, and shall partner with other research institutions for capacity development as one of its major responsibilities, along with training, research, documentation and development of a State level information base. It will network with other knowledge-based institutions and function within the broad policies and guidelines laid down by the NDMA/SDMA. It will organise training of trainers, for DM officials and other stakeholders. The SIDM will strive to emerge as a 'Centre of Excellence' in the field of Disaster Management. The SIDM will play an important role in developing and facilitating the implementation of a National/State training schedule for DM. It will also be the nodal institution for State and National cooperation for training.

The State shall raise State Disaster Response Force-SDRF on the similar lines of National Disaster Response Force-NDRF. The SDRF shall be trained by NDRF 5th Bn. Pune to respond effectively to any disaster situations in the State and can also support capacity development and training needs of Aapda Mitra Volunteers, Civil Defence, National Cadet Corps (NCC), National Service Scheme (NSS) and Nehru Yuva Kendra Sangathan (NYKS), community and volunteers in preparedness and response. It is important that the SDRF and other agencies involved in response mechanism are able to work harmoniously for which NDRF must have a role in the training of all responders. The renowned institutes in the State including GIPARD, imparting training in DM shall be strengthened with skilled resource persons and financial assistance. Also, the DM cells in the Training Institutes, Police Academies, Goa Institute of Public Administration and Rural Development-GIPARD, Directorate of Fire and Emergency Services-DFES, Airport/Seaport Authorities, Indian Coast Guard-ICG, Indian Navy, Captain of Ports and other institutes/Departments will contribute most significantly in developing DM related skills. The capacity of existing institutes needs to be upgraded in accordance with regional and local requirements. Other training institutions belonging to various Ministries/ Departments/ Agencies/ PSUs at the State level, must include DRR in their training programmes and departmental examinations.

10.3 Capacity Development of Local Bodies – Rural and Urban

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

10.4 Training of Communities

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

10.5 Disaster Resource Networks –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, as encouraged by Government of India, the state shall establish its own State Disaster Resource Network (SDRN) portal on the pattern of IDRN. The resource network shall cover state-level and district level agencies involved in disaster risk management.

10.6 Capacity Development Themes

The capacity development is applicable to all aspects of disaster management. The State Government/Departments and agencies will take actions for capacity development of different stakeholders. It must be noted that the division of responsibilities for the state level stakeholders are described in greater detail in the responsibility framework given in separate chapters. The capacity development themes for DRR and related responsibilities are summarised in Table 10-1. The specifics corresponding to each Sub-Thematic Area are mentioned in the chapters shown in the last column of the table.

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

Sr. No.	Thematic Area	Sub-Thematic Area	Chapter (s) where Responsibilities are described
1.	**Deploying advanced technology and equipment**	• Adopting the best global technologies • Identifying technology needs based on hazard risk and vulnerability and experiences • Procurements of best and most appropriate equipment	3, 4, 5, 7, 8, 9
2.	**Disaster Information System**	• Maintaining the resource network • Monitoring and maintaining the resource data • Regular updating the resource data • Developing fail-safe communications with advance technology • National and state level disaster information system • Improve data flows across Central Ministries/ Dept./ States and other authorised users • Integration of HRVCA data with disaster information systems • Ensuring reliable and credible database on disaster losses (direct and indirect) and post-disaster reconstruction	3, 4, 5, 7, 8, 9
3.	**Disaster Risk Governance**	• Mainstream and integrate DRR and strengthen institutional mechanisms for DRR • Promote participatory approaches, partnerships and networks • Promote quality standards, certifications, and incentives	12

4.	**Disaster Risk Management**	• Promote, encourage and facilitate appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions • Design and implement social safety-net mechanisms, including community-based systems • Disaster resilience of health care systems by integrating disaster risk management into primary, secondary and tertiary health care • Business resilience, and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices	3, 4, 5, 7, 8, 9
5.	**DM and DRR capacities at local levels**	• Trainings in DRR at different levels of local governance • Improve awareness and preparedness of stakeholders at all levels • Preparing DM plans, regular updating, and mock drills	3, 4, 5, 7, 8, 9
6.	**DRR– in education, research and professional disciplines**	• Incorporate subjects of relevance to DRR in 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 DRR • Develop ToTs • Research in diverse areas of DRR	3, 4, 5, 7, 8, 9
7.	**Early Warning**	• Deploy the state of art methods and technologies • Up-grade technical infrastructure and systems • Improve EW dissemination and ensure the last mile connectivity to the most remote parts • Improve the alerts system to make it more relevant to different regions and sections	7
8.	**Emergency Operation Centres - Strengthening**	• Enhance emergency response capabilities • Strengthen EOCs, improve infrastructure, upgrade equipment, adopt best available technologies • Improve capabilities based on experience after each disaster event • Deploy best of ICT • Conduct capacity audits of EOCs • Set up State and District level EOCs with adequately trained manpower • Regular reviews and improvement of SOPs, protocols, etc. • Mobile control rooms	7, 8
9.	**Global Anthropogenic Climate Change Risks**	• Recognise and address climate change risks in DRR • Strengthen adaptations to GACC	3, 7
10.	**Mainstreaming DRR**	• Incorporating DRR into development plans and programs	5

		• 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	
11.	**Non-Structural Measures for DRR**	• Institutional arrangements, policies, legal support, and regulatory framework • Revision of building codes and standards for rehabilitation reconstruction practices both for urban and rural areas • Norms and incentives for retrofitting • Reinforce systems to implement, monitor, and enforce regulations for DRR to promote disaster-resistant built environment	3, 4, 5, 7, 8, 9
12.	**Post-2015 Global Frameworks – coherence and mutual reinforcement across DRR themes**	• 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
13.	**Preparedness and Response**	• Institutional reforms, modernization, and changes in legal framework • Strengthening of Fire and Emergency Services • Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization • Comprehensive revamping of Fire and Emergency Services with institutional reforms and modernization • Adoption and adaptation of emerging global good practices • Rigorous training and HRD of first responders • Table-top exercises, simulations, and mock drills to improve operational readiness of the plans • Rescue equipment at all levels • Systems to provide basic services in emergencies • Preparedness and response plans at all levels • Community-based DRR and DM	8
14.	**Recovery and Build Back Better**	• Post-Disaster Needs Assessment (PDNA) systems and expertise • Credible damage assessment mechanisms and expertise • Planning capabilities to ensuring coherence of BBB with overall development efforts and goals • Studies and research for incorporating resilience into BBB models • Studies on past disasters and recovery to draw useful lessons	9

15.	**Skill Development for Disaster Resilience**	• Training and skill development for masons and other artisans • Promoting community-based DM considering specific needs, regional diversities and multi-hazard vulnerabilities • Training on CBDR and preparedness at local levels • Address gender issues, and special needs of children, disabled, • aged, etc. holistically in the DM context • Promote private sector and civil society involvement • Promote PPPs	3, 4, 5, 7, 8, 9
16.	**Social Inclusion in DRR**	Gender-based vulnerabilities Scheduled Castes and Scheduled Tribes Elderly Children Persons with Disabilities	4,7
17.	**Understanding Risk**	• Observation Networks, • Information Systems, • Research • Forecasting • Zoning/ Mapping • Monitoring • Hazard Risk Vulnerability and Capacity Assessment (HVCA)	7

Chapter-11
Financial Arrangements

11   Financial Arrangements

11.1 Background

XV Finance Commission has recommended the creation of funds for disaster mitigation along with disaster response, which will now together be called **National Disaster Risk Management Fund (NDRMF)** and **State Disaster Risk Management Funds (SDRMF).**[12]

In order to set up recovery, reconstruction, preparedness and capacity building facility to address activities of immediate nature within SDRF/ NDRF have been subdivided into funding window by the 15th Finance Commission. The **SDRF** would receive **80 per cent of the total SDRMF**, while **SDMF** would get **20 per cent** of the allocation. Within the SDRF allocation, there would be three sub-allocations.

While the funding windows of SDRF and SDMF are not inter-changeable, there could be flexibility for re-allocation within the three sub-windows of SDRF for that financial year. Distribution of total SDRF allocation among sub-window is given as under:

(I) Forty percent (40%) of the annual allocation of **SDRMF** i.e. equal to **50% of SDRF** allocation for the year is kept for **Response and Relief** activities. These activities would be administrated as per GOI approved items & norms.

(ii) Thirty percent (30 %) of the annual allocation of **SDRMF** i.e. equal to **37.50% of SDRF** allocation for the year is kept for **Recovery and Reconstruction** activities. These activities would be administrated as per GOI approved items & norms.

(iii) Ten per cent (10%) of the annual allocation of **SDRMF** i.e. equal to **12.50% of SDRF** allocation for the year is kept for **Preparedness and Capacity-building** activities. These activities would be administrated as per GOI approved items & norms.

State Disaster Response Fund

The State Disaster Response Fund (SDRF), constituted under Section 48 (1) (a) of the Disaster Management Act, 2005, is the primary fund available with State Governments for responses to notified disasters. The Central Government contributes 75% of SDRF allocation for general category State. The annual Central contribution is released in two equal instalments as per the recommendation of the Finance Commission. SDRF shall be used only for meeting the expenditure for providing immediate relief to the victims.

Disaster (s) covered under SDRF: Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, frost and cold waves.

Local Disaster: A State Government may use up to 10 percent of the funds available under the SDRF for providing immediate relief to the victims of natural disasters that they consider to be 'disasters' within the local context in the State and which are not included in the notified list of disasters of the Ministry of Home Affairs subject to the condition that the State Government has listed the State specific natural

---

[12] Disaster Management Division, Ministry of Home Affairs, Government of India

disasters and notified clear and transparent norms and guidelines for such disasters with the approval of the State Authority, i.e., the State Executive Authority (SEC).

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

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

The default period of assistance is as per norms prescribed. However, based on assessment of the ground situation, the SEC may extend it beyond the prescribed time limit subject to the condition that expenditure on this account should not exceed 25 per cent of State Disaster Response Fund allocation for the year. The SEC will organize contributions from the relevant State Government, administer the State Disaster Response Fund and invest the accretions to the State Disaster Response Fund in accordance with the norms approved by GOI from time to time. State must meet the capacity development expenses from the State Disaster Response Fund and not National Disaster Response Fund, subject to a limit of 10 per cent of the State Disaster Response Fund.

11.3.1 Capacity Development covers the following:

- Setting up/strengthening of Emergency Operation Centres (EOCs) in the State
- Training/Capacity Building of stakeholders and functionaries in the State
- Supporting disaster management centres in the State
- Preparation of Disaster Management Plans based on Hazards, Risks, and Vulnerability Analysis
- Strengthening of SDMA and DDMA

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

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

State Disaster Mitigation Fund (SDMF)

In view of the provision of the Disaster Management Act, 2005, and the recommendations of XV Finance Commission, Government of India framed Guidelines for administration of State Disaster Mitigation Fund-SDMF at the State level and issued the same on 14th January 2022. In the light of the said guidelines, Government of Goa took the necessary steps to set up the SDMF in the State on 09.09.2022. In order to implement the measures aimed at reducing the risk, impact or ill effects of a disaster or threatening disaster situation, the State Government shall utilize the State Disaster Mitigation Fund-SDMF established as per the Section 48 (1) of the Disaster Management Act, 2005. It will help the State in carrying out mitigation activities for reducing the impact of disasters.

Scope of State Disaster Mitigation Fund (SDMF)

SDMF will fund mitigation projects at the State level. It will support and fund the following types of projects:

i) All projects relating to mitigation measures: (a) for the notified disasters by the Government of India namely cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst, pest attack and frost & cold wave; and **(b)** for the 'disasters' notified by the State Government within the local context in the State, which are to be completed within the geographical jurisdiction of the State, will be funded from the SDMF.

ii) The State Government may use up to 10% fund of the annual allocation of the SDMF for the purpose of mitigation projects in respect of disasters that they consider to be 'disasters' within the local context in the State as notified under SDRF guidelines.

iii) Projects which are of State-level significance, protecting assets, eco-systems and settlements within the State.

iv) Projects which promote practices to reduce disaster risks and its impacts.

v) Projects which build community resilience through information and knowledge.

vi) Projects which focus on creating safe conditions of living for people from weaker socio-economic categories, people with disabilities, and women.

vii) Regional projects which are initiated from the National Disaster Mitigation Fund (NDMF).

viii) Research and studies related to disaster mitigation through the small grants window.

ix) In case of flood mitigation projects, States should undertake the following non-structural measures:

a) Adopting Integrated Flood Management approach by considering river basin as a hydrological unit. b) Real Time Hydro-meteorological Data Acquisition Network coupled with Decision Support System for integrated or standalone operation of reservoir(s), as the case may be. c) Delineation and demarcation of flood plain zones on certain notified stretch (es) of river(s) within the State and regulation of various activities permissible therein.

Limitation of State Disaster Mitigation Fund (SDMF)

i) At least 10% of the SDMF each year should be earmarked for the non-structural measures. (Components of non-structural measures in projects consisting of both the kinds of measures may be counted towards this limit).

ii) In a year, not more than 50% of SDMF may be utilized for measures/projects to mitigate risks from a single hazard. However, this stipulation may be relaxed by the Ministry of Home Affairs on the recommendations of Sub Committee of National Executive Committee (SC-NEC), based on the written request of the State with proper justification.

iii) In a year up to 5% of the SDMF, funds may be earmarked for small grants window to support small proposals related to innovation, technology, community leadership, research, studies and learning. The NDMA and the SDMA will devise a mechanism to fund projects from this window.

iv) Funds available under SDMF shall not be used for general environmental improvement or landscape beautification and for funding the existing Government programmes/ongoing schemes etc.

v) Mitigation Fund should generally not be used for maintenance and upkeep of any structure or engineering measure aimed at mitigation. This fund should be used for developing and implementing new projects. The mitigation measures that have been implemented, should be maintained through other sources of funding.

vi) Resources under Mitigation Fund cannot be used towards the establishment expenditure such as salaries, office expenditure etc. to be incurred by the Disaster Management Authorities or other entities, except for payment of remuneration to technical staff included in the projects costs. Such payments will be as per the GFR-2017 and extant Government of India guidelines.

Administrative Mechanism to be followed for processing of proposals under State Disaster Mitigation Fund

(i) The SDMA will constitute an Appraisal Committee to be headed by a Member of SDMA with members from line Departments of the State Government and State entities for appraisal of the proposals/ projects under SDMF.

(ii) The Departments/ Agencies of the State Government/ DDMA, who wish to take up projects from SDMF, will submit the project proposals to the State Government Department dealing with the Disaster Management, which in turn will refer the project proposal to the Committee headed by the Member, SDMA for appraisal.

(iii) The recommendations of the Appraisal Committee of SDMA shall be placed before the SEC for consideration/ sanction.

State Executive Committee (SEC)

i) SEC, constituted by the State Government as per provision of section 20 of the DM Act, 2005, will decide on matters connected with the administration of SDMF including obtaining contributions from the Central Government, investing the accretions to the SDMF in accordance with the prescribed norms and approving the mitigation project from SDMF.

ii) SEC shall ensure that the money drawn from SDMF is actually utilized for the purpose for which the SDMF has been set up.

11.4 The Goa State Disaster Management Rules 2007:

Provision of Disaster Management Fund in the Annual State Budget:

11.4.1 Constitution of Fund. - (1) The State Government, shall after due appropriation made by the Legislature of the State by law in this behalf, make in its annual budget a provision relating to fund under

the following Heads and contribute such some of money as it thinks fit for the purpose of carrying out the activities and programmes set in the Disaster Management Plan by the various Authorities under the Act. The funds shall be established under the following Heads, namely: -

(i) the State Disaster Response Fund;

(ii) the District Disaster Response Fund;

(iii) the State Disaster Mitigation Fund;

(iv) the District Disaster Mitigation Fund.

The State Executive Committee, the State Authority and District Authority, as the case may be, may spend such as they think fit for performing their functions under the Act and all such sums shall be treated as expenditure payable out of respective fund Head. The authority thereof shall maintain all the expenditure in form as specified by the Government.

11.4.2 Form of Annual Report. - The State Authority shall during each financial year prepare annual report in respect of the year last ended giving a true and full account of its activities during the previous financial year furnishing particulars as specified in "Form A" (Annexure-V), appended to the rules. The annual report shall be forwarded to the Government within three months from the end of the previous financial year and the Government shall cause every such report to be laid before the State Legislature.

11.5.1 Financing Prevention, Mitigation, and Preparedness

The provisions relating to funding of prevention, mitigation, and preparedness, as per DM Act 2005 are listed below:

i. Section 18 (2) (f) provides that **SDMAs** may recommend provision of funds for mitigation and preparedness measures;

ii. Section 38 (2) (d) provides that **the State Government** may allocate funds for measures for prevention of disaster, mitigation, capacity -building and preparedness by the departments of the Government of the State in accordance with the provisions of the State Plan and the District Plans;

iii. Section 39 (c) provides that the departments of the **State Government** shall allocate funds for prevention of disaster, mitigation, capacity- building and preparedness.

11.6.2 Allocation by Ministries and Departments

Section 49 (1) states that: very Ministry or Department of the Government of India shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan.

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

11.6.3 Provisions in the Act for Disaster Risk Reduction

Some of the statutory provisions incorporated in the Disaster Management Act, 2005 for mainstreaming DRR and financing thereof are reproduced below.

i. **Section 18 (2) (g)** provides that the SDMA may review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;

ii. **Section 22 (2)(b)** provides that the SEC may examine the vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation;

iii. **Section 23 (4) (b)** provides that the State Plan shall include measures to be adopted for prevention and mitigation of disasters;

iv. **Section 23 (4) (c)** provides that the State Plan shall include the manner in which the mitigation measures shall be integrated with the development plans and projects;

v. Section 23 (4) (d) provides that the State Plan shall include, capacity-building and preparedness measures to be taken;

vi. **Section 30 (2) (iv)** provides that the guidelines for prevention of disasters, mitigation of its effects, preparedness and response measures as laid down by the National Authority and the State Authority are followed by all departments of the Government at the district level and the local authorities in the district;

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

viii. **Section 30 (2) (xiv)** provides that the District Authority may set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public;

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

x. **Section 32 (a)** provides that every office at the district level shall prepare a Plan setting out:
   - provisions for prevention and mitigation measures as provided for in the District Plan and as is assigned to the department or relevant agency;
   - provisions for taking measures relating to capacity-building and preparedness as laid down in the District Plan;
   - the response plans and procedures, in the event of, any threatening disaster situation or disaster;

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

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

xiii. **Section 39 (b)** provides that the departments of State Government may integrate into its development plans and projects, the measures for prevention of disaster and mitigation;

11.7 Implementation of DRR – Financial Aspects

11.7.1 Public Funded Schemes

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

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

Outlay for reconstruction activities are normally embedded in the schemes of the Union Government to ensure that "Building Back Better" is in consonance with the approved programs. Post disaster reconstruction work is funded by the Union Government through increased outlay for the on-going infrastructure projects in the region and providing more untied grant to the affected State. The

Centre/State may also utilize funds from international agencies for specific intervention in a particular region in the form of an externally aided project.

11.7.2 Flexi Funds as a part of Centrally Sponsored Schemes

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

a) To provide flexibility to States to meet local needs and requirements within the overall objective of any given Scheme at the sub-head level

b) To pilot innovation to improve efficiency within the overall objective of any given Scheme at the sub-head level

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

11.7.3 Externally Aided Projects

Besides the funds which are available through public funded schemes, efforts have also been made by the centre to mobilize the resources from external funding agencies for vulnerabilities assessment, capacity development, institutional strengthening of response mechanism and mitigation measures etc. For reconstruction and rehabilitation measures in the aftermath of major disasters, the State Government would seek the continuous support from Central Government.

11.8 Risk Transfer and Insurance

As of now Government of India is acting as a self-insurer for the purpose of maintaining relief funds (National Disaster Response Fund and State Disaster Response Fund). The funds are monitored by MHA

in consultation with Ministry of Finance. The amount committed for State Disaster Response Fund is invested by the Union in government securities. MHA has issued guidelines in consultation with Ministry of Finance for the maintenance and encashment of the securities as and when required. However, need for projects or risk transfer instruments by private agencies, is also acknowledged by the Government. The corresponding policy changes and fund requirement is to be deliberated in detail in consultation with the IRDA, insurance sector and other stakeholders.

Goa Disaster Management Fund Scheme:

Minimum Standards of Relief-Ex Gratia assistance

The Ex-Gratia Assistance on account of loss of or damage to houses and restoration of means of livelihood to the disaster victims shall be provided as per the Items and Norms of Assistance from SDRF/NDRF issued by Ministry of Home Affairs, Government of India and Goa Disaster Management Fund Scheme (GDMFS) spearheaded by Revenue Department Government of Goa. Also, whichever is higher among the two, shall be considered as Minimum Standards of Relief as applicable. Furthermore, whenever the Items and Norms of Assistance from SDRF/NDRF and GDFMS are revised, the Ex gratia Assistance shall be provided as per the revised notification.

Chapter-12
Strengthening Disaster Risk Governance

12   **Strengthening Disaster Risk Governance**

12.1 Background

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

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

UNDP describes disaster risk governance as:

> "The way in which public authorities, civil servants, media, private sector, and civil society at community, national and regional levels cooperate in order to manage and reduce disaster and climate related risks. This means ensuring that sufficient levels of capacity and resources are made available to prevent, prepare for, manage and recover from disasters. It also entails mechanisms, institutions and processes for citizens to articulate their interests, exercise their legal rights and obligations, and mediate their differences." (UNDP 2013)

UNISDR defines it as:

> "The system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy." (UNISDR 2016)

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

and ensuring the rule of law/compliance with adequate legal provisions. These are of crucial importance in fostering development and promoting risk reduction.

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

12.2 Sendai Framework and Strengthening Disaster Risk Governance

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

(a) Mainstream and integrate disaster risk reduction within and across all sectors and promote the coherence and development of relevant laws, regulations, and public policies. It must guide both the public and private sectors through the legal framework that clearly spells out the roles and responsibilities. It must address disaster risk in publicly owned, managed, or regulated services and infrastructures. It must encourage actions by persons, households, communities, and businesses. It has to enhance relevant mechanisms and initiatives for disaster risk transparency. It must put in place coordination and organizational structures.

(b) Adopt and implement disaster risk reduction strategies and plans, across different levels (local to national) and timescales, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening resilience –economic, social, health and environmental.

(c) Carry out assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at different levels

(d) Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions of sectoral laws and regulations, including those addressing land use, urban planning, building codes[13], environment, resource management, health and safety standards, and update them, where needed, for better disaster risk management

(e) Develop and strengthen mechanisms to periodically review and assess the progress on various DM plans as well as encourage institutional debates, including by parliamentarians and relevant officials, on DRR plans.

(f) Assign clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks, and undertake comprehensive public and community consultations during the development of such laws and regulations to support their implementation.

(g) Establish and strengthen government coordination forums composed of relevant stakeholders at the national and local levels, such as national and local platforms for disaster risk reduction.

(h) Empower local authorities, as appropriate, through regulatory and financial mechanism to work and coordinate with civil society, communities and indigenous people and migrant in disaster risk management at the local level.

(i) Work with parliamentarians for disaster risk reduction by developing or amending relevant legislation and setting budget allocations.

---

[13] **Building Codes: This implies the latest/updated Indian Standards**

(j) Promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations.

(k) Formulate relevant public policies and laws aimed at addressing issues of prevention or relocation, where possible, of human settlements in disaster risk-prone zones.

12.3 Responsibility Framework for Strengthening Disaster Risk Governance

Based on these considerations, and the increased emphasis globally on strengthening disaster risk governance to reduce disaster risk and to build resilience, the major tasks, agencies of the central and state government are presented in a responsibility framework. India currently has in place many institutions dedicated to disaster reduction, response, and for disaster risk governance at the centre and within the states at various levels from local to the state. However, there is wide variation in the functioning, structure, and capabilities. To strengthen disaster governance, a DM Cell will be established in each Central Ministry and a nodal officer, not below the rank of Joint Secretary will be appointed.

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

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

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

	Major Themes	Strengthening Disaster Risk Governance	
		State Agencies and their Responsibilities	
1.	• **Mainstream and integrate disaster risk reduction within and across all sectors** • **Institutional Strengthening**	SDMA/RD, DDMA, PRIs, ULBs, all departments involved in Disaster management	**Short Term (T1)** • Empower local authorities • Carry out assessment of the technical, financial and administrative capacity for disaster risk management at all levels within the state **Medium Term (T2)** • Improve work culture • Promote the coherence and development of relevant laws, regulations, and public policies • Adopt and implement disaster risk reduction strategies and plans, across different levels and timescale • 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 **Long Term (T3)** Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety enhancing provisions
2.	• **Capacity Development** • **Empower local authorities** • **Strengthen coordination mechanisms**	SDMA/RD, DDMA, PRIs, ULBs, Dept. (Env. & CC), All Departments involved in Disaster Management	**Recurring** Implementation in state ministries, departments, and agencies **Short Term (T1)** 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 **Medium Term (T2)** • Involve communities, PRIs, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational institutions

		• Develop necessary capacity to understand and effectively enforce regulatory norms and standards for DRR • 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 **Long Term (T3)** • 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 DRR plans
3.	**Promote Participatory Approaches, Partnerships and Networks**	SDMA/RD, DDMA, PRIs, ULBs, All departments involved in Disaster management, especially DRD and UDD	**Recurring** Promote for participation of communities, individuals, households, and businesses in all aspects of disaster management **Short Term (T1)** Implement participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location **Long Term (T3)** Establish and strengthen government coordination forums composed of relevant stakeholders
4.	**Work with elected representatives**	SDMA/RD, DDMA, PRIs, ULBs, All Departments involved in disaster management, especially DRD and UDD	**Recurring** • Sensitize the political leadership • Involve the political leadership at state, district, block, and local levels in discussions on DRR
5.	**Grievance Redress Mechanism (GRM)**	SDMA/RD, DDMA, PRIs, ULBs, all departments involved in disaster response	**Recurring** • Ensuring the functioning of a sound grievance redress mechanism in all the ministries/ agencies involved in disaster response

			Short Term (T1) • Review existing GRM applicable for state and centre and within state • Develop plans to strengthen GRM **Medium Term (T2)** • Implement plans for strengthening GRM
6.	**Promote quality standards, such as certifications and awards for disaster risk management**	SDMA/RD, DDMA, PRIs, ULBs	**Recurring** • Ensure implementation of standards • Monitor compliance **Short Term (T1)** Formulate state-level regulations along with wide public consultations **Medium Term (T2)** • Develop suitable by-laws specifically for urban and rural areas • Institute systems of certifications and awards for DRR • Develop enforcement mechanisms **Long Term (T3)** • Implement Techno-Legal regimes • Establish institutional arrangements for monitoring compliance

RD-Revenue Department: Since Revenue Department in the State is the nodal department for disaster management, so SDMA/RD can be synchronised accordingly

Chapter-13
International Cooperation

13   **International Cooperation**

13.1 Participation in International Efforts

Goa is committed in playing a pro-active role in the India's International Disaster Risk Reduction Initiatives. Goa SDMA has implemented the Sendai Framework for Disaster Risk Reduction Scheme and is committed to achieve the priorities and the objectives through systematic and institutional efforts. The priorities for action under SFDRR are exercised to achieve the results on 07 Global through the 10 deliverables set for the SFDRR Scheme by National Disaster Management Authority in the MoU with the Government of Goa. With multi-dimensional initiatives and expertise, Goa remains committed to playing a leading role in strengthening local and national cooperation efforts in mitigating and reducing the effects from disasters. Goa SDMA was honoured with DRR Award in World Congress on Disaster Management (WCDM) by The Hon'ble Union Minister of Tourism, Culture and Development of North Eastern Region, Government of India held by Disaster Management Initiatives and Convergence Society (DMICS) on 21st June 2022 at India International Centre (IIC), New Delhi. The Award is given by WCDM for recognizing champions in DISASTER RISK REDUCTION (DRR) for rendering their selfless service and bringing innovation in managing the natural and man-made disasters including pandemics and biological disasters and in mitigating their impact on the society. Goa does cooperation in the field of disaster management with neighbouring Coastal States. Goa has been working closely with many States for the exchange of ideas and expertise in disaster management. The State successfully conducted the safe and secure G 20 Summit 2023 related meetings in the State in an organised and peaceful manner. As per the directions given by National Disaster Management Authority, New Delhi, Government of India, Goa SDMA conducted Table Top Exercises and Mock Exercises on CBRN Emergencies at all G-20 Venues (Grand Hyatt and Taj Convention Centre/Cidade-de-Goa) on 10th and 15th April, 2023 respectively for a safe and secure G-20 events in Goa. The Table Top Exercise cum Mock Exercise conducted at the above venues was attended by representatives from Goa State Disaster Management Authority-SDMA, District Disaster Management Authority-DDMA North and South, Goa Police, Directorate of Fire and Emergency Services-DFES, Directorate of Health Services-DHS, National Disaster Response Force-NDRF (5th Bn. Pune), Department of Atomic Energy-DAE, Anti-Terrorist Squad-ATS and Bomb Detection and Disposal Squad-BDDS, Emergency Response Teams-ERT of both Grand Hyatt and Taj Convention Centre/Cidade-de-Goa.

13.2 Accepting Foreign Assistance:

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

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

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

13.3 Accepting Multilateral Assistance:

In the case of an offer of assistance from UN Agencies, the State will rely upon the Government of India to evaluate and consider all such offers on its merits. The State will coordinate with the concerned UN agency only on the directions of the GOI to accept such offers. In accordance with the applicable norms and protocols of the Government of India, the State will permit only those 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 of the State.

13.4 Fostering Partnerships:

Goa is keen to share expertise and work with other countries in the areas of disaster management. Goa is on the International map and can play a major role for capacity building initiatives of the country in the Asia Pacific region and looks forward to building sustained regional and international partnerships under the Sendai Framework. The State has hosted various prestigious domestic as well as international events like G 20 Summit 2023 and other Business, Tourism, Sports and Entertainments related events. The State Government is committed in fostering the partnerships with the domestic as well as international agencies regarding sharing of knowledge and best practices for capacity building in the

domain of disaster management. Goa has the potential to work with countries in the region and beyond in building resilient nations and communities, against disasters. Goa acknowledges the benefit of engaging with the international community in providing humanitarian assistance in the State in emergencies.

Since Goa is one of the most famous tourist destination in the country as well with the inflow of both Domestic and International tourists; so tourist safety equally becomes important to the State in wake of disaster/crisis situations. The State Disaster Management Authority is committed to extend best possible support to the International tourists in the times of disaster emergencies. The SDMA believes in proactive approach to mitigate the negative impacts of an inevitable disaster situation. SDMA believes in establishing an appropriate liaising processes with the Consulates of the International Countries to assist their respective citizen (foreign tourist) visiting the State of Goa. Accordingly, SDMA has initiated the conduct of introductory meetings the representatives of the Consulate Generals of the other Countries and conducted one meeting with Foreign Service Officers from Consulate General of the United States of America Mumbai, India on 13th Feb 2024. Goa SDMA assured the best possible support to assist all foreign tourists including U.S. citizens as well during unforeseen difficulties in the State.

Chapter-14
Maintaining, Monitoring and Updating the Plan

14 Maintaining, Monitoring and Updating the Plan

15.1 Background

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

15.2 Training and Drills:

At different levels, the nodal agency tasked with developing respective DM plan must disseminate it to all other agencies associated with the plan execution having specific responsibilities (State Ministries/ Departments, District Administration, etc.). These key stakeholder agencies are required to train their personnel, so that they have the knowledge, skills and abilities needed to perform the tasks identified in the plan. Each agency shall assign nodal officers for DM and prepare adequate training schedule. Each nodal agency for DM must hold, in accordance with a mandatory timetable, training workshops with regular mock drills, at least twice a year. Such programs are crucial to ensure full preparedness and to maintain operational readiness of the disaster response operation teams, institutional mechanisms, and the equipment. Mock drills and trainings must be organized to test their readiness to deploy within the shortest possible time following the activation of a disaster response. They shall be conducted in a manner like that of the drills carried out by fire-fighting department or army units. These workshops and drills must be held at the pre-designated locations or base camps under the guidance of the designated incident commanders and associated departmental heads. The objective of all these trainings and drills would be to both familiarize the teams with the SDMP and to increase their operational efficiencies. The trainings are crucial because they go beyond concepts and guidelines into inculcating in the individuals the critical importance of working as a coherent team for emergency response with a clear chain of command. The workshops and drills will also provide an opportunity to practice SOPs. These workshops would also give the teams an opportunity to develop all the stakeholders into a cohesive response unit.

15.3 Testing the Plan and Learning to Improve

Evaluating the effectiveness of a plan involves a combination of training events, exercises and real-time incidents to determine whether the goals, objectives, decisions, actions and timings outlined in the plan led to a successful response. The purpose of exercises and drills is to promote preparedness by

testing the plan with equal participation of all relevant stakeholders. The process of evaluation and remedial actions will identify, illuminate, and correct problems with the SDMP. This process must capture information from exercises, post -disaster critiques, self-assessments, audits, administrative reviews, or lessons-learned processes that may indicate that deficiencies exist. Members of the planning team should reconvene to discuss the problem and to consider and assign responsibility for generating remedies across all mission areas. Remedial actions may involve revising planning assumptions and operational concepts, changing organizational tasks, or modifying organizational implementing instructions (i.e., the SOPs/SOGs). Remedial actions may also involve reassessment of capabilities, revisiting assumptions made in the SDMP, and finding solutions to overcome the deficiencies. The final component of a remedial action process is a mechanism for tracking and following up on the assigned actions. As appropriate, significant issues and problems identified through a remedial action process and/or the annual review should provide the information needed to allow the planning team to make the necessary revision(s) to the plan.

14.4 Monitoring by State Ministries/Depts. and District Admin.

All the departments of the State Government and District Administration should prepare a checklist with verifiable indicators to regularly monitor the progress of the implementation of respective DM plans. The monitoring system must be aligned with the Sendai framework monitoring checklist (Annexure -III). Keeping the Sendai framework as a reference, they must develop specific checklists relevant to various hazards. The monitoring must include periodic reviews synchronised with the quasi -cyclic or recurring nature of hazards such as cyclone, or flood. They must also regularly review preparedness for disasters that tend to occur without warnings or are extremely rare such as earthquake or tsunami. For recurring or frequent hazards, they should employ check lists to assess preparedness before the onset of the season. For other hazards, this can be undertaken as an annual exercise. Ministries / Departments of Government of Goa should also conduct periodic review on the extent of financial provisions required for implementing their Plan.

14.5 Revise/Update

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

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

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

Annexure-I: List of SDMA's Disaster Management Guidelines/Plans/Notifications/Schemes/Projects

Source: ------------------(Goa SDMA Website) ------------------(as on June. 10, 2024)

Schemes/Projects:

1. National Cyclone Risk Mitigation Project-NCRMP;
2. Upscaling of Aapda Mitra Scheme;
3. Goa Disaster Management Fund Scheme;
4. Sendai Framework for Disaster Risk Reduction Scheme;
5. Extension of Emergency Response Support System (Dial 112);
6. Common Alert Protocol-CAP Integrated Alert System

Notifications:

1. Notification of Incident Response System at State and District Level;
2. Notification of State Specific Disasters;

Plans:

1. District Disaster Management Plans;
2. Local Contingency Plan for Mass Rescue Operation at Sea-2023;
3. Heatwave Action Plan 2024
4. Airport Emergency Response Plan
5. Communication Plans

Hazard Risk Maps for Goa

Vulnerability Atlas of Goa, Third Edition 2019, Building Materials and Technology Promotion Council (BMTPC)

Earthquake Hazard Map

(https://bmtpc.org/DataFiles/CMS/file/VAI2019/eq-goa.html , accessed March 16, 2024)

Wind Hazard Map

(https://bmtpc.org/DataFiles/CMS/file/VAI2019/WIND-goa.html, accessed March 16, 2024)

Landslide Hazard Map

(https://bmtpc.org/DataFiles/CMS/file/VAI2019/ls-goa.html , accessed on March 16, 2024)
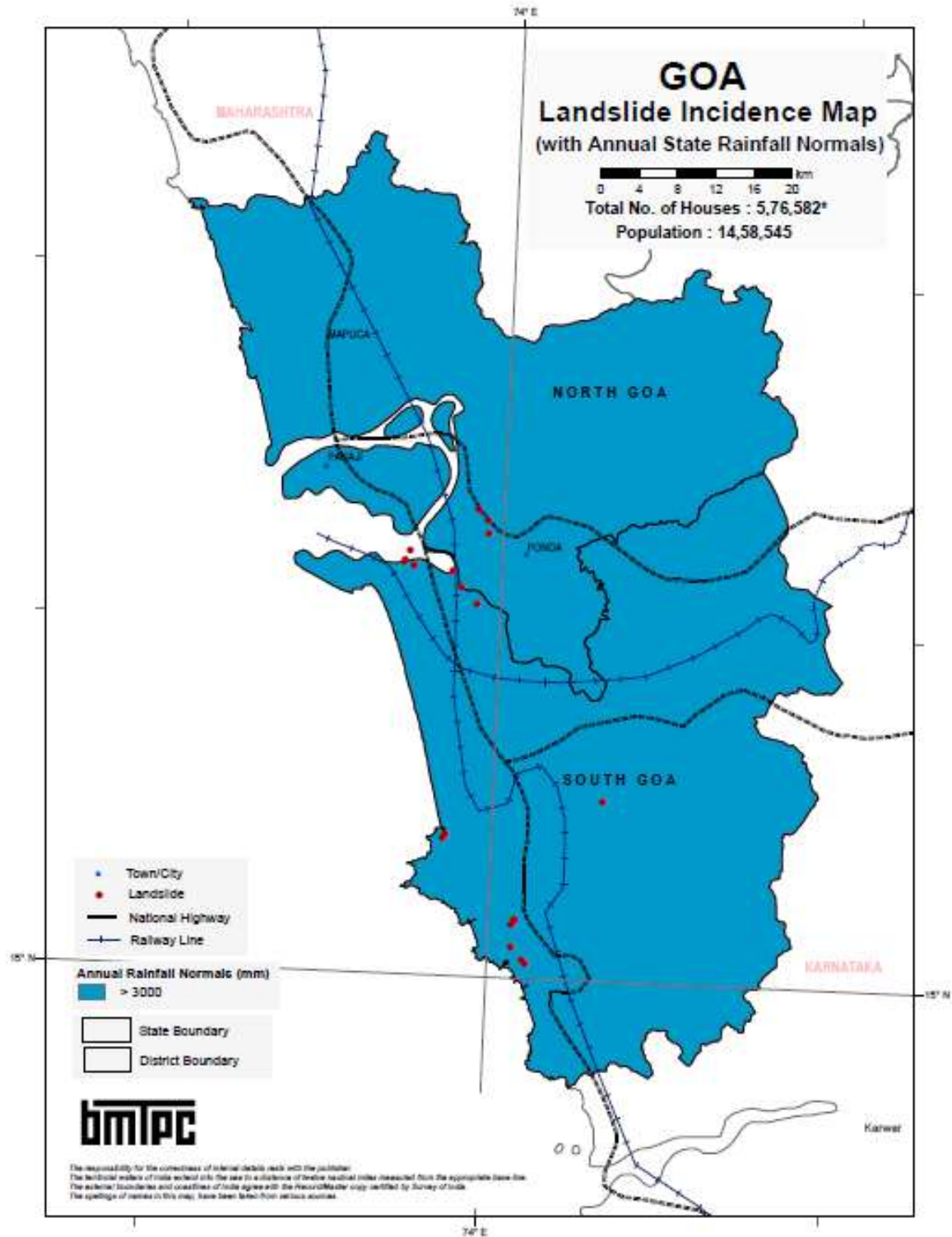
Cyclone Hazard Map (2 Year Return Period)

Cyclonic Wind Speed for 2 Year Return Period

Legend

Cyclonic Wind 2 Year Return Period

Wind Speed,Km/hr

- 34 - 38
- State Boundary
- District Boundary
- Tehsil Boundary
- Village Boundary
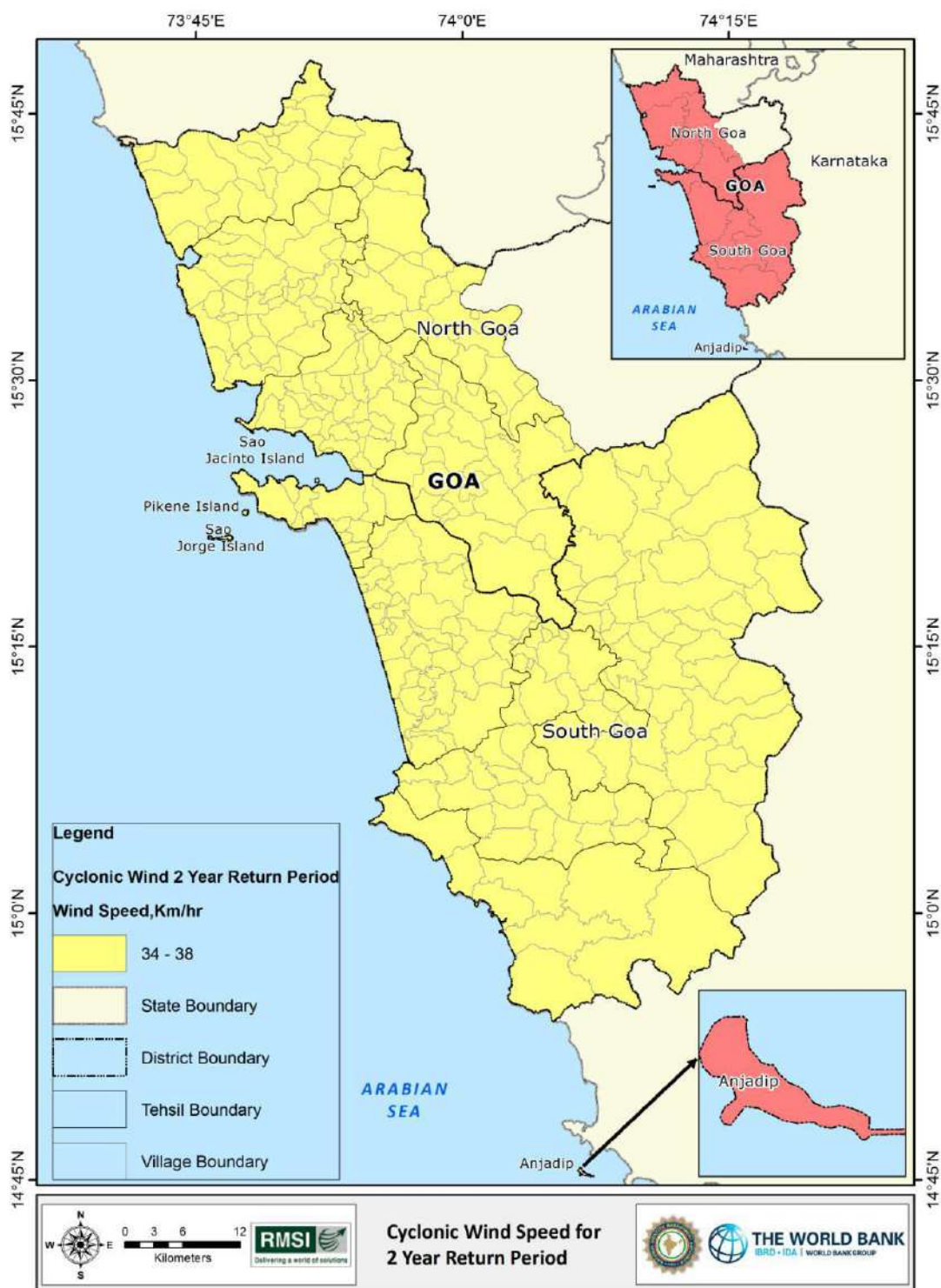
Cyclone Hazard Map (5 Year Return Period)

Cyclone Hazard Map (10 Year Return Period)

Cyclonic Wind Speed for 10 Year Return Period
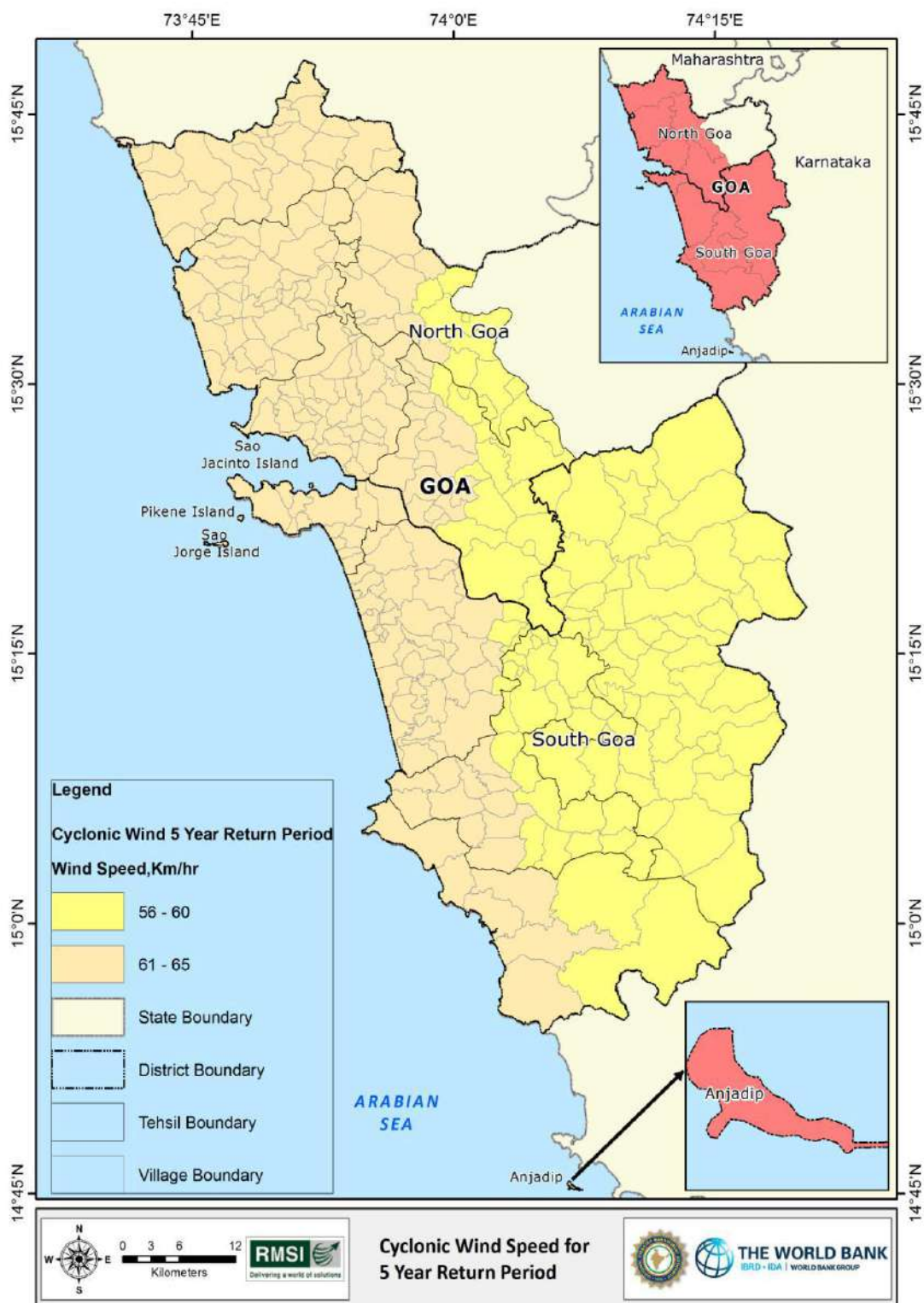
Cyclone Hazard Map (25 Year Return Period)
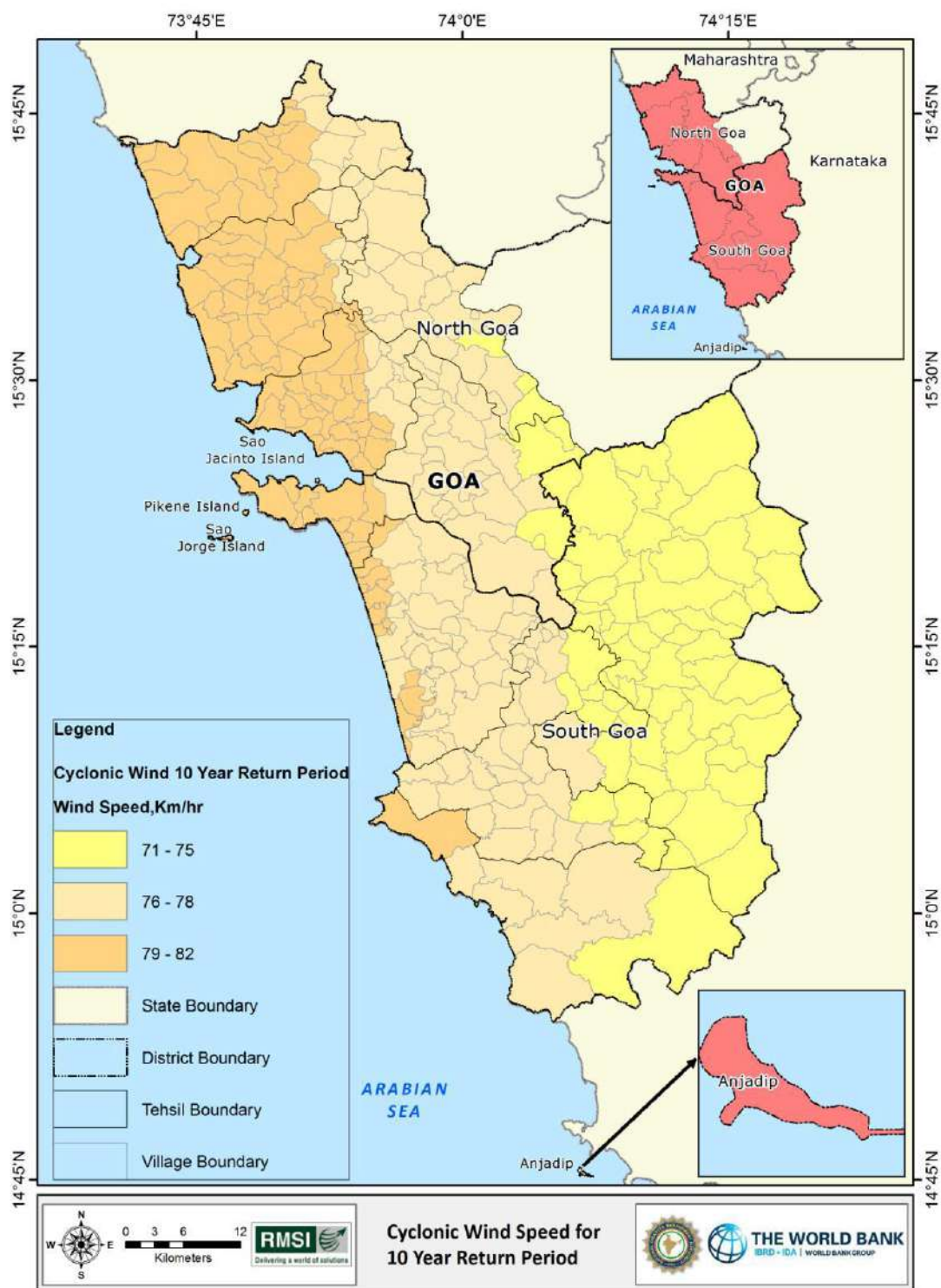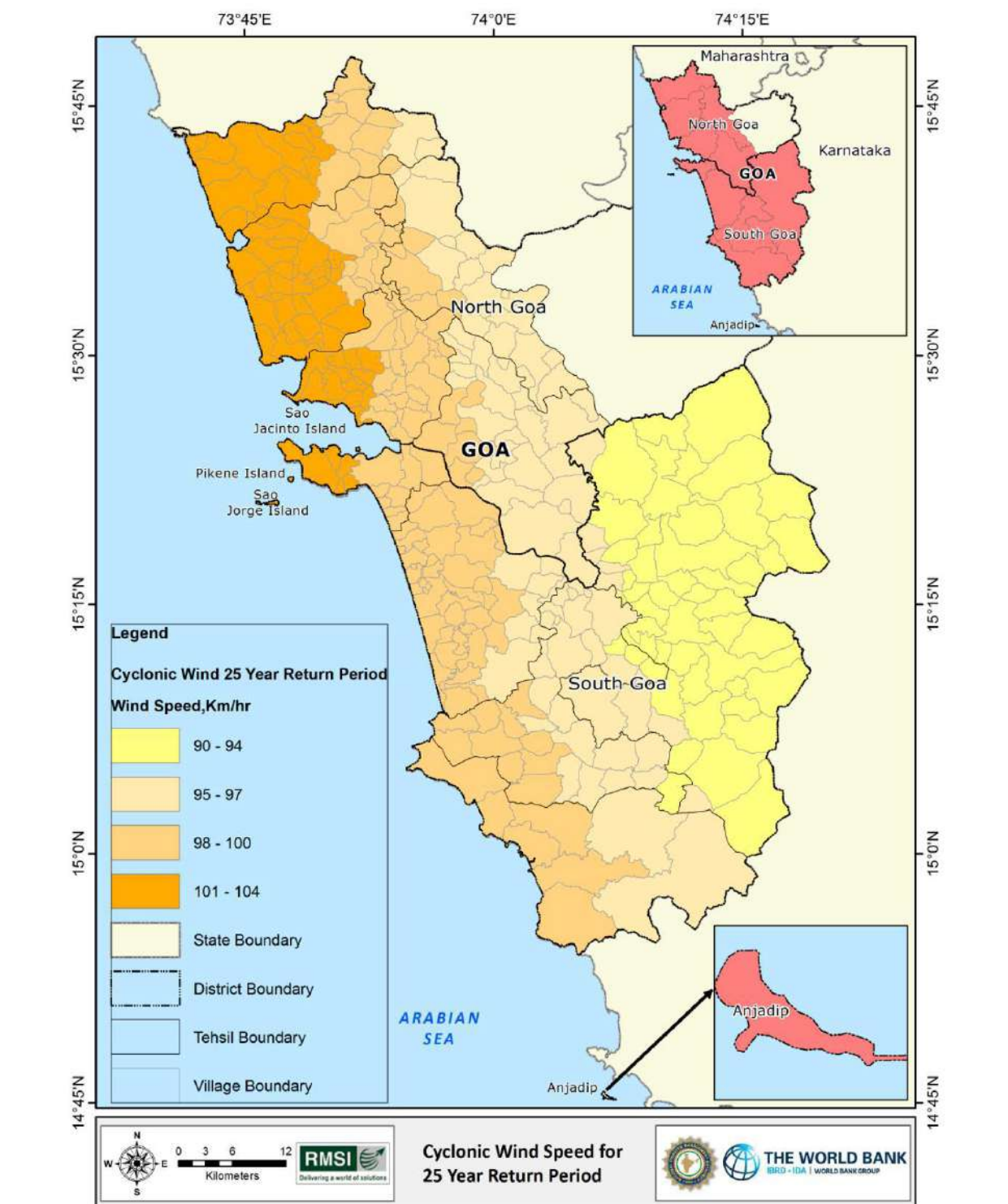
Cyclone Hazard Map (50 Year Return Period)
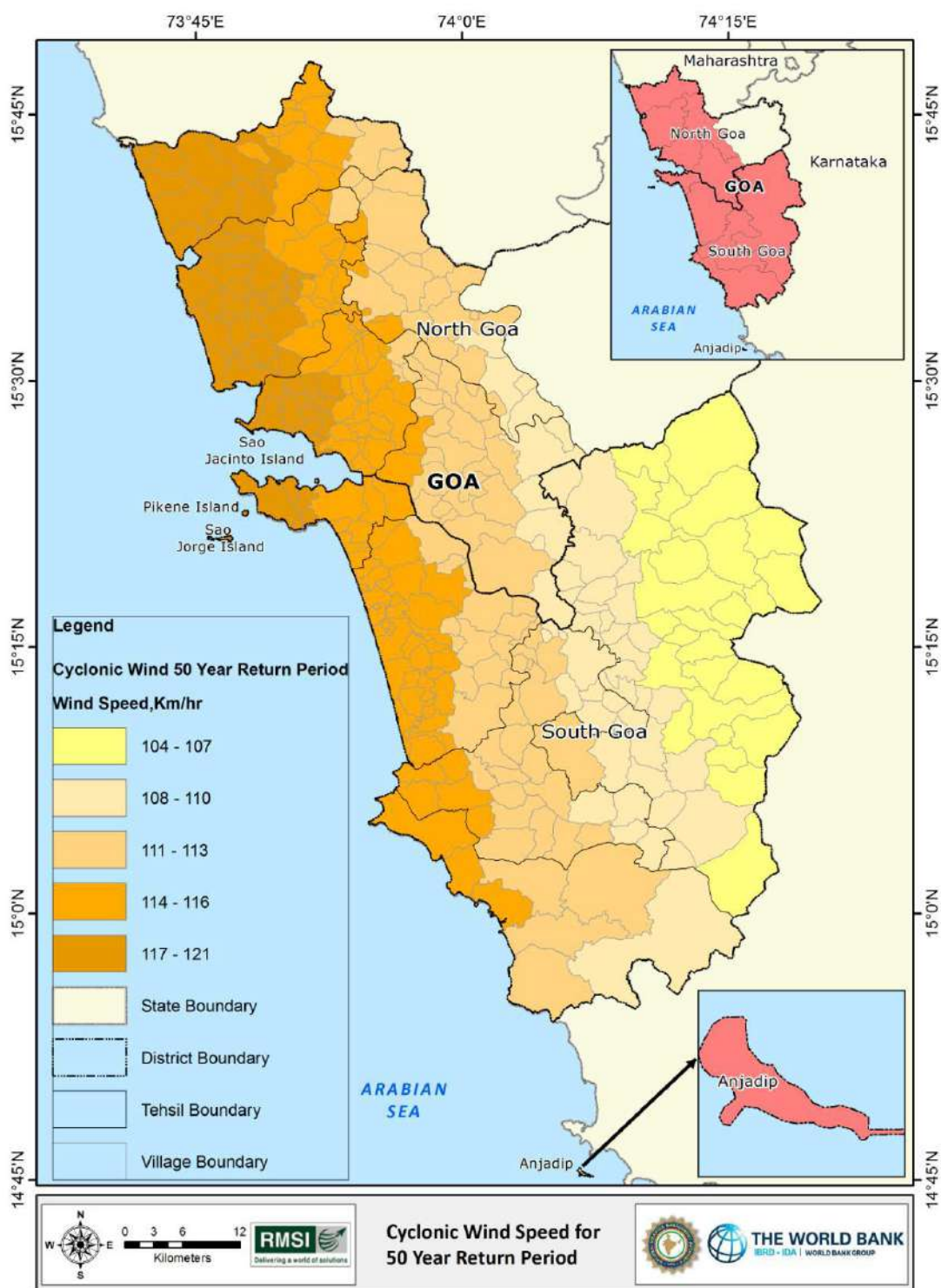
Cyclone Hazard Map (100 Year Return Period)
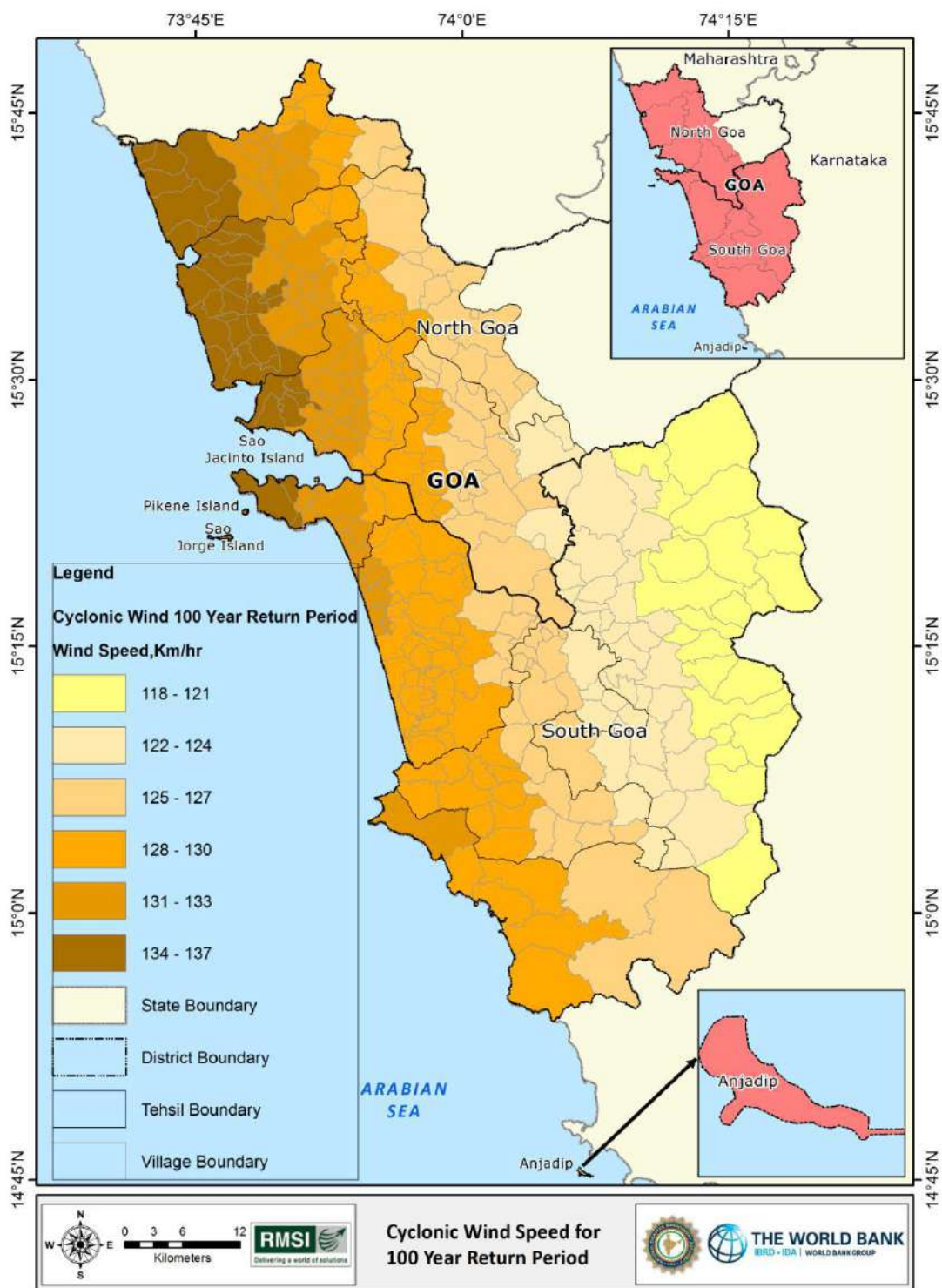
Cyclone Hazard Map (250 Year Return Period)

Cyclone Hazard Map (500 Year Return Period)

Cyclonic Wind Speed for 500 Year Return Period
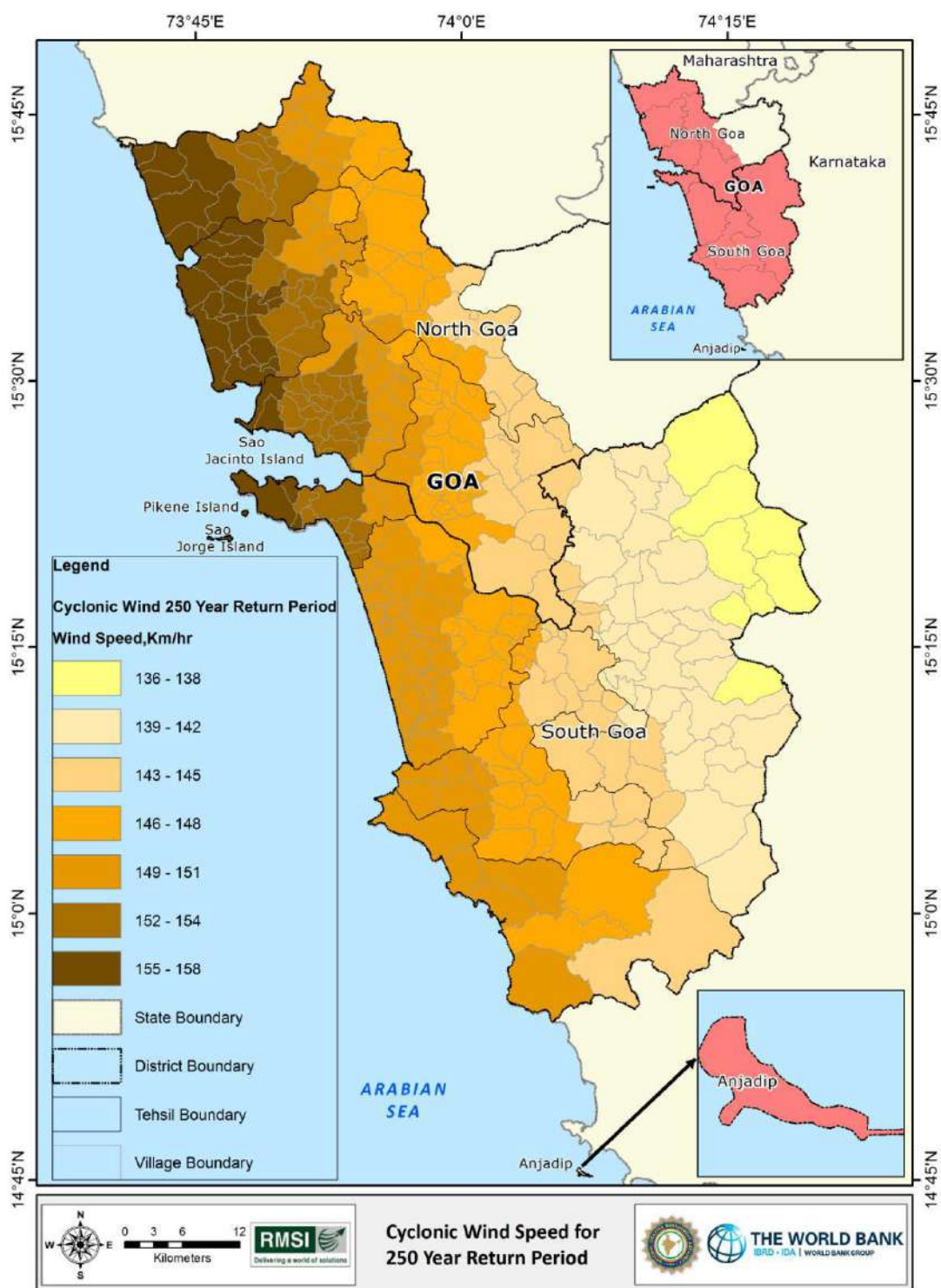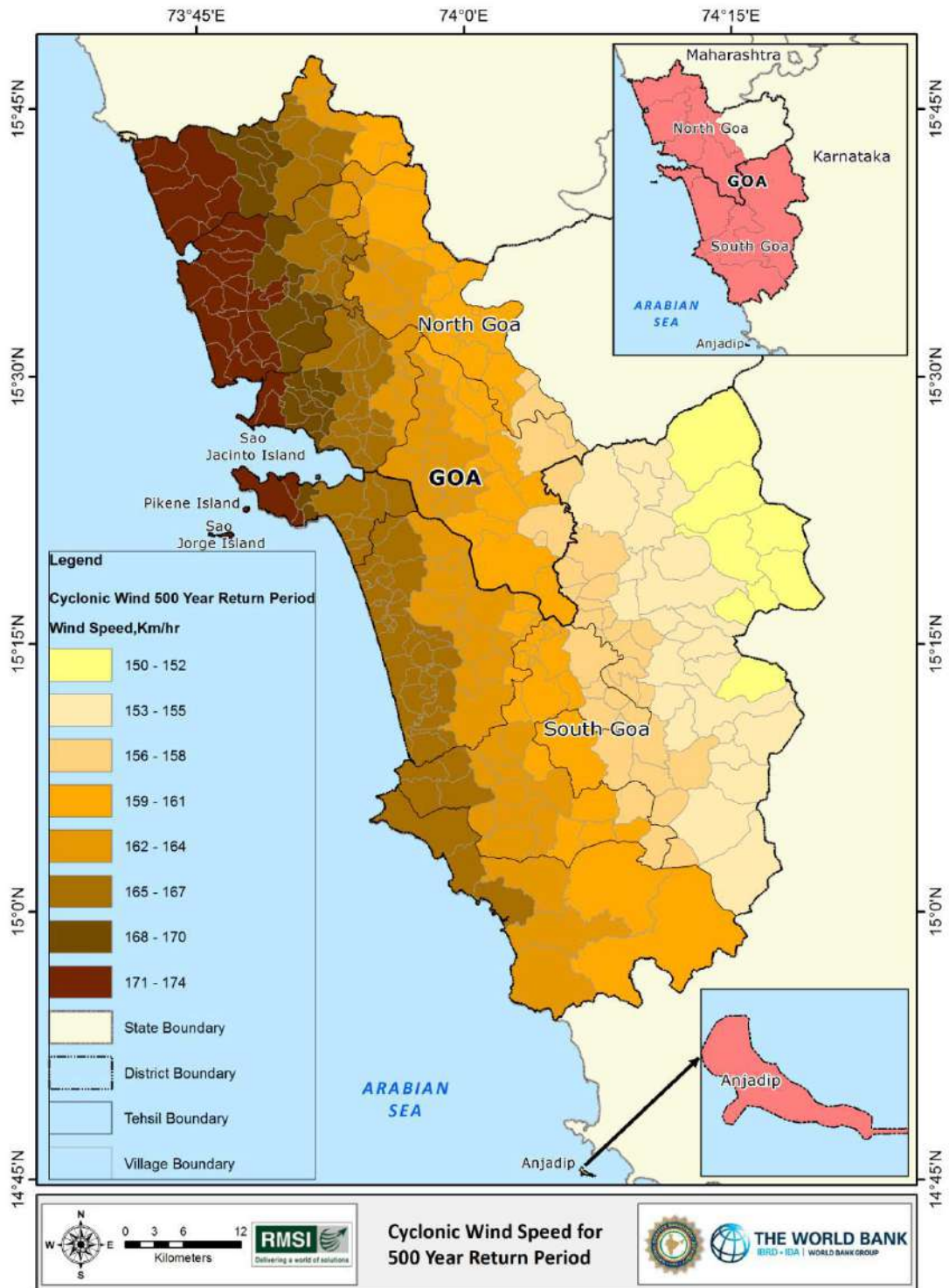
Surge Hazard Map (2 Year Return Period)
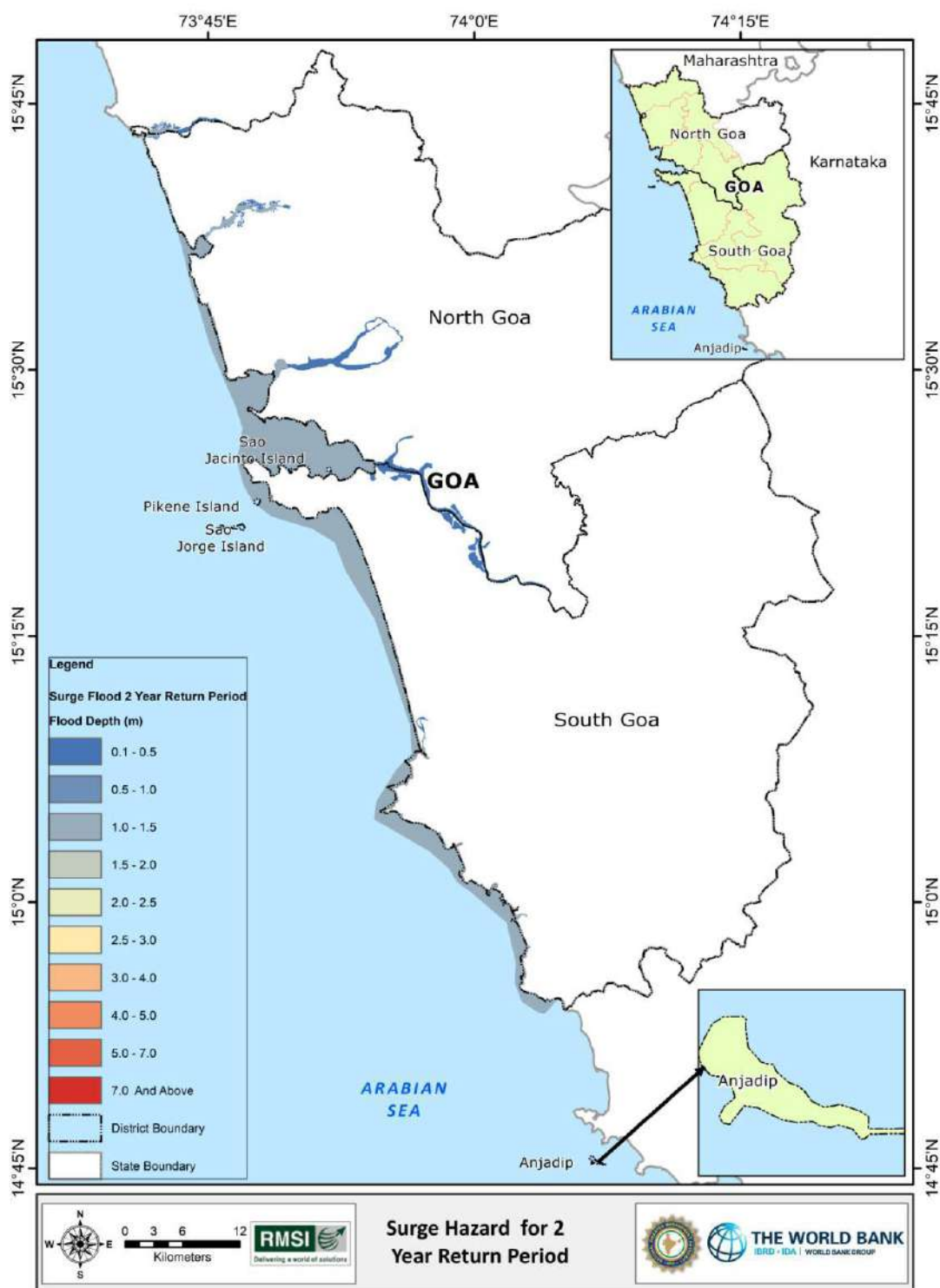
Surge Hazard Map (5 Year Return Period)
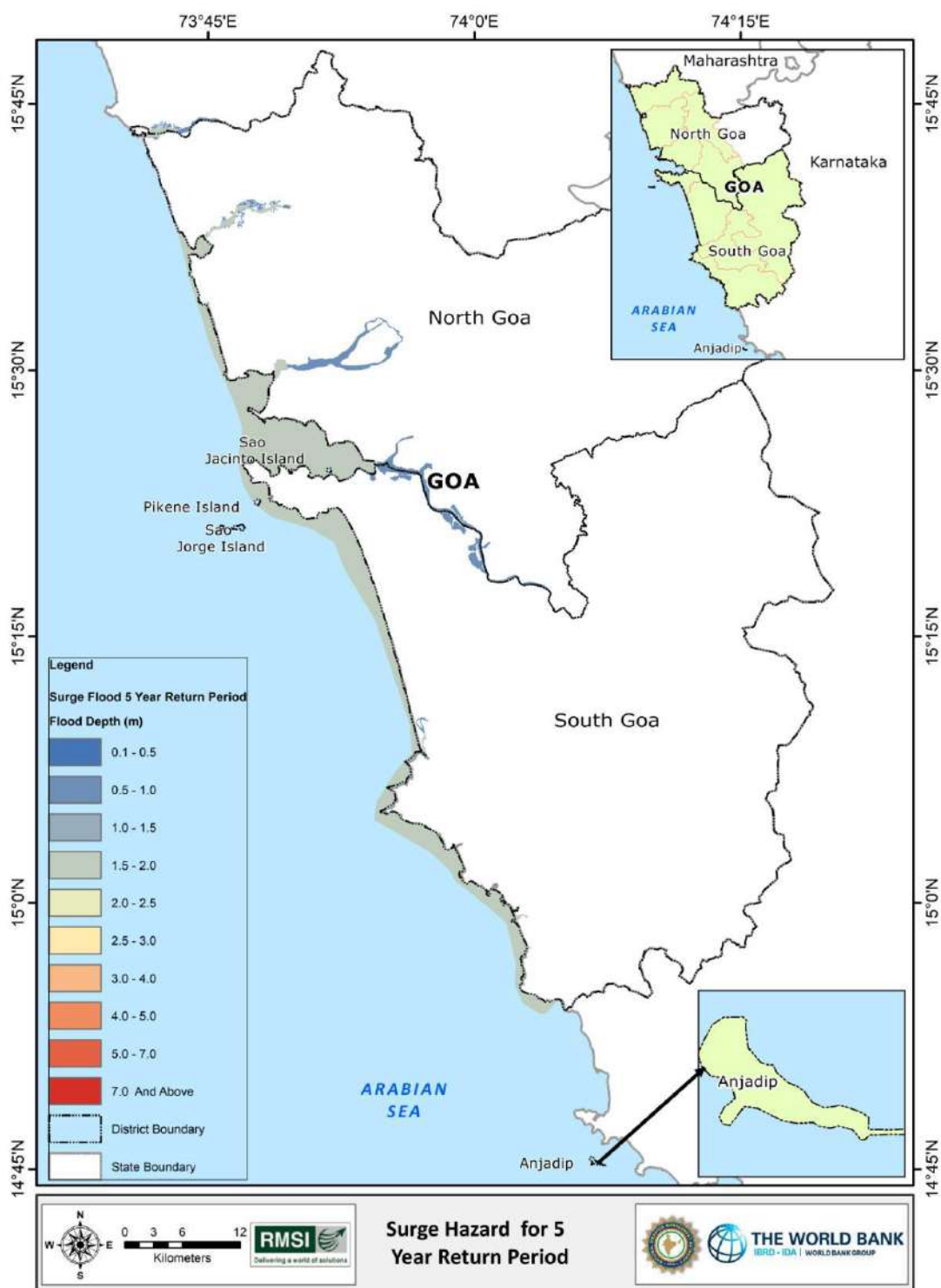
Surge Hazard Map (10 Year Return Period)
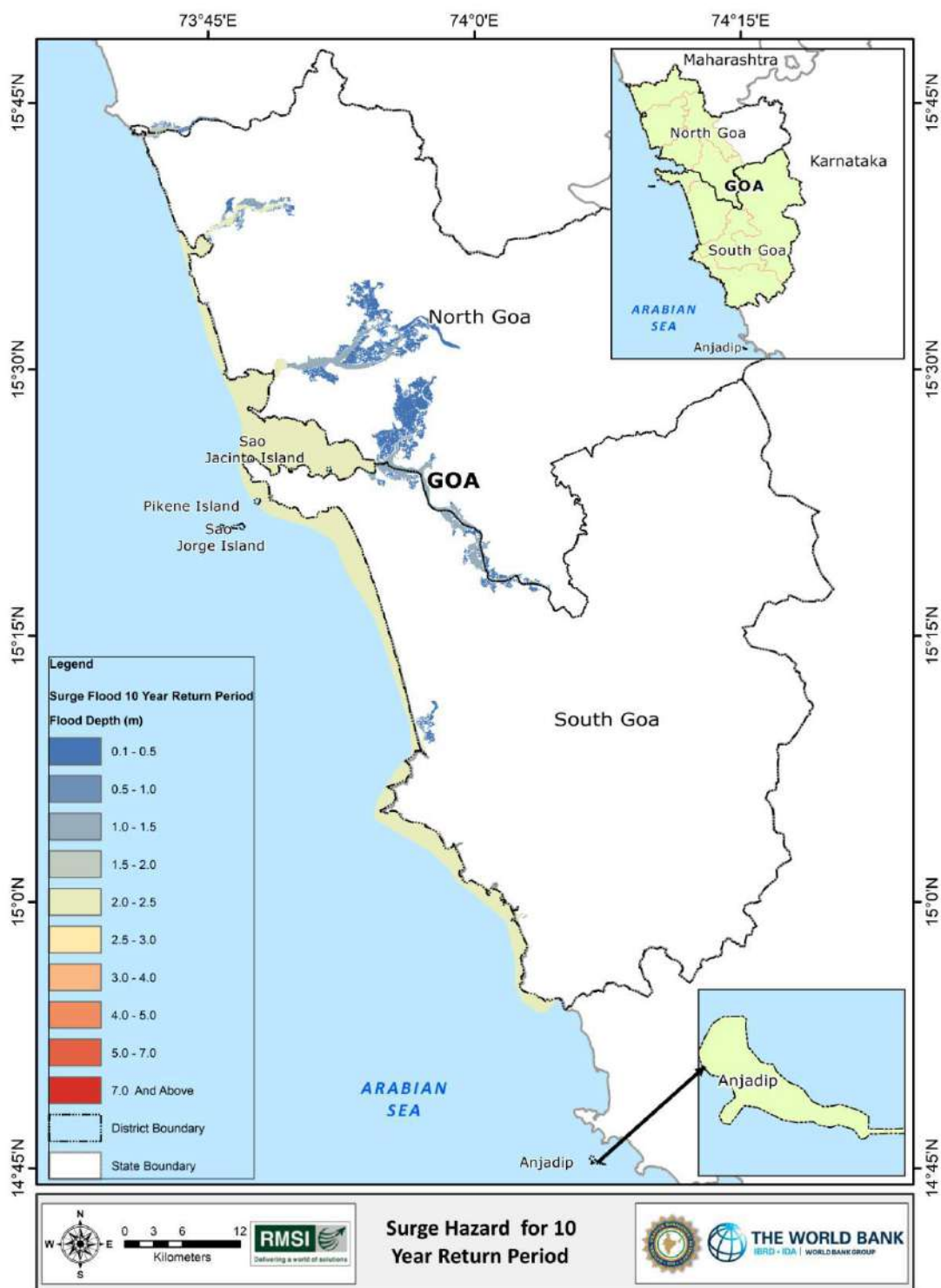
Surge Hazard Map (25 Year Return Period)
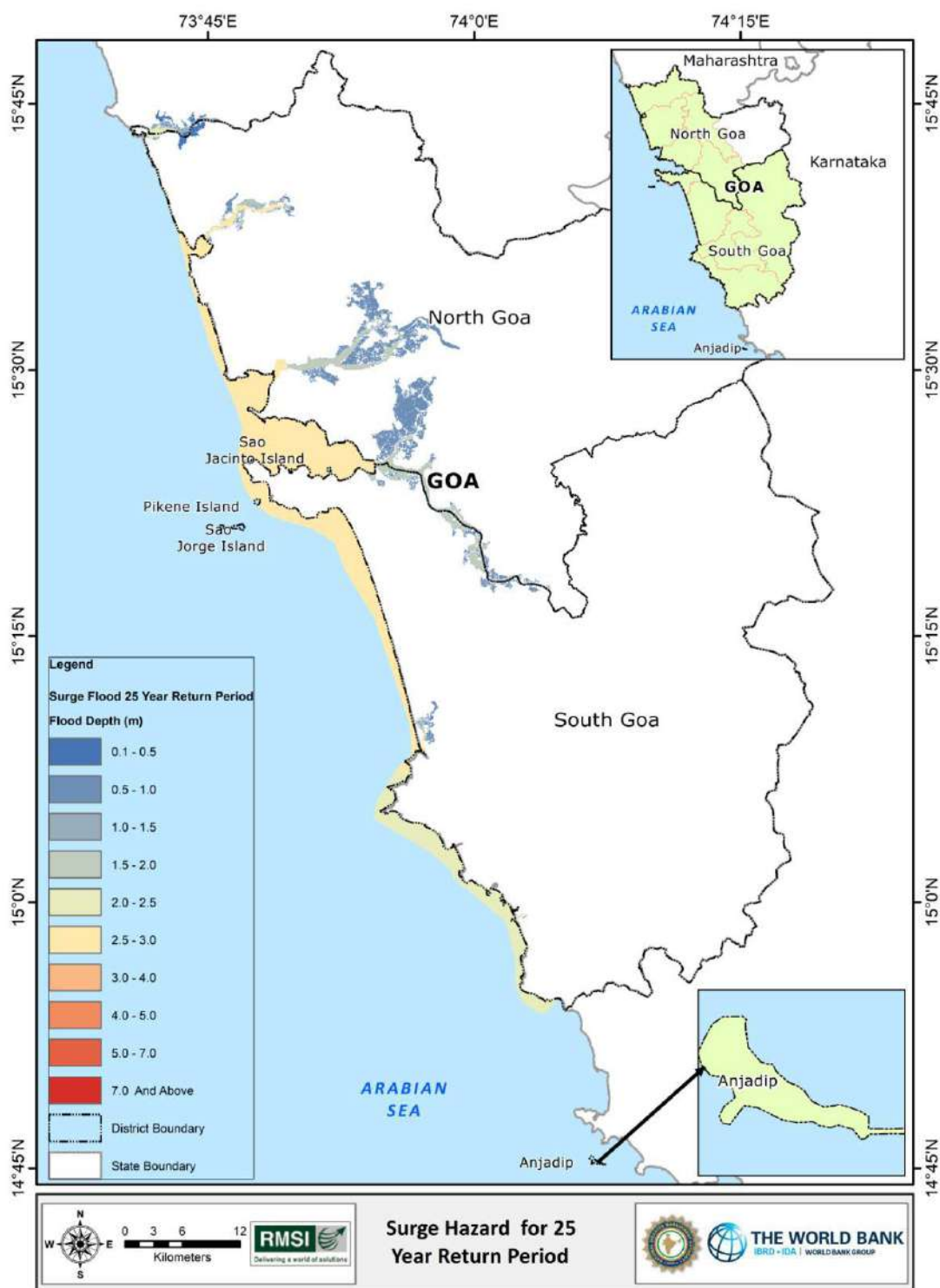
Surge Hazard Map (50 Year Return Period)
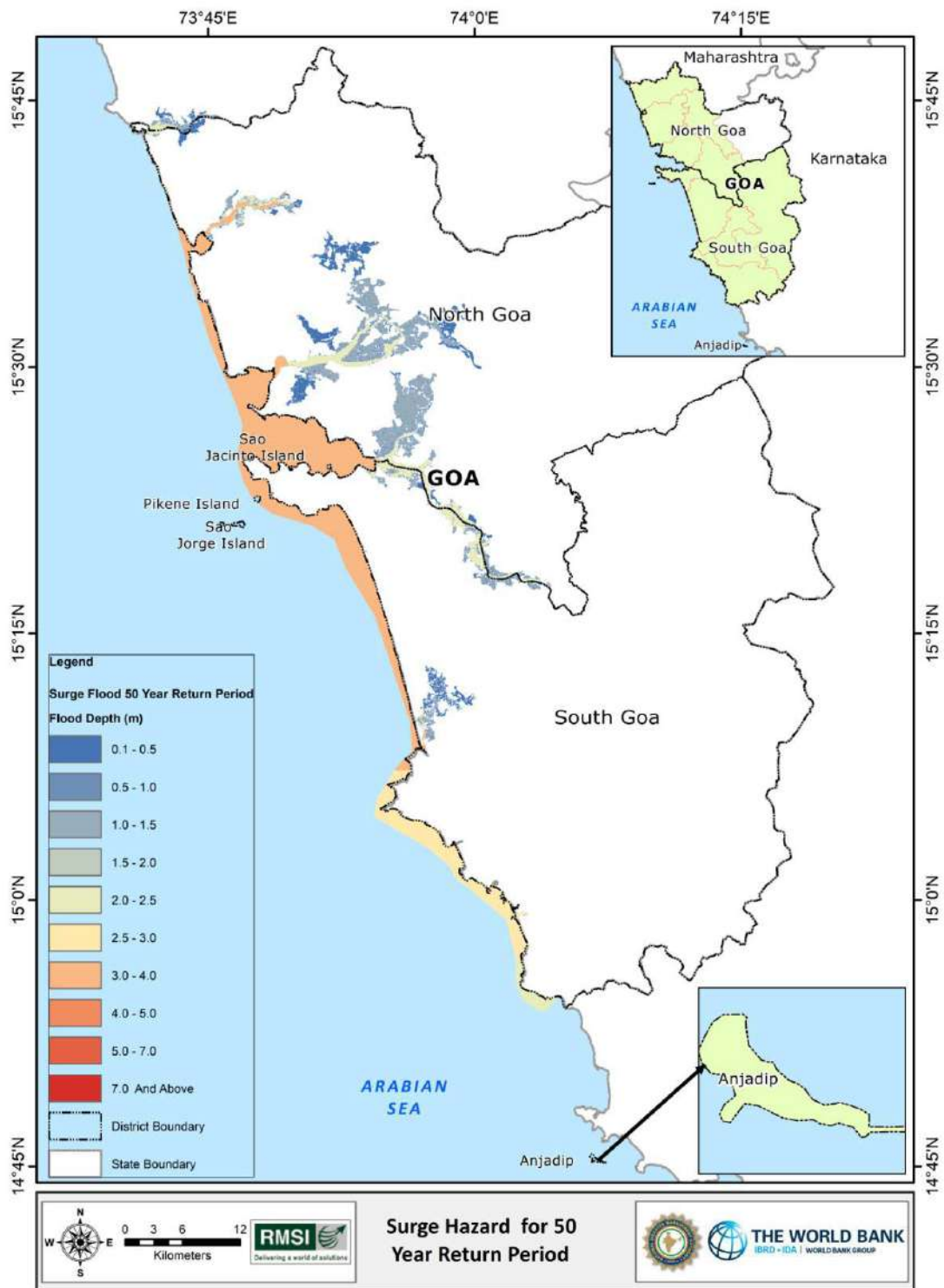
Surge Hazard Map (100 Year Return Period)
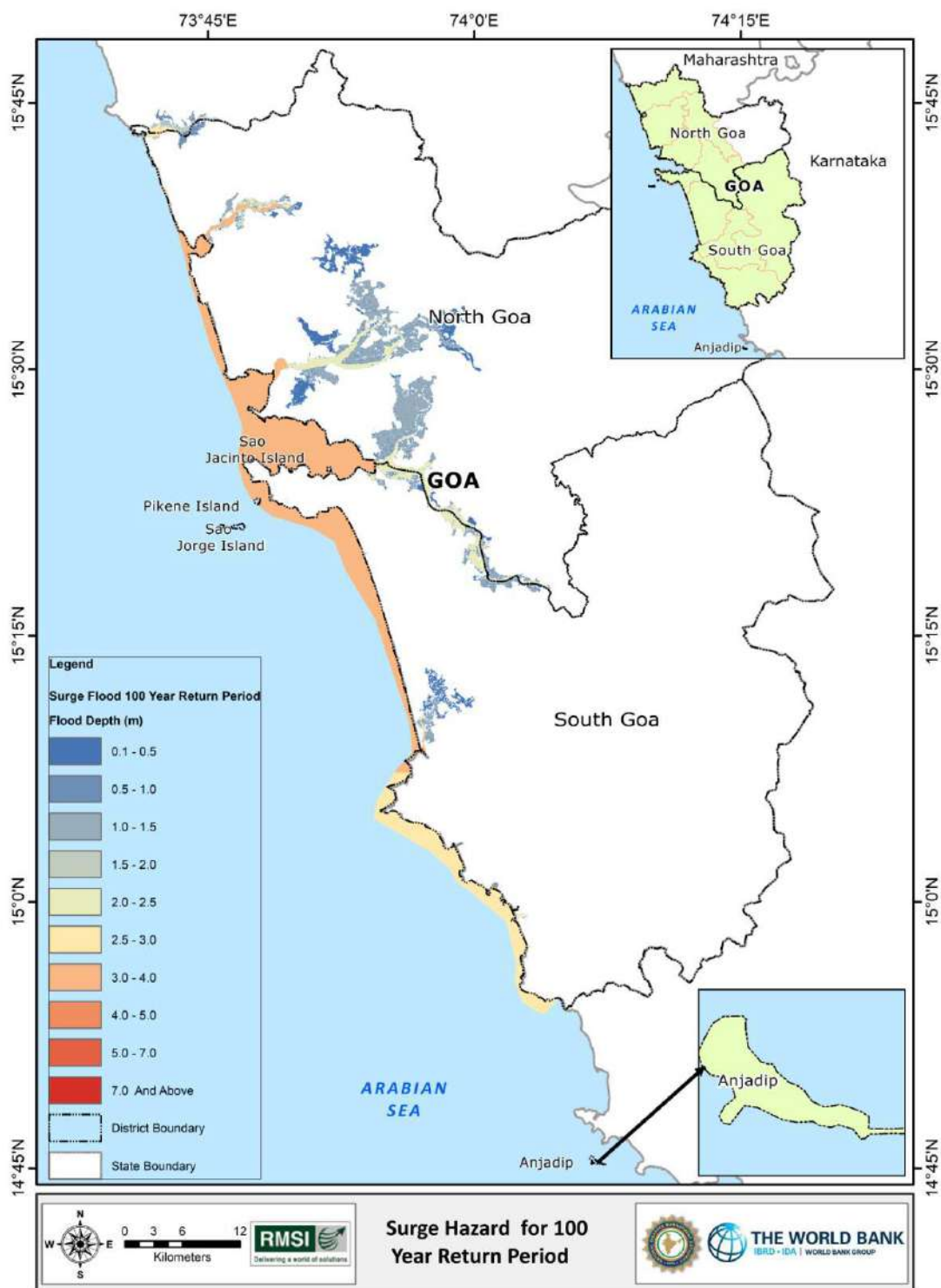
Surge Hazard Map (250 Year Return Period)
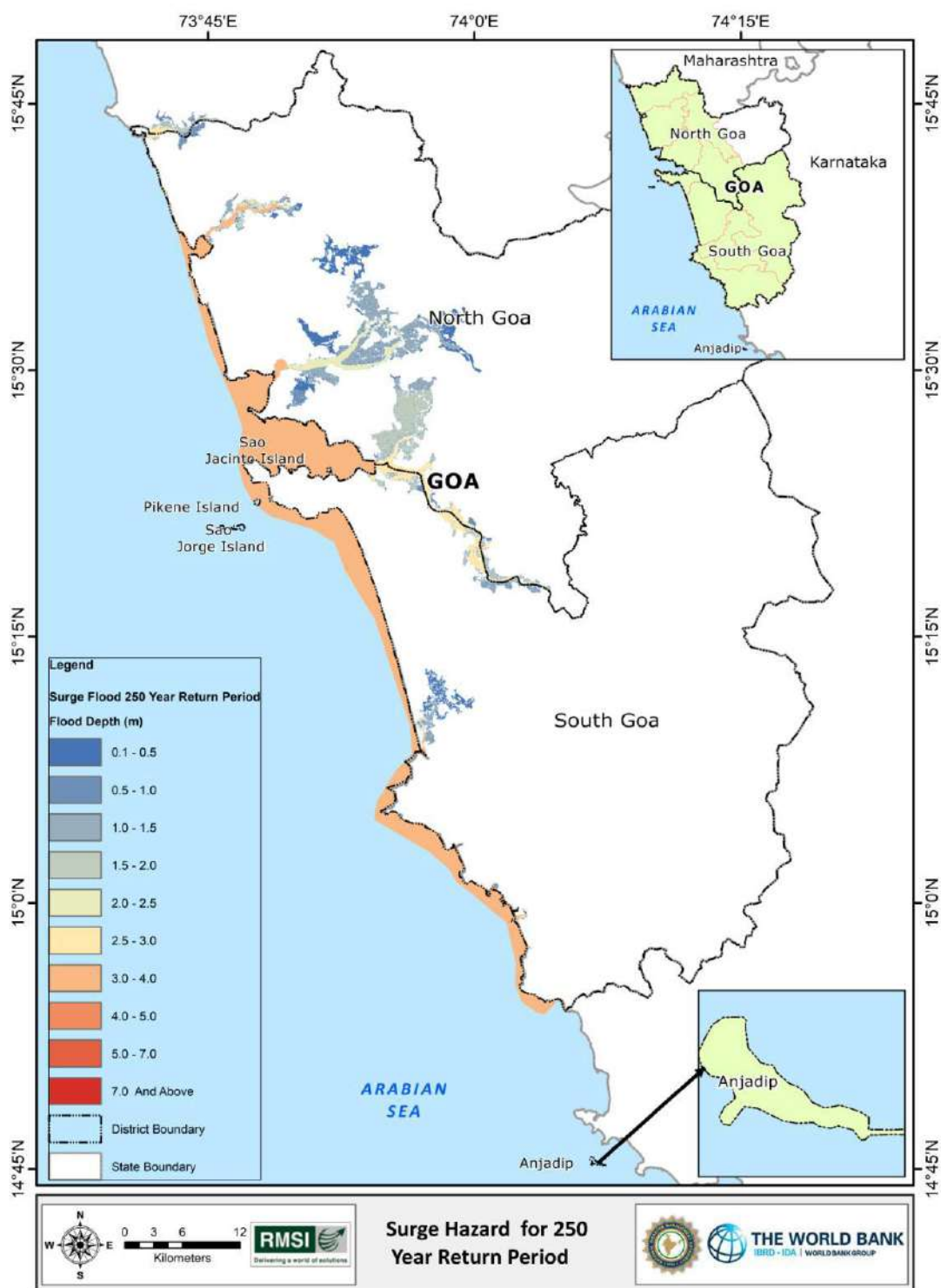
Surge Hazard Map (500 Year Return Period)
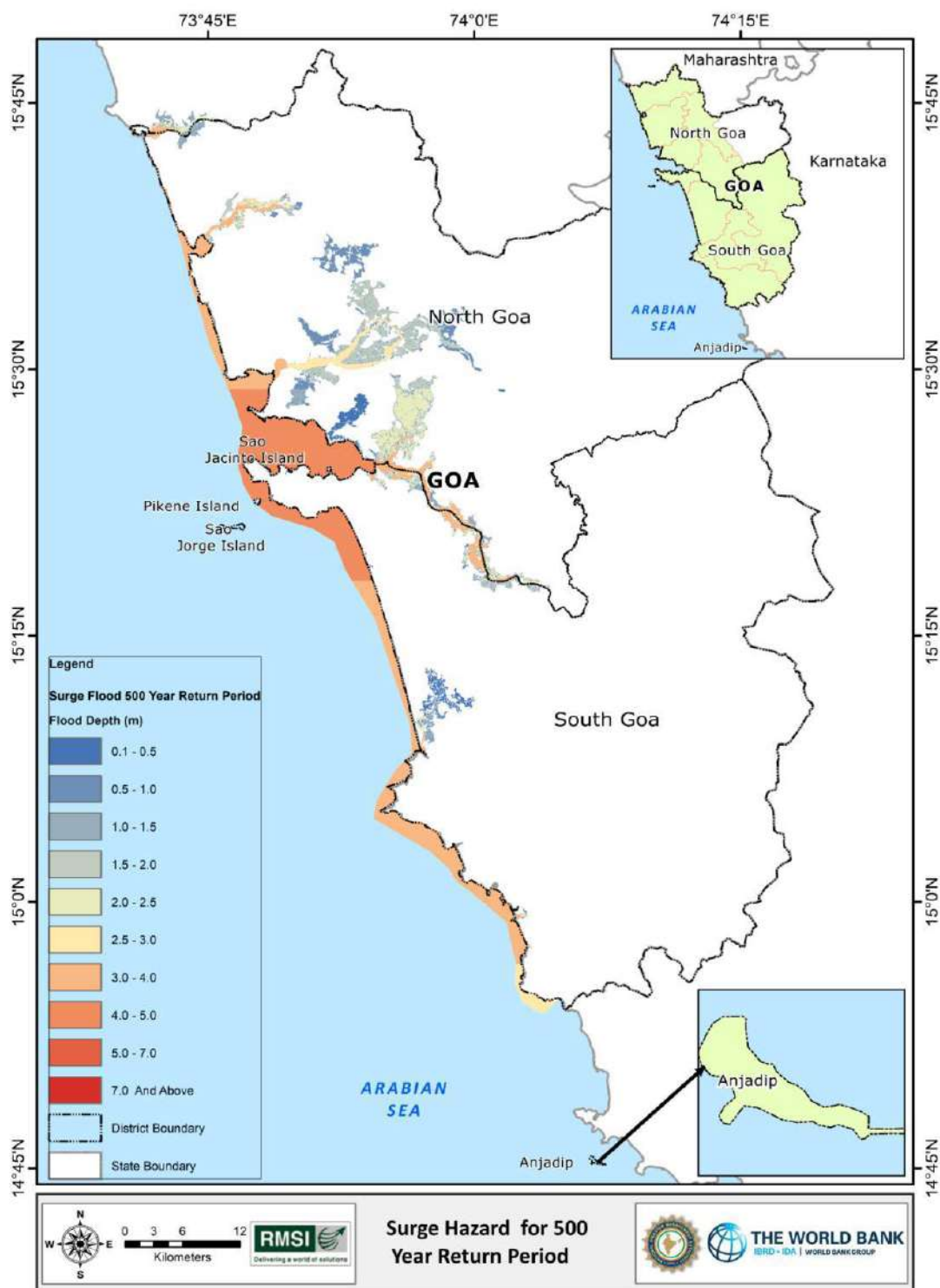
Flood Hazard Map (02 Year Return Period)
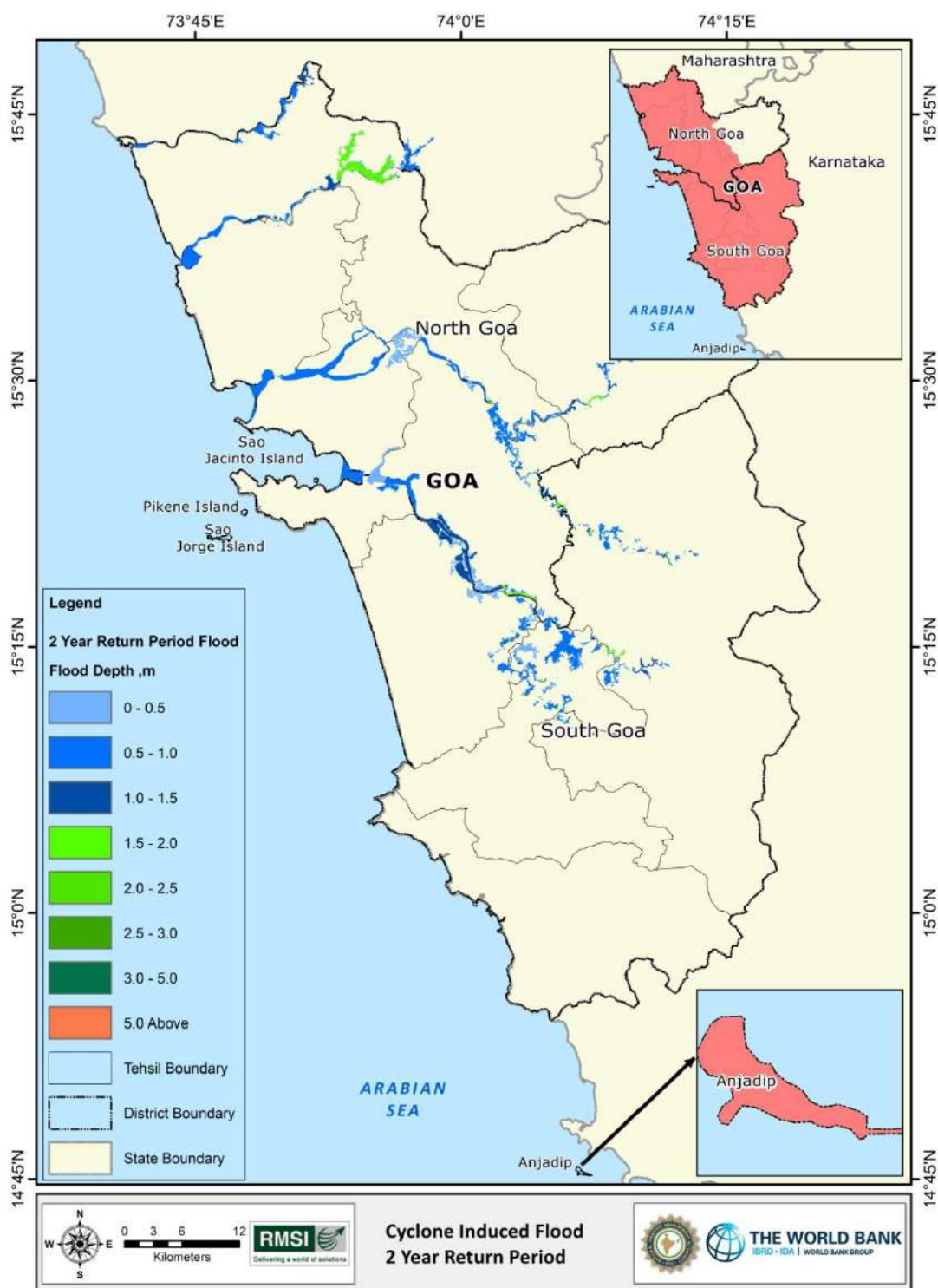
Flood Hazard Map (05 Year Return Period)

Legend

5 Year Return Period Flood

Flood Depth ,m

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 5.0
- 5.0 Above
- Tehsil Boundary
- District Boundary
- State Boundary

Cyclone Induced Flood
5 Year Return Period

RMSI
Delivering a world of solutions

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP
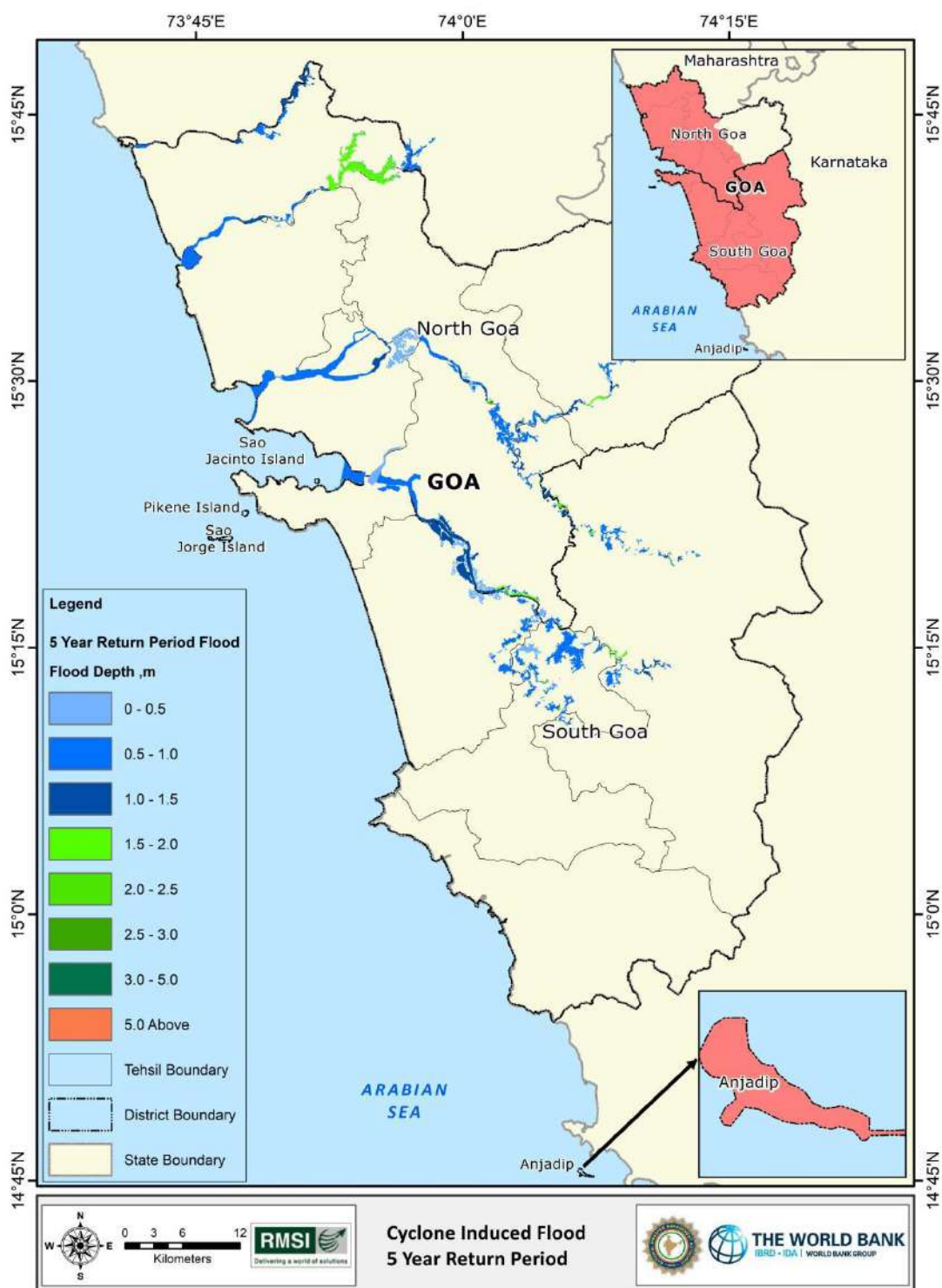
Flood Hazard Map (10 Year Return Period)
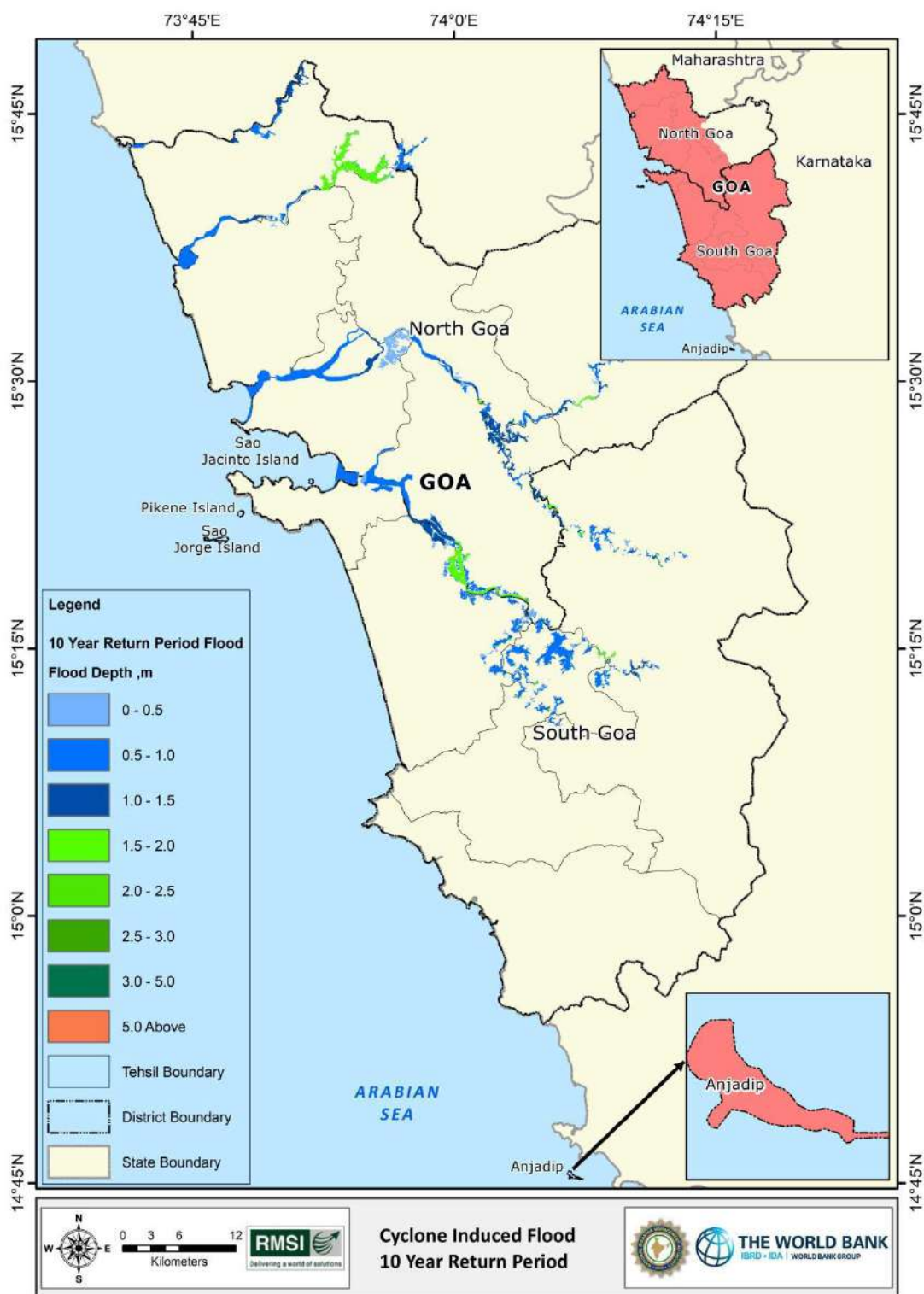
Flood Hazard Map (25 Year Return Period)
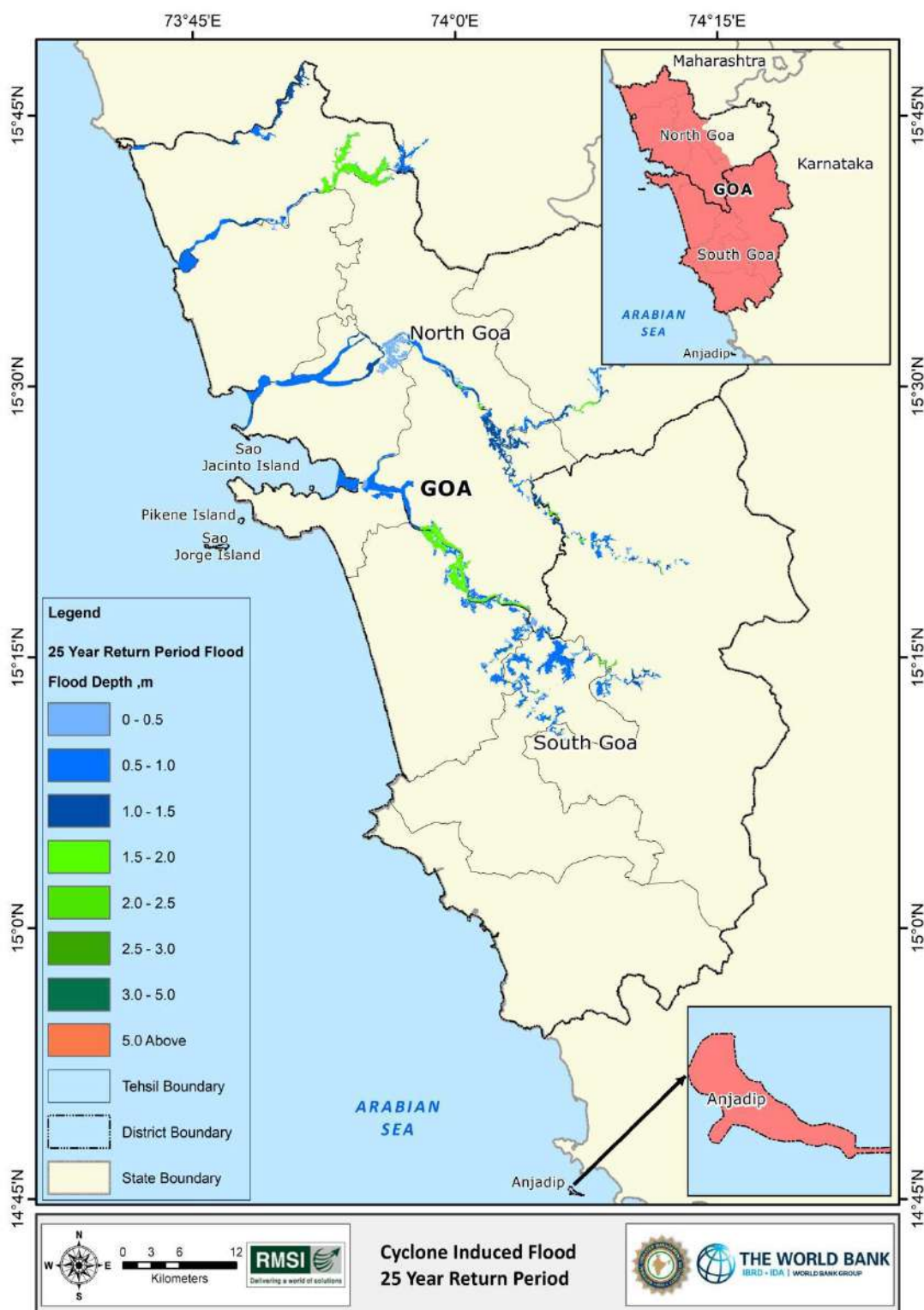
Flood Hazard Map (50 Year Return Period)
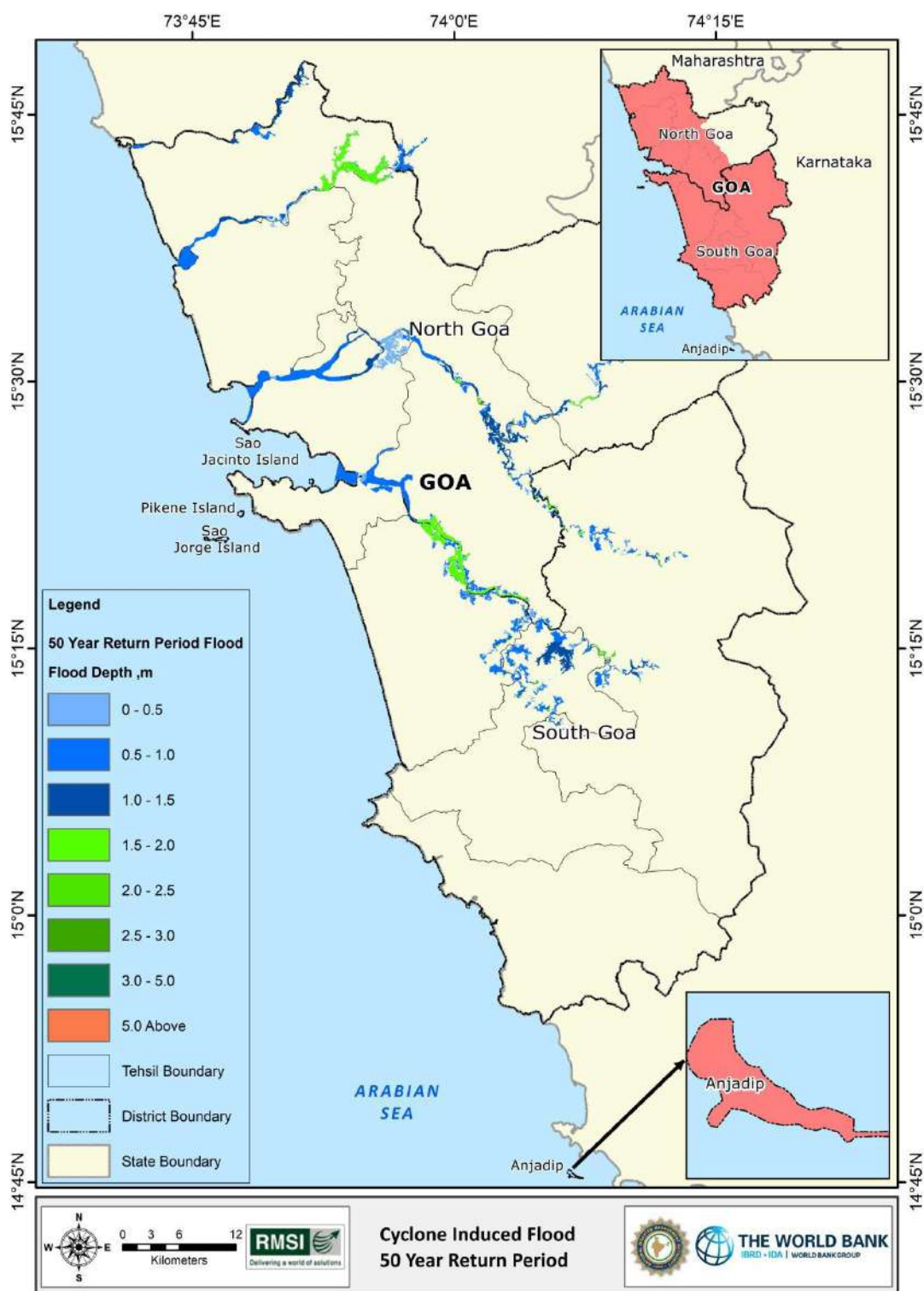
Flood Hazard Map (100 Year Return Period)
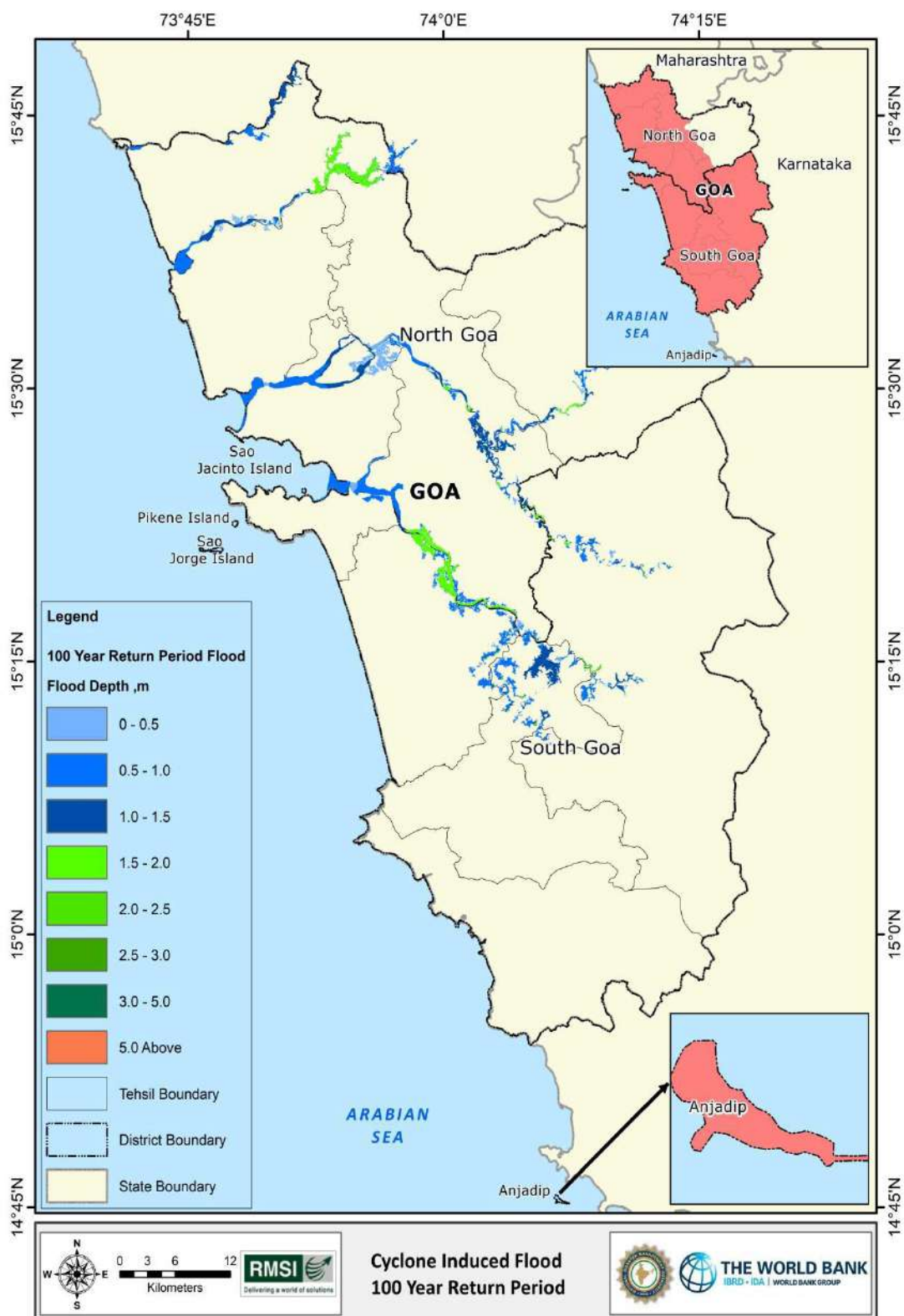
Flood Hazard Map (250 Year Return Period)

Flood Hazard Map (500 Year Return Period)

Legend

500 Year Return Period Flood

Flood Depth ,m

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 5.0
- 5.0 Above
- Tehsil Boundary
- District Boundary
- State Boundary
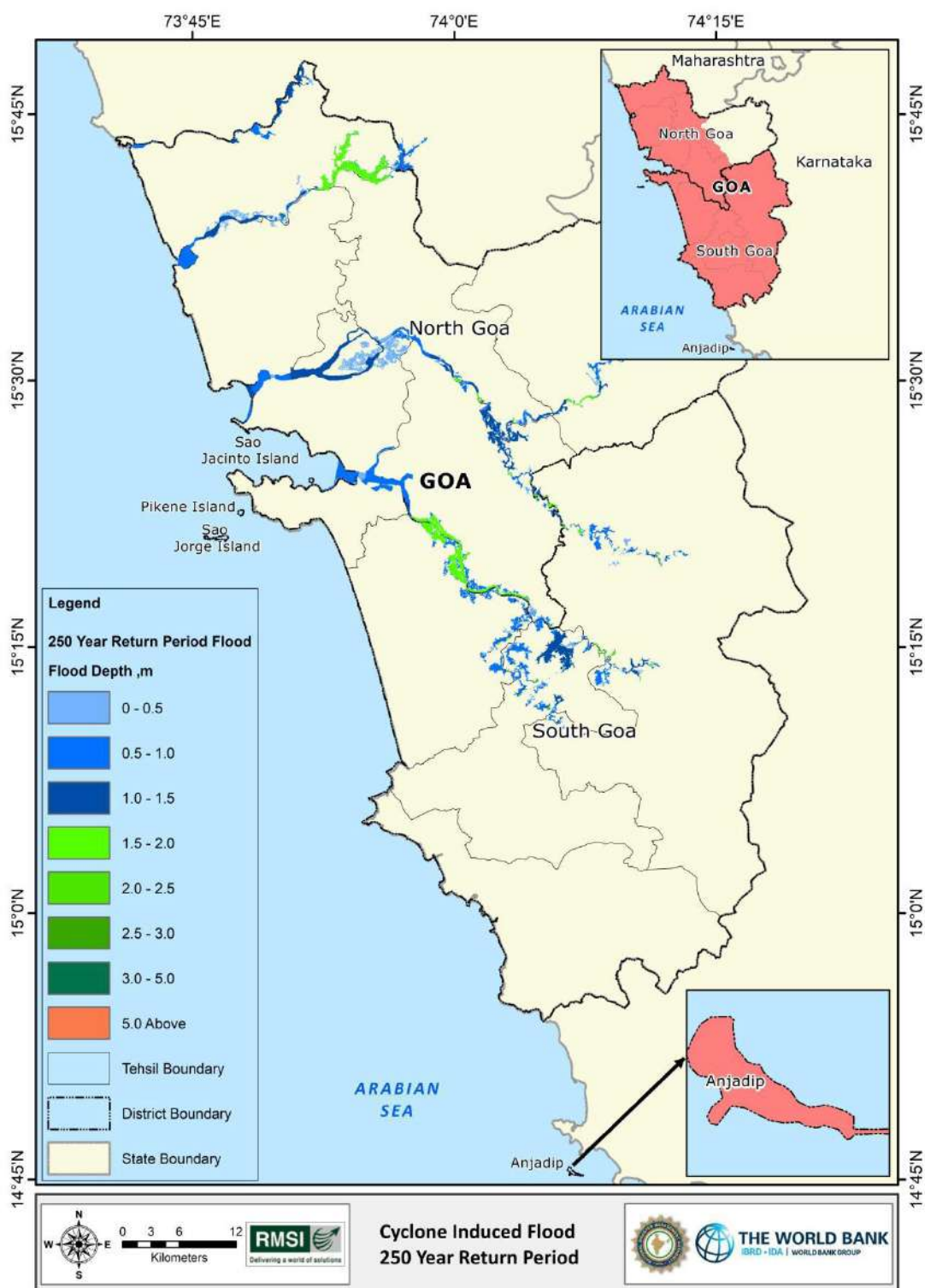
Cyclone Induced Flood
500 Year Return Period
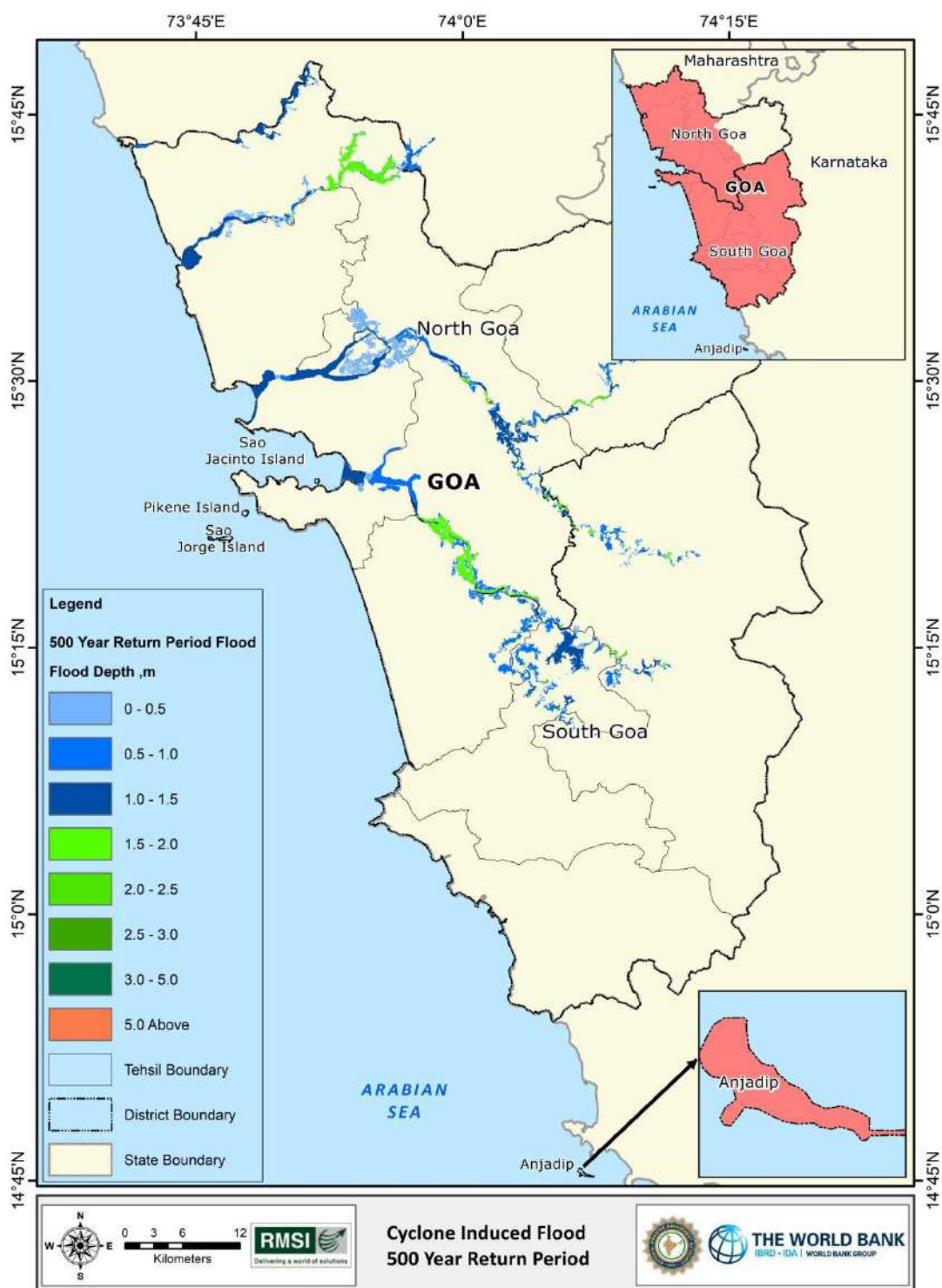
Annexure-III: Sendai Framework Indicators

A set of 38 indicators was identified to measure global progress in the implementation of the Sendai Framework for Disaster Risk Reduction. The indicators will measure progress in achieving the global targets of the Sendai Framework, and determine global trends in the reduction of risk and losses.

Global target A: Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortalities between 2020 2030 compared with 2005-2015.

| A-1 (compound)	Number of deaths and missing persons attributed to disasters, per 100,000 population.
A-2	Number of deaths attributed to disasters, per 100,000 population.
A-3	Number of missing persons attributed to disasters, per 100,000 population. The scope of disaster in this and subsequent targets is defined in paragraph 15 of the Sendai Framework for Disaster Risk Reduction 2015-2030 and applies to small-scale and large-scale frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risk.

Global target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.

B-1 (compound)	Number of directly affected people attributed to disasters, per 100,000 population.
B-2	Number of injured or ill people attributed to disasters, per 100,000 population.
B-3	Number of people whose damaged dwellings were attributed to disasters.
	Number of people whose destroyed dwellings were attributed to disasters.
	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters.

Global target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.

C-1 (compound)	Direct economic loss attributed to disasters in relation to global gross domestic product.
C-2	Direct agricultural loss attributed to disasters. Agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure
C-3	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters. *Productive assets would be disaggregated by economic sector, including services, according to standard international classifications. Countries would report against those economic sectors relevant to their economies. This would be described in the associated metadata.*
C-4	Direct economic loss in the housing sector attributed to disasters. *Data would be disaggregated according to damaged and destroyed dwellings.*

C-5	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters. *The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.*
C-6	Direct economic loss in the housing sector attributed to disasters. Data would be disaggregated according to damaged and destroyed dwellings.

Global target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.

D-1 (compound)	Damage to critical infrastructure attributed to disasters.
D-2	Number of destroyed or damaged health facilities attributed to disasters.
D-3	Number of destroyed or damaged educational facilities attributed to disasters.
D-4	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters. *The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.*
D-5	Number of disruptions to basic services attributed to disasters.
D-6	Number of disruptions to educational services attributed to disasters.
D-7	Number of disruptions to health services attributed to disasters.
D-8	Number of disruptions to other basic services attributed to disasters. *The decision regarding those elements of basic services to be included in the calculation will be left to the Member States and described in the accompanying metadata.*

Global target E: Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.

E-1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.
E-2	Percentage of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies. *Information should be provided on the appropriate levels of government below the national level with responsibility for disaster risk reduction.*

Global target F: Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.

F-1	Total official international support, (official development assistance (ODA) plus other official flows), for national disaster risk reduction actions. *Reporting of the provision or receipt of international cooperation for disaster risk reduction shall be done in accordance with the modalities applied in respective countries. Recipient countries are encouraged to provide information on the estimated amount of national disaster risk reduction expenditure.*

F-2	Total official international support, (ODA) plus other official flows), for national disaster risk reduction actions provided multilateral agencies.
F-3	Total official international support, (ODA) plus other official flows), for national disaster risk reduction actions provided bilaterally.
F-4	Total official international support, (ODA) plus other official flows), for the transfer and exchange of disaster risk reduction –related technology.
F-5	Number of international, regional and bilateral programmes and initiatives for the transfer and exchange of science, technology and innovation in disaster risk reduction for developing countries.
F-6	Total official international support, (ODA) plus other official flows), for national disaster risk reduction actions capacity building.
F-7	Number of international, regional and bilateral programmes and initiatives for disaster risk reduction-related capacity-building in developing countries.
F-8	Number of developing countries supported by international, regional and bilateral initiatives to strengthen their disaster risk reduction related statically capacity.

Global target G: Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

G-1 (compound G2-G5)	Number of countries that have multi-hazard early warning systems.
G-2	Number of countries that have multi-hazard monitoring and forecasting systems.
G-3	Number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms.
G-4	Percentage of local governments having a plan to act on early warnings.
G-5	Number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels.
G-6	Percentage of population exposed to or at risk from disasters protected through pre-emptive evacuation following early warning. *Member States in a position to do so are encouraged to provide information on the number of evacuated people.*

Source: https://www.preventionweb.net/sendai –framework/sendai-framework monitor/indicators

Annexure-IV: Heatwave Advisory

Government of Goa
State Disaster Management Authority/Revenue Department
Secretariat, Porvorim-Goa 403 521
Website: www.sdma.goa.gov.in email: usrev2-sect.gov@nic.in

No: 1/15/2/2018-RD   Dated: 08.04.2024

PUBLIC NOTICE

Preventive Measures on Heatwave

Based upon the Special Bulletin on Current Temperature Status and Warnings for Goa State issued by **IMD (Meteorological Centre, Goa)**, the maximum temperature recorded today was in the range of **33-35°C** and is likely to remain unchanged for next 7 days, over North & South Goa districts resulting into Heatwave like conditions or discomfort.

Possible Impact of above normal Temperature:

- Heat is tolerable for general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases;
- Possibility of Dehydration;
- Dry grass catching fire;
- It is advised to take precautionary measures for hot weather while going outside during peak hours of the day (around 11 a.m.-03 p.m.).
- Heat cramp, heat rash likely during peak hours of the day between (around 11 a.m.-03 p.m.).

In view of the above, general public is advised **NOT** to panic and take following preventive measures:

Preventive Measures:

1. Avoid prolonged heat exposure.
2. Wear light weight, light colored, loose, cotton clothes.
3. Cover your head: use a wet cloth, hat or umbrella while going out during peak hours.
4. Drink sufficient water at regular interval even if not feeling thirsty to avoid dehydration.
5. Use ORS, homemade drinks like lassi, torani (rice water), sugarcane juice, lemon water, buttermilk, etc. to rehydrate the body.
6. Caution workers to avoid direct sunlight during the peak hours.
7. Schedule strenuous jobs to cooler times of the day.
8. Increasing the frequency and length of rest breaks for outdoor activities.
9. Recognize the signs of heat stroke, heat rash or heat cramps such as weakness, dizziness, headache, nausea, sweating and seizures.
10. Farmers are advised to continue irrigation activities in sugarcane, summer maize, pulses and other crop and vegetables.
11. Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body and avoid high protein food and do not eat stale food.
12. Give additional attention to the pregnant workers and others with a medical condition.
13. Election rallies/ gatherings need to be judiciously monitored during peak hours of the day (11a.m. to 3 p.m.). Also people going for rallies/ gatherings are advised to take necessary precautions to avoid prolonged exposure in high humid & temperature areas.
14. Listen to Radio, watch TV, read Newspaper for local weather forecast for possibility of Heat Wave and follow the heatwave preventive measures issued by the Authorities.
15. In case of emergency, call **112.**
16. Download **SACHET Application** from Play Store (Android) and App Store (IOS) to stay updated with the location based live weather forecast by IMD, necessary do's and don'ts on all disasters including Heatwave.

Note: Heat wave criteria for Goa State (Coastal station) is when maximum temperature departure is **4.5°C or more from normal**, Heat Wave may be described provided actual maximum temperature is **37°C or more.**

These guidelines are also available on the official website of Goa SDMA: www.sdma.goa.gov.in

Issued in public interest by
Goa State Disaster Management Authority

Annexure-V: Form "A"

— 12 —

FORM 'A'

BUDGET OF PROJECT ACTIVITIES

(See rule 21)

Budget head	Last year budget estimates		Last year revised budget estimates		Last year actuals		Current year budget estimates	
	Physical Unit	Amount	Physical Unit	Amount	Physical Unit	Amount	Physical Unit	Amount

Expenditure Housing

Goods
Works
Consulting Service
Others

Social Sector

Goods
Works
Consulting Service
Others

Urban and Rural Infrastructure

Goods
Works
Consulting Service
Others

Community Participation Support

Goods
Works
Consulting Service
Others

Disaster Management Capacity

Goods
Works
Consulting Service
Others

Income

Grants
Government of India
Government of Gujarat
World Bank
Asian Development Bank
Donation

Annexure-VI: Contact Details of SDMA & Nodal Officers:

SDMA

Sr. No.	Name & Officer's Designation	Office Phone	Mobile	Fax/Email
1.	Dr. Pramod Sawant **Hon'ble Chief Minister/ Chairperson (SDMA)**	2419841/42	9765599920	cm.goa@nic.in
2.	Shri Atanasio Monserrate **Hon'ble Minister for Revenue/ Vice Chairperson (SDMA)**	2419829/2419531	7057688096	rm.goa@nic.in
3.	Shri Puneet Kumar Goel, IAS **Chief Secretary/CEO (SDMA)**	2419401/24194908	9999892363	cs-goa@nic.in
4.	Shri Sandip Jacques, IAS **Secretary (Revenue)/ Member Secretary (SDMA)**	2419411	9822104807	jsrev-sect.goa@nic.in
5.	Shri Surendra Naik **Joint Secretary (Revenue)**	2419314	9822142132	jsrevenue.goa@nic.in
6.	Kum. Vrushika Premanand Kauthankar **Under Secretary (Revenue –I)**	2419446	9657181083	usrev1-sect.goa@nic.in
7.	Shri Sandeep Sahadev Gawde **Under Secretary (Revenue-II)**	2419444	7798984311	usrev2-sect.goa@nic.in
8.	Shri. Gowhar Jeelani **Senior Consultant, Goa SDMA**	----	7889788784	gowharjeelani007@gmail.com
9.	State Control Room	2419550/2415583	--	--
10.	**ERSS (Disaster Emergencies)**	112	--	--

NODAL OFFICERS FOR DISASTER MANAGEMENT

Sr. No	Name of the Department	Name of the Nodal Officer	Designation	Mobile No.	email id
1.	Collector – North	Shri Pravin H Parab	Additional Collector – II	9226398053	ac2-north.goa@nic.in
2.	Collector – South	Shri Uday Prabhu Dessai	Additional Collector – II	9764480571	ac2-cols.goa@nic.in
3.	Directorate of Health Services	Dr. Prashant Suryawanshi	Epidemiologist/State Surveillance Officer, DHS	9011025052/ 9422390965	gassu.idsp@nic.in
4.	Goa Medical College, Bambolim	Dr. Rajesh Patil	Professor and I/c Trauma & Emergency Medicine, GMC	9970901121	dr.rpatil@gmail.com
5.	Directorate of Fire & Emergency	Shri Rajendra A. Haldankar	Deputy Director (Fire Services) Central & South Zone, Ponda & Margao	9763717051	ddfcz-fire@goa.gov.in ddfsz-fire@goa.gov.in
6.	State Police Control Room, PHQ, Panaji	Shri Ram Asre	Dy. Superintendent of Police	7875756060/ 2428400	dspspcr@goapolice.gov.in
7.	Public Works Department	Shri Allan J. G. Pereira	Superintending Engineer, Circle Office III, Altinho - PWD	92712147504	se3-pwd.goa@nic.in
8.	Water Resources Department	Shri Krishnakant Patil	Superintending Engineer, Circle I	9420690025	se5-wrd.goa@gov.in
9.	IMD (Met Centre Goa)	Dr. Rajasree V P M	Scientist 'C', IMD	9821794140	rajasree.vpm@imd.gov.in
10.	Captain of Ports	Shri Abhay A. Barve	Dy. Hydrographic Surveyor	9422415721	abhay.barve7678@gmail.com
11.	Home Guard & Civil Defence	Shri Francisco X. Corte	Junior Staff Officer Civil Defence and District Commandant Home Guards	7875756232	commandanthgcd@goapolice.gov.in
12.	Electricity Department	Rajiv Samant Stephen Fernandes	Superintending Engineer, Circle – I, South, Margao	7350644000 7719012626	secircle1@rediffmail.com se2north@gmail.com

			Superintending Engineer, Circle – II, North, Panaji		
13.	Directorate of Fisheries	Dr. Sunita Pauskar – North Smt. Preetam Naik - South	Superintendent of Fisheries	9850764554 8806839645	dir-fish.goa@nic.in
14.	Directorate of Panchayats	Shri Gurudatta Naik	Block Development Officer (HQ)	9764599548	dir-panc.goa@nic.in
15.	Forest Department	Shri Naveen Kumar, IFS	Dy. Conservator of Forests (Working Plan)	7798986115	dcfwp-forest.goa@nic.in
16.	Coast Guard	Yogesh Singh	Deputy Commandant	7358083769 9895693150	yogesh.singh@icg.gov.in
17.	Animal Husbandry & Veterinary Services	Dr. Veena Kumar	Dy. Director (Plan), AH&VS	9607918105	dir-ahvs.goa@nic.in
18.	Department of Tourism	Shri Dhiraj Vagle	Dy. Director, Tourism	9822133053	dir-tour.goa@nic.in
19.	Directorate of Transport	Nancy Fernandes	Dy. Director (Admn.)	9359272752/ 2225606	dda-tran.goa@gov.in
20.	Urban Development	Shri Ganesh V. Barve	Additional Director (Urban .Devt)	9637017751	dir-dma.goa@nic.in
21.	Department of Civil Supplies and Consumer Affairs	Shri Amit Sawant	Deputy Director	9284375081 0832-2226084	dir-csca.goa@nic.in
22.	Office of Commissioner, Lab & Employment	Dr. Shubhangi S. Lotlikar	Administrative Medical Officer	9423092520	amo-esis.goa@gov.in
23.	Labour Department	Shri Satish S. Vaghonkar	Dy. Labour Commissioner	9823476636	com-labo.goa@nic.in
24.	Directorate of Settlement & Land Records	Shri Mandar M. Naik	Dy. Director (Admn.)	7875352676	dir-land.goa@nic.in
25.	Inspectorate of Factories & Boilers	Shri Sanjay R. Naik	Inspector of Factories	9923959733	naik-ifb.goa@gov.in

26.	Corporation of the City of Panaji	Shri Vivek A. Parsekar	Municipal Engineer, Grade I - CCP	9922541999	commissioner@ccpgoa.com
27.	Department of Agriculture	Shri Anant P. Hoble	Asst. Director (INM)	9623287239	ananthoble@gmail.com
28.	Directorate of Higher Education	Dr. Gervasio S.F.L. Mendes	Additional Director	9421094271	gervasiom83@gmail.com
29.	Directorate of Education	Smt. Sylvia Fernandes	Dy. Director _Education	9850108747	dir-educ.goa@gmail.com
30.	Technical Education	Smt. Sanjana D. Bandodkar	Dy. Director (Admn.)	9623834945	dir-dte.goa@nic.in
31.	Goa State Infrastructure Dev. Corp.	Shri Dilip Joshi	General Manager (Civil –I)	9011066777/ 2493550	dilip.joshi@gsidcltd.com
32.	Town and Country Planning Department	Shri Vinod Kumar Chandra	Town Planner (HQ)	9423056571/ 2437352	ctp-tcp.goa@nic.in
33.	Information and Publicity	Shri Kiran B. Munankar	Assistant Information Officer	9421874884	ojaskiran@gmail.com
34.	Directorate of Industries, Trade & Commerce	Shri Himanchu Patnekar Shri Prashant Kamat	Dy. Director (Adm.) Functional Manager	9423885859 8550916963	dir-indu.goa@nic.in
35.	GIPARD	Dr. Seema Fernandes	Assistant Director	9822167364	ad-gipard@gov.in sferns16@rediffmail.com
36.	National Institute of Oceanography	Dr. Anil Prathihary	Principal Scientist	9420924812	apratihary@nio.org
37.	Department of Science, Tech. & Waste Mgmt.	Shri Nikhil Caerio	Assistant Manager	7720856041	nikhil.caeiro@zerowastegoa.com

Annexure VII-List of Humanitarian Agencies/Organisation in Goa.   Source: North and South Goa Collectorate

Name of organization	Type of Organisation (NGO/CSO/CBO/FBO)	Name of Contact Person	Designation of Contact Person	Mobile No.	E-mail Id	Office Address
Quepem Citizen Committee	NGO	Shaikh Azim	President	9850467765	NO	Khushawati Enterprises Quepem Goa
Quepem Civil And consumer Action Network	NGO	Dr Mahendra Bale	President	9822488727	dcunhamarcus@gmail.com	Marcus Dcunha H.No. 71 Condy Quepem Goa
Adivasi Sangatana Kepem	CBO	Caitan Carvalho	President	9822132527	NO	1st floor Zeferino Commecial Complex Opp Bank of India Quepem Goa
United Tribes Association Alliance (UTTA)	CBO	Prakash S. Velip	President	9822121740	No	Saraswati Niwas, Bharatkar Marg Quepem Goa

Lions club of curchorem sanvordem	NGO	Avin Naik	President	9923280309	No	Nil
Rotary club of curchorem sanvordem	NGO	Santesh Savordekar	President	9673587599	No	Venktash Chamber 2nd floor Curchorem
Canconkaracho Ekvot	NGO	Shri. Shirish Pai	-	7020974329	-	-
Canconkaracho Ekvot	NGO	Shri. Manoj Prabhugaonkar	-	9823605007	-	-
Canconkaracho Ekvot	NGO	Shri. Diogo D'Silva	-	8999865569	-	-
Canconkaracho Ekvot	NGO	Shri. Pedro Ervilho Barretto	-	9284041243	-	-
Canconkaracho Ekvot	NGO	Shri. Jack Fernandes	-	9822165261	-	-
Canconkaracho Ekvot	NGO	Shri. Vikas Bhagat	-	9881282445	-	-
Canconkaracho Ekvot	NGO	Shri. Denis Fernandes	-	7887340350		
Nil	Nil	Nil	Nil	Nil	Nil	Nil

Madkai Nagrik Kruti Sangh	NGO	Shri Premanand H. Gaude	President	9860187948	--	Marcaim Goa
Aasara Foundation Ladies Wing Narishakti	NGO	Anita Kavlekar		9011072079	1)Sushanti1@yahii.co.in (personal) 2) nari.shakti/Ponda@yahoo.com	Room No.73,1st Floor Ponda commerce Centre-Ponda
Lions Club Ponda	NGO	1) Sudesh Borkar (Administration) 2) Dr Uday Kudalkar (President)		1) 9370333637 2)9923123147	Lionsclubponda@gmail.com	Lion Club Ponda Ponda Commerce Centre 1st floor
Dhatwada Usgao Citizen Forum	NGO	Vassudev Gaude	Secretary	7798103380		Gurunath Devasthan Dhatwada Usgao
Swabhimance Usgaonkar	NGO	Rohan Naik	President	9823584558 9146954387	naikrohan0099@gmail.com	445, Tiral Usgao Goa
Goa First	NGO	Parshuram Sonurlekar	President	8806288934	…..	H.No.188-C, Nr.Jetty Post Office,

						Harbour, Mormugao.
Vasco Muslim Social Trust	NGO	Hassan Ismail Khan	President	8087080147	vascomuslimsocialtrust@gmail.com	04, Vasco Residency, Churc Road, Sasmolem Baina, Vasco.
Unumid A Drop of Hope	NGO	Hassan Ismail Khan	President	8087080148	cezankahn79@gmail.com	H.No.53, Nr.Khapreshwar Temple, Patrong Baina, Vasco, Goa.
Zindagi Goa	NGO	Muskhan Khan	President	9168397139	goazindagi@gmail.com	H.No.53, Nr.Khapreshwar Temple, Patrong Baina, Vasco, Goa.
El Shaddai Charitable Trust	NGO	Sunil Sharma	Central Incharge	9225901276	infogoa@childrescue.net	El Shaddai Chartable Trust, El Shaddai House Socol Vaddo,

						Assogao, North Goa.
Savera	NGO (Private)	Sr.Tara Kerkar	Proprietor	9891749042	NA	Flat No.04, 1st Floor, Our Lady of Guia Bldg., (RTO Bldg.) Next to BDO Office, Vasco, Goa.
ARY ANYAY (Rahit Zindagi)	NGO (Private)	Shri Arun Pandey	Director	9422438109	arzindia@gmail.com	Flat No.04, 1st Floor, Our Lady of Guia Bldg., (RTO Bldg.) Next to BDO Office, Vasco, Goa.
Presentation Society	NGO (Private)	Sr.Fatima Rodrigues	President	9881897506	pbvmnagoa@gmail.com	Presentation Society Presentation Convent, Mangor Hill, Vasco, Goa.

El Shaddai Charitable Trust	NGO	Sunil Sharma	Incharge	9623398402	Ashraya@childresue.net	El Shaddai Charitable Trust El Shaddai House Socol Vaddo, Assagao, North Goa.
Nez Goenkar Fauz	NGO	Mr. Pascoal Costa	General Secretary	7775975304	Anthony 6969-@Hotmail.com	Nr. MPT Ground Patrong Baina Vasco-Da-Gama
Betalbatim Civic & Consumer Forum	NGO	Xavier Cota	Convenor	9850101376	bccf2003@gmail.com	H.No.39/A Nagwaddo Betalbatim
Colva Civic & Consumer Forum	NGO	Judith Almeida	Convenor	9823085206		
Desterro Eves Mahila Mandal	NGO	Celsa Antao, Pirni Nagoa	Chief Executive (President)	956196648	desterroeves@gmail.com	Head office 21/Sapna Terraces Swatentra Path Vasco da Gama

Cavelossim Villagers Forum	NGO	Prince Pereira	President	9860733178		
Cuncolim People's Forum	NGO	Santana Piedade Afonso				
Curtorim Union	NGO	Joaquim Santan Rodrigues		9822670181		R/o. Bathora Curtorim
Curtorkars Ekvot	NGO	John D'Silva		9850467062		R/o. Fondegele Curtorim
Bicholim						
Life Line Foundation	NGO	Naravan Nandiwale	Project Manager	958848659	IlgoaQbsnl.in	H.N0.509/2, above ICICI Bank Vithalapur Karapur, San uelim - Goa
Aasth	NGO	Sidhi Prabhu		8830215207	Sidhi.rasha(ãgmail.com	Housing Board Colony Harvalem, San uelim- Goa

Bardez						
OPM Caritas Goa	NGO/SAA/Unwed Mothers	Fr. Maverick	Director	9423888255	opmnachinola@yahoo.com caritas@caritasgoa.org	H. No.; 425, OPM, Caritas Goa, Nachinola, Aldona PO, Bardez Goa.
Caritas Centre for Deaf & Blind	NGO	Fr. Maverick	Director	98238 50586	caritas.sensegoa@gmail.com	Near St.Anne's Chapel, Tabra Waddo, Saligao Goa 403511
Victory House - Project of EI Shaddai Charitable trust	NGO	Julia Mathew	Managing Director	7796082607	victory@childrescue.net	Cottla vaddo, muddawadi, saligao goa
Sethu - Centre for Child Development and Family Guidance	NGO	Dr. Nandita D'Souza	Director	77200 13749	https://sethu.in/#	Hno 5/84, 5/48, Dhon vaddo, saligao goa
St. Joseph home for aged	NGO	Deepika Dsouza	-	9407407176	dsouzadeepika1952@gmail.com	Porta wada, siolim Bardez Goa

Green Cross	NGO	Suneel Korajkar	Chairperson	9822123042	Suneeelkorajkar@yahoo.in	Office no. 10, 1st Floor, Om Chamber, Mapusa Goa
Asha Charitable Society	NGO	Rui da Gama	President	9822166876	-	Asha Center, Sweet Home building, 1st Floor, Rajwaddo, Mapusa, Bardez Goa
Goa Outreach	NGO	Robert Lyon	Volunteer	9881787338	-	H.No. 4/88/Acoi, Bardez Goa
WOW Foundation	NGO	Ketaki Parab	Founder	9923312801	wowfoundation15@gmail.com	Karaswada, Mapusa, Goa
Goychi Nari Shakti	NGO	Sankalp Bhonsle	Secretary	9764362794	-	Next to Vodafone Gallery, Mapusa Goa
Calangute Constituency Forum	NGO	Mr. Premanand Diukar	Secretary	9890288319	calanguteconstituencyforum@gmail.com	C/O Mrs. Clotildes Braganca 'D' Block, Maria Rosa, Phase - I, Naikavaddo Calangute

Jagrut Sirsaikaranc ho Ekvott	NGO	Mr. Vidhyadhar Bhagat	President	9822483456	vidhyabhag123@gmail.com	H. No. 17/76, Bella Vista, Near Seza Footbal Academy, Sirsaim, Bardez Goa.

ANNEXURE-VIII: LIST OF FACTORIES STORING HAZARDOUS MATERIAL

Sr. No	Lic. No.	Name & Address of the Factories
1.	GOA/0007	Fabrica de Gas Carbonica Pvt. Ltd, Survey Nos.87/6 & 87/7, Nuvem Salcete, Goa- 403604.
2.	GOA/0011	Hindustan Petroleum Corpn. Ltd. F.L Gomes Road, Vasco-da-Gama, Goa.
3.	GOA/0012	Indian Oil Corporation Ltd. Rua Francisco Luis Gomes, Vasco, Goa.
4.	GOA/0030	Goa Shipyard Ltd, Vaddem, Vasco, Goa
5.	GOA/0083	Goa Steel Limited, Radhakrishnalndl, Esate, Bicholim, Goa
6.	GOA/0087	Goa State Co-op. Milk Producers Union Limited, Curti, Ponda, Goa.
7.	GOA/0109	Chawgule & Co. Pvt. Ltd, Shipbuilding Division Survey No. 501, Near Borim Bridge, Loutulim, Salcete, Goa-403718
8.	GOA/0113	Essity Operation Goa Limited (formerly Belladona Plasters Limited) Survey Nos. 134-1A, 134-1B, 134-4, 134-6, 137-1A & 137-2, Nirancal Road, Curti Ponda, Goa-403409.
9.	GOA/0134	D.C.I Pharmaceuticals Pvt. Ltd. Vidyanagar, Margao, Goa
10.	GOA/0135	Opa Water Works, W.D.III (PHE), P.W.D Opa Khandepar, Ponda, Goa.
11.	GOA/0152	Deccan Fine Chemicals (India) Pvt. Ltd. Survey No.28/1 (Part) Santa Monica Works, Corlim Ilhas, Tiswadi Goa.
12.	GOA/0153	M.R.F Limited (Unit-1), Survey No. 258/0, Post Box No. 1, Usgao, Tiska, Ponda, Goa-403401
13.	GOA/0156	Zuari Agro Chemicals Ltd. Jai Kisaan Bhawan, Zuarinagar, goa
14.	GOA/0159	United Spirits Ltd, Sy. Nos, 164,165/1, 165/2,

		Bethora Ponda, Goa- 403401
15.	GOA/0160	Dempo Shipbuilding & Engg. Ltd, Bainguinim, Old GOA.
16.	GOA/0170	Goa Carbon Ltd, MargaoIndl. Estat. St. Jose de Areal, P.O. Curtorim, Goa – 403709
17.	GOA/0180	GovindPoy Oxygen Ltd. Arlem, Raia, Margao, Goa
18.	GOA/0322	M/s. Procter & Gamble Health Ltd, (Formerly Merck Limited) Plot No. 11/1, Marvasado, Usgaon, Ponda Goa
19.	GOA/0335	Automobile Corpn. Of Goa Limited, Honda, Sattari, Goa.
20.	GOA/0365	Indian Oil Corporation Ltd. Aviation Fuel Station, Dabolim, Goa
21.	GOA/0374	Marpol Pvt. Ltd, (Unit-1) Plot Nos. 13, 14 & 15, KakodaIndl, Estate, Kakoda, Goa
22.	GOA/0393	Hindustan Petroleum Corpn. Ltd (L.P.G. Bottling Plant) Kundaim, Ponda- Goa
23.	GOA/0421	Crompton Greaves Consumer Electrical Limited, Plot No. 1, BethoraIndl. Estate, Bethora, Ponda Goa.
24.	GOA/0444	Polynova Industries Limited, Plot No. 92 to 101 Kundaim Indl. Estate, Kundiam Goa.
25.	GOA/0445	Indian Oil Corpn. Ltd, (Marketing Divn) New Aviation Fuel Station, Dabolim, Goa
26	GOA/0456	Cadila Healthcare Ltd, Plot No. 203-206, 211, 212 & 231, Kundiam Indl. Estt. Kundaim Goa.
27.	GOA/0459	Crompton Greaves Consumer Electrical Limited, 214-A, Kundiam Indl. Estate, Kundim Goa.
28.	GOA/0489	Automobile Cropn. Of Goa Limited, (Bus Body Division) Bhimpal, Sattari, Goa
29.	GOA/0523	Proctor & Gamble Hygiene & Health Care Ltd, Plot No, 173, 314 & 315, Kundaim Indl. Estate, Kundaim, Goa

30.	GOA/0561	Advance Composites Pvt. Ltd, Plot Nos. 77, 78, 89, 89A & 90, Bicholim Indl. Estate, Bicholim Goa.
31.	GOA/0614	M/s. C. G. Power & Industrial Ltd (FHP Motor Unit) Plot No. 196, 197 & 198, Kundaim Indl. Estt. Kundiam, Goa
32.	GOA/0617	Nestle India Limited, Plot Nos. 294 – 297, UsgaoIndl. Estate, Usgao, Goa
33.	GOA/0622	Marpol Pvt. Ltd, (Unit-1) Plot No. 16, 17 & 18, KakodaIndl. Estate, Kakoda, Goa,
34.	GOA/0623	Vedanta Limited, (Pig Iron Division-1) Survey Nos. 39, 41, 36/1 (Part), 37 (Part), 42/1 (Part), 43/1 (Part), Amona, Marcela, Goa – 403401
35.	GOA/0627	Blue Cross Laboratories Limited, Plot No. L-17, Verna Indl. Estate, Verna, Goa – 403722.
36.	GOA/0629	Vedanta Ltd. (Met Coke Divn) Survey Nos. 205 & 207, Navelim, P. O Sanquelim, Bicholim, Goa - 403505
37.	GOA/0638	Apex Packing Products Pvt. Ltd. Plot No. 186, Kundaim Indl. Estate, Kundaim, Goa.
38.	GOA/0641	Goa Glass Fibre Ltd. Village Colvate, Bardez, Goa
39.	GOA/0643	HFCL Limited L-35, 36, 37, Phase II, Verna Electronic City, Verna, Salcete, Goa – 403722
40.	GOA/0648	Abbott India Limited, Plot No. L-18 & 18, Verna Indl. Estate, Verna, Goa – 403722
41.	GOA/0652	Himgiri Casting Pvt. Ltd. Plot Nos. 291 to 296 & 305 to 309, Kundaim Indl. Estt. Ponda, Goa – 403115
42.	GOA/0654	Betts India Pvt. Ltd. Plot No. L-78 Verna Indl, Estate, Verna Goa- 403722
43.	GOA/0671	Nestle India Limited,

		P. Box No. 1, Village Maulinguem, Bicholim Taluka, Goa
44.	GOA/0680	Goa Paints & Allied Products Pvt. Ltd 280, Kundaim Indl, Estate, Kundaim, Goa
45.	GOA/0682	Indoco Remedies Limited, L-14, Verna Indl, Estate, Verna, Goa – 403722
46.	GOA/0693	Unichem Laboratories Ltd. Plot No. 17 & 18, PilerneIndl. Estate Pilerne, Bardez, Goa
47.	GOA/0697	Mediziest Pharmaceuticals Pvt. Ltd Plot No. L-40, Verna Indl, Estate, Verna, Goa – 403722
48.	GOA/0710	M/s. Orange Fox Steels Pvt. Ltd. (Formerly Rukminirama Steel Rollings Pvt. Ltd) Plot No. L-26, CuncolimIndl. Estt, Cuncolim, Goa. – 403703
49.	GOA/0714	Global Ispaat Limited, Plot No. 16, M-18, 19 & 20, CucolimIndl, Estate, Cuncolim, Goa – 403703
50.	GOA/0727	Pentair Water India Pvt. Ltd, Plot Nos, L/52 to 55, Verna Indl. Estt. Verna, Goa – 403722.
51.	GOA/0729	M/s. Malco Energy Limited (Formerly, Nicomet Industries Limited) Plot Nos. L-15, L-15 (Part), L-19 & L-20, CuncolimIndl. Estt, Salcete, Goa-403703
52.	GOA/0732	Karthik Inductions Limited Plot No. 120 to 122-A, Kundiam Indl. Estt. Ponda, Goa-403115
53.	GOA/0733	Berger Paint India Limited, Plot No. 316 & 317, Kundaim Indl. Estate, Kundaim, Goa.
54.	GOA/0735	Finolex Cables Ltd, (Unit-III) 263/2, Belgaum Road, Usgao Tisk, Ponda, Goa.
55.	GOA/0736	Guala Closure India Pvt. Ltd. Survey No. 60/2 (part) & 49/0 (part) Harvale, Sanquelim, Goa.
56.	GOA/0742	Dura Line India Pvt. Ltd. Plot Nos. L-24/25, Verna Indl. Estate. Verna, Goa- 403722
57.	GOA/0745	Western Beverages Pvt. Limited, M-10, CuncolimIndl, Estate,

		Cuncolim, Goa -403722,
58.	GOA/0746	Scoop Industries Pvt. Ltd. Plot No. 13, CorlimIndl. Estate, Corlim, Ilhas, Goa
59.	GOA/0756	IFB Industries Limited, Plot No. L-1, Verna Indl. Estate, Verna, Goa 403722
60.	GOA/0781	Flipak India Pvt. Ltd. Plat No. 46, 47 & 49-A PilerneIndl. Estate, Pilerne, Bardez Goa.
61.	GOA/0782	Ferrao Ice Factory, Mazilwaddo, Dussa, Chinchinim, Salcete, Goa
62.	GOA/0784	Astra Metal System Pvt. Ltd. Plot No. L-75, Verna Indl. Estate. Verna, Goa 403722
63.	GOA/0791	Nestor Pharmacceuticals Ltd. L-43, Verna Indl. Estate, Verna, Goa 403722
64.	GOA/0796	Sanofi India Ltd. Plot No. L-121, Phase III, Verna Indl. Estate, Salcete, Nagoa, Goa
65.	GOA/0798	Encube Ethicals Private Ltd. Plot Nos. C-1 to C-4, C-17 to C-20, D1 to D-3, D-15 & E2 MadkaimIndl. Estt. Ponda, Goa.
66.	GOA/0890	Kineco Pvt. Ltd. Plot No. 41, PilerneIndl. Estate, Pilerne, Bardez,
67.	GOA/0890	Fiemench Perfumes (India) Pvt. Ltd, D2/1, Kundaim Indl. Estate, Kundaim, Goa
68.	GOA/0893	Hindustan Coca-Cola Beverages Pvt. Ltd. M-2, M-11, Phase – III –B Verna Indl. Estate, Verna, Goa – 403722
69.	GOA/0916	FDC Limited (Unit-1), Plot Nos. L-56 & L-57, Verna Indl. Estate, Verna, Goa 403722
70.	GOA/0932	Finolex Cables Ltd. Plot No. L-117 & 118, Verna Indl Estate. Verna, Goa- 403722
71.	GOA/0963	Marksans Pharma Limited, Plot No. L-82 & 83, Verna Indl. Estate, Verna, Goa – 403722
72.	GOA/0978	Real House Distillery Pvt. Ltd, Sr. No. 31, Plot (A), St. Pedro, 50 Bainguinim, Goa

73.	GOA/0979	Real Bottling Factory Private Limited Plot No. (B), Sr. No. 31, St. Pedro, Bainguinim, Goa
74.	GOA/0987	National Industrial Corporation, TivimIndl. Estate, Tivim Goa
75.	GOA/0991	John Distilleries Ltd. Plot No. M-21, M-21A, M-21-B, CuncolimIndl. Estt. Salcete, Goa-403703
76.	GOA/0992	Marpal Pvt. Ltd. Unit II, Plot No. A, B, C KakodaIndl. Estt, Kakoda, Goa.
77.	GOA/1002	Ulka Sea Foods, 74/1, Orgao, Marcela, Ponda, Goa
78.	GOA/1020	Mandavi Distilleries & Breweries Pvt. Ltd, D-8, MadkaimIndl. Estt. Madkaim, Goa
79.	GOA/1027	Cipla Ltd, Plot No, L-139, L-140A, L-140B, L-141, l-142, L-143, L-144A, L-144B, L-145 & L-1,46, Verna Indl. Estt. Salcete, Goa – 403722
80.	GOA/1022	New Millennium Bakers, Plot No. 107/ 108, Verna Ind, Estate, Verna, Goa -403722
81.	GOA/1027	Pfizer Ltd, Plot No. L-137, Phase IIIA Verna IndlEstt. Verna. Goa- 403722
82.	GOA/1036	Indoco Remedies Ltd, (Plan II) Plot No. L-32, 33 & 34, Verna Indl. Estt. Verna, Goa – 403722
83.	GOA/1038	Esteem Industries Pvt. Ltd, Plot Nos. 76, 77, 103, 108 & 131, PissurlemIndl. Estt. Sattari, Goa – 403506
84.	GOA/1044	Bharat Petroleum Corporation Ltd, Plan No. M-19 to M-35, Phase III-B, Verna, Lndl. Estate, Verna, Goa -403722
85.	GOA/1045	Cipla Ltd. (Unit II) Plot No. 103 to 105 & 107 to 112, L-138, L-147, L-147/1, L-147/2, L-147/3 &L-150, Verna Indl. Estt. Salcete, Goa – 403722.
86.	GOA/1047	Chowgle & Co. Pvt. Ltd, Ship Buiiding Divn, Survey Nos. 310/1 & 310/2, Rassaim, Loutulim, Salcete, Goa-403718.
87.	GOA/1050	Goan Bounty,

		Plot No. 51-B, Dulapi, Corlim Goa
88.	GOA/1089	Aparant Iron and Steel Pvt. Ltd, Village, Costi, Sanguem, Goa
89.	GOA/1093	Colorcon Asia Pvt. Ltd, Plot No. M 14 to 18, Verna Indl. Estate, Verna, Salcete, Goa – 403772.
90.	GOA/1100	Real Food Exporters Pvt. Ltd, House No. B/64, Shed D, Bainguinim.
91.	GOA/1133	Zuari Indian Oil Tanking Pvt. Ltd, Oil Terminal at Sancoale, Zuarinagar- Goa
92.	GOA/1147	Microlabs Limited Plot Nos, S-155 to S-159 Phase III-B & N1 Phase IV, Verna Indl. Esate, Verna, Salcete, Goa -403722
93.	GOA/1150	Berger Becker Coating Pvt, Ltd, Plot No. 114, PilerneIndl. Estate. Pilerne, Goa
94.	GOA/1155	Glenmark Pharmaceuticals Ltd (Unit-I), Soil & Semi Solid Dosage Plant, S-7, Govate Indl. Estt. Colvate, Bardez, Goa -403513
95.	GOA/1156	FDC Ltd, (Unit-II) L-121 B, Phase III, Verna Indl, Estate, Verna Goa – 403722
96.	GOA/1157	Shraddha Ispat Pvt. Ltd, Survey No. 53/1, Village Santona, Sanguem -Goa
97.	GOA/1159	Cipla Limited, (Unit-III) M-62 & M-63, Verna Indl, Estate, Verna Goa -403722
98.	GOA/1160	Goa Sponge & Power Ltd. Village Santona, Sanguem, Goa
99.	GOA/1164	Lupin Limited, 15-B, Phase 1 A, Verna Indl, Estate. Verna, Goa- 403722
100.	GOA/1175	Glow Paints Pvt. Ltd Plot No. 121, BethoraIndl, Estate, Bethora, Ponda, Goa
101.	GOA/1176	Shaiv Distilleries Pvt. Ltd. Plot No. 101-104, Bicholim, Indl. Estate, Bicholim Goa
102.	GOA/1177	Roberlet Goldfield (I) Pvt. Ltd (Formerly Gold Field Fragrances Pvt. Ltd). Plot No. 85 & 86, PilerneIndl, Estate, Pilerne, Bardez, Goa
103.	GOA/1179	Intech Qragnic Ltd, Survey No. 33/A,

		Dhargal, Village Pernem, Goa
104.	GOA/1216	Srithiklspat Pvt. Ltd Plot No. 3, Sanguem, Goa.
105.	GOA/1221	Global Spirits & Foods, P-59, B-5, PilerneIndl, Estate, Pilerne, Bardez, Goa
106.	GOA/1226	Kineco Kaman Composites India Pvt. Ltd, Plot No. 60, PilerneIndl, Estate, Bardez, Goa -403511
107.	GOA/1228	Quality Foods, Plot No. SB 39 & SB 50 A, CuncolimIndl, Estate, Cuncolim, Goa – 403703.
108.	GOA/1248	Tevapharm India Pvt. Ltd, Plot No. A-1, Phase 1-A, Verna Indl Estate, Verna, Salcete, Goa- 403722
109.	GOA/1250	Sharddha Ispat Pvt. Ltd, Plot No. M-1, ConcolimIndl. Estate, Cuncolim, Goa – 403703.
110.	GOA/1252	Omni Impex Pvt. Ltd, Plot No. 65, PissurleIndl, Estate, Honda, Sattari, Goa
111.	GOA/1255	Watson Pharma Pvt. Ltd, Plot No. A3 to A6, Phase 1 A, Verna Indl, Estate, Verna, Goa – 403722
112.	GOA/1259	Chowgule & Co. Pvt. Ltd, Shipbuilding Division, Survey No. 137/1, Plot No. 24/25, Near Golden Marble Sancoale, Mormugao, Goa
113.	GOA/1262	Model Infra Corporation Pvt. Ltd, L-13, Verna Indl Estt, Verna, Goa, - 403722
114.	GOA/1275	Commscope India Pvt. Ltd, Plot No. 2, Phase IV VernaIndl. Estt Verna, Goa – 403722
115.	GOA/1281	Quality Exports, Plot No. SB-64 to 71, Cuncolimindl. Estt, Cuncolim, Goa- 403703
116.	GOA/1286	Atlas Fisheries Private Limited, 42/ 3A, Dauji, Old Goa, Goa.
117.	GOA/1291	CG Power and Industrial Solutions Limited, Plot Nos, S-14 & S-15, Colvale Industrial Estate, Colvale, Bardez, Goa
118.	GOA/1294	Indospirit Beverages Private Limited, L-22, Cuncoim Industrial Estate, Cuncolim, Goa – 403703.

119.	GOA/1297	Putzmeister Concrete Machines Pvt. Ltd, Plot No. N-4, Phase, IV, VernaIndl, Estt. Verna, Goa - 403722
120.	GOA/1302	Mandovi Dry Docks, Survey Nos. 224/22, 225/0, Tariwada, Piligao, Bicholim Goa.
121.	GOA/1308	Sanofi Healthcare India Pvt. Ltd. GIDC, Plot No, L-121 Phase IIIA, Verna Indl. Estt. Verna, Goa – 403722
122.	GOA/1309	Hitek Brass Producre Pvt. Ltd, Plot No. 174, Kundiam Indl, Estt. Kundaim Goa
123.	GOA/1317	Hindustan Petroleum Corporation Limited Plot N. A-10 & A-11, Murgaon Co-op. Industrial Estate, Chicalim, Vasco, Goa.
124.	GOA/1334	Lgloo Dairy Services Pvt. Ltd, Plot No. 144/145, KundaimIndl. Estate, Kundaim, Ponda, Goa
125.	GOA/1335	Blue Ocean Beverages Pvt. Ltd, Plot No. A-1, Phase-II, MargaoIndl, Estt, St. Jose de Areal, Salcete, Goa – 403709
126.	GOA/1338	Devyani Food Industries Ltd, Survey No. 295, Tisk Usgao, Pondoa, Goa.
127.	GOA/1342	Sipping Spirits Pvt. Ltd, Plot No. 56 B, Colvale Indl. Estt. Bardez Goa.
128.	GOA/1345	CiplaBoiotec Ltd. Plot No, L-147/4, Verna Indl. Esttt, Verna, Salcete Goa - 403722
129.	GOA/1349	Mohitlspat Ltd, Plot No, 1 Navelim Village, BichoimiIndl, Estt, Bicholim, Goa
130.	GOA/1350	Birla Furukawa Fibre Optics Pvt. Ltd, Plot No. L-62 to L-64, VeraIndl, Estt, Verna, Salcete, Goa – 403722
131.	GOA/1358	Alphagam Coating Solutions Private Limited, Shed NOS,D2/9, D2/17 to D2/21, Bicholim Industrial Estate, Bicholim Goa
132.	GOA/1387	Borkar Packaging Pvt. Ltd, Plot No. P1-B MargaoIndl. Estt. St. Jose de Areal, Nessi, Curtorim, Salcete, Goa – 403709
133.	GOA/1399	Leela Distilleries Pvt. Ltd, Plot Nos. A-16, 17 & 18, MadkaimIndl, Estt, Ponda, Goa-403401

134.	GOA/1402	Vedanta Limited (Pig Iron Division Unit-II) Survey Nos. 177 & 120 (Part), Biholim Industrial Estate, Navelim P. O Sanquelim, Bicholim, Goa
135.	GOA/1403	United Marine Products, Plot No, L-28, Cuncolim Industrial Estate, Salcete, Goa 403722
136.	GOA/1411	Cazcar, Plot No. 520 & Part of 519, Pent, Nanora, Assanora, Biclolim, Goa.
137.	GOA/1425	Tech- Force Composites Private Limited, Plot Nos. 48/ A & 48/B, Survey No. 73, St. Jose De Areal, Nessai, Salcete, Goa – 403709
138.	GOA/1428	P.K, Composites Private Limited, Shed Nos. D2-1 & D2-2 in Plot Nos 22 & 23, Bicholim Industrial Estate, Bicholim, Goa
139.	GOA/1433	Universal Cables Limited, Plot Nos, L-58 to L-60 Verna Industrial Estate, Verna, Salcete, Goa -403722
140.	GOA/1485	Sagar Feeds & Food Processing Industries Plot No. L-27, CuncolimIndl. Estate, Salcete, Goa – 403703
141.	GOA/1488	A.W. Faber Castell (India) Private Limited, Plot No. 24/1-d-1, Molago De Orora, Corlim, Ilhas, Goa- 403002
142.	GOA/1532	Fortune Distillers & Vintners Pvt. Ltd, Plot No, M-5, CuncolimIndl. Estate, Salcete, Goa- 403703,
143.	GOA/1536	Indotech Ice & Cold Storage, Plot No. U-10, GIDC, CuncolimIndl. Estate, Salcete, Goa – 403703,
144.	GOA/1546	Gagan Wine Trade & Financers Ltd, Plot No. 62, Pissurlemindl. Estate, Sattari, Goa.
145.	GOA/1561	VerGo Pharma Research Laboratories Pvt. Ltd, Plot No. B5, B22, B23, B23(A), Phase, 1-A, Verna Indl. Estt, Salcete, Goa – 403722
146.	GOA/1584	Esteem Industries Pvt. Ltd (Unit III), Plot No. 155, BicholimIndl, Estate, Bicholim, Goa -403529,
147.	GOA/1604	West Coast Shipyard, Survey Nos. 306/0 (Part) & 29/0,

		Russiam, Loutolim Salcete, Goa -403718
148.	GOA/1614	Hindustan Waste Treatment Private Limited, Survey No. 47/1, Village Calangute, Near Pilerne Fire Station, Calangute, Bardez, Goa.
149.	GOA/1640	Reliance Industries Limited, Survey No. 10/1, ChicalimIndl. Area, Vasco, Mormugao, Goa-403726
150.	GOA/1642	Aquarius Shipyard Pvt. Ltd, Survey No. 25/1, H. No. 505, Sao, Mathias, Naroa, Tiswadi, Goa-403403
151.	GOA/1666	Ion Exchange (India) Limited, Plot No. U-05/04, Phase IV, Verna, Industrial Estate, Verna, Salcete, Goa – 403722
152.	GOA/1684	Seahath Canning Company. Plot No. 8 & 7 (Part), MargaoIndl, Estste, St. Jose de Areal, Margao, Salcete, Goa – 403709
153.	GOA/1686	Fullarton Distilleries Pvt. Ltd. Survey No. 71/0 & 72/1 Khandepar, Ponda, Goa
154.	GOA/1707	Pinto's Cold Storage and Ice Plant Plot No. L-5, CuncolimIndl, Estate, Cuncolim, Salcete, Goa
155.	GOA/1712	M/s. IFB Industries Ltd, Plot No. N-7, Phase IV, VernaIndl. Estate, Verna, Salcete, Goa
156.	GOA/1719	Bharat Petroleum Corporation Ltd, Plot No. A4, Aviation Fuelling Station, Mormugoa Co. Operative Indle Estate,
157.	GOA/1732	Hughes Precision Manufacturing Pvt. Ltd, Plot No. 99-102, Verna IndlEstt, Verna Salcete Goa 403722
158.	GOA/1736	Syngenta Biosciences Pvt, Ltd, Survey No. 28, Subdiv No. 1 Santa Monica Works, Corlim Tiswadi Goa.
159.	GOA/1741	Joecons Marine Export Pvt. Ltd, Plot No. L4 & M23, Cuncolindl. Estate, Cuncolim, Salcete, Goa.
160.	GOA/1754	City Metal Works & Coats, Plot No. B3-4, B3-5, D3-7, MargaoIndl. Estate, San Jose De Areal, Salcete, Goa

161.	GOA/1757	Shakti Chemicals Plot No. C-10, Survey No. 391, Sub Div. 1, Madkaimindl. Estate, Madakim, Ponda, Goa
162.	GOA/1760	M/s. Apex Packing Products Pvt. Ltd, Plot No, B33, B33A & B34, KundaimIndl, Estate, Kundaim, Ponda, Goa 403115

Emergency Operation Centre (E.O.C.)

a) **Establishment and location of EOCs**

- The EOC is set up at State, District and Taluka Level

b) **Concept of Operation of EOC at the State Level**

- The SEC headed by Chief Secretary at the State level & Collector at the district level or his/her designee will initiate the activation of emergency services of the EOC.
- The EOC will be manned by a skeleton staff throughout the year. In the event of emergency, it will be fully activated with participants from key departments like Health, Agriculture

   Veterinary, Police, Civil Defence etc., apart from the personnel belonging to the Revenue Department

- The SEC/ DC will announce the alternative location in case the State/District EOC is affected by any eventuality/ emergency.
- Nodal officers of various Depts. posted at the EOC will be responsible for maintaining communications through radio and telephone with their respective departments at the District and Block levels
- The SEC will requisition necessary staff as required for effective functioning of the EOC during the time of emergencies

c) **Organisational set up of EOC**

1. EOC in charge: While the SEC will be overall in charge of the EOC, the day-to-day Operations of the EOC will vest with an official in charge of Disaster Management Deptt. & will be responsible for assisting the SEC and other nodal officers for overall coordination and effective functioning of the EOC. Similar arrangement will be made by Collector in the district EOCs.
2. The State Government will take steps for establishing EOCs as per GoI-MHA guidelines in state and district H.Q., where all the Emergency Support Functions (ESFs) will be located during emergencies

d) **Communication Section:**

The hotlines, V-SAT and wireless communication will be established at the EOC at the State level with the following:

- Chief Minister
- Chief Secretary
- DG Police
- Collector
- Local Army and Air Force Command
- Related Departments (Primary Agencies)
- Information and arrival point at the State

- Information and arrival point at the affected Districts

e)   Tasks for all EOCs

- Determine policies during disaster and post disaster period Adjudicate conflicting, claims and /or request for emergency personnel, equipment, and other resources;
- Designate responsibilities and duties, as necessary to maintain the optimal use of resources;
- Provide operating units with requested resources for sustained operations Maintain documentation of resource allocation and availability.

Assessment Report Format

The assessment report may include the following as far as practicable:

Extent of damage in terms of:

- Geographical area (administrative units and divisions)
- Expected affected population and effect on population (primary affected persons, dead, injured missing, homeless, displace, orphans, destitute, traumatized population, children under five, pregnant women, lactating mothers
- Districts/Areas worst affected
- Damage to infrastructure according to each ESF
- Buildings (Major and minor damage/destruction) Infrastructure (road damaged/ destroyed, bridge, communication network, electricity network, telecom network
- Health Facilities (Infrastructure damage, condition of equipment, staffs affected, availability of medicines/drugs, vaccination/immunizations, major health problems
- Water & Sanitation (Availability of safe drinking water and sanitation facilities, environmental sanitation, stock of disinfectants, condition of water supply system, repair status of water supply system, potable water system
- Crop/ Agriculture (crop damage, livestock loss, health services for livestock, cattle feed/ fodder availability, damage to agricultural infrastructures)
- Food/nutrition (adequate availability of food for family, relief, PDS, Community Kitchen, requirement of baby food
- Secondary threats (potential hazardous sites, epidemics etc.)
- Logistic and Distributions System (Availability of storage facilities, means of transportation, availability of fuel, distribution of criteria)
- Priority needs (needs of search and rescue, need for team/ boats/special equipment and shelter) Clothing (children clothing, adult clothing, winter clothing
- Food items (type of food, baby food, specialized food, cattle feed and fodder)
- Sanitation (potable water, chlorine powder and disinfectants, manpower for repair of drinking water points and disinfections of water bodies
- Health (medical staff, drugs, IV fluids, ORS, equipment, Mobile unit, Immunization vaccine, Cold chain system).
- Education (infrastructure both temporary and permanent, teacher kits, reading materials)
- Crop/ agriculture (need of seeds, fertilizers, pesticides, implements)
- Equipment and manpower required for restoration of infrastructures

<div align="right">**Annexure-XI**</div>

Guidelines for preparing Disaster Management Plans by Departments of State Government

1.   Introduction:

As per the section 40(1) of Disaster Management Act, 2005, every department of the State Government should prepare a disaster management plan in conformity with the guidelines laid down by the State government. The concerned subsections of the DM Act are annexed for ready reference). This guideline has been prepared in order to facilitate the preparation of all the disaster management plans by all the state departments under the umbrella of the State Disaster Management Authority. The state Disaster Management Plan will be prepared in conjunction with the disaster management plans of the departments and in consultation with National Disaster Management Authority, Ministry of Home Affairs and other nodal agencies of the government.

1.1 The preparation of plans will fulfil the statutory requirements as laid down in the Disaster Management Act and would ensure that efforts have been made by the department to fulfil statutory duties-failure of which invites stringent liabilities including criminal proceedings by the law of the State. This planning exercise is an effort made to mainstream all issues concerned with emergency preparedness, response and mitigation/risk reduction activities. The department should include the following components in the department plan.

◆   Planning on Emergency Response at all levels,

◆   Planning on providing Relief and Recovery support (post disaster)

◆ Planning on Prevention and Mitigation issues (Including mainstreaming mitigation into the development programmes supported by schemes financed by the federal / state government, multilateral/bilateral and donor institutions)

◆Planning for resources such as financial and human resource to fulfil the above three components

The roles and responsibilities (in fulfilling the above four components) of all the actors and agencies within the department should be clearly spelt out in the plan. This will avoid ambiguity and confusion while executing the plan in the times of crisis. Thus, the roles and responsibilities under the above listed heads/sections should be prepared and the responsibilities assigned. Department plan must clearly identify and assess the current capacity of the department. In other words, the department assess the availability of human resources /manpower, equipment, need for training and further capacity building through human resource development plan. In addition, existing resource allocation by the department on disaster management functions and requirements of additional funds for a minimum period of next three years must be indicated in the plan.

Each department disaster management plan shall begin with the introduction section and will essentially cover the following points:

Goal: The goal of the Department Disaster Management Plan should be clearly spelt out.

Objective:

The department should clearly indicate the objective of the departmental plan. For example, the Health Department can state the following objectives:

◆ To save lives of affected population by effective medical response
◆ Prompt and effective treatment of injured in disasters
◆ Provide medical emergency function support (ESF) to allied institutions / secondary ESF Members such as Medical Response Teams at state, district and sub-divisional levels, Indian Red Cross, Civil Defence, Fire Service, NGOs etc.
◆ Prevention of health related outbreak and epidemics
◆ To keep all health infrastructure, equipment and personnel in a state of readiness for response
◆ To ensure that all health facilities can withstand the actual disaster by adoption of structural and non-structural measures and ensuring that every facility has All Hazard Disaster Management Plan.
◆ Preparation of Guidelines for State Health Contingency Plan (This may include typical SOPs for Epidemics such as H1N1 etc.), Disease Surveillance System etc.
◆ To conduct trainings and capacity building all identified staff including refresher

The above is only illustrative example and is not an exhaustive list for action. The department can determine the scale of operations as per the functions allocated by the state and accordingly align the objectives.

The process involved in preparing the plan shall include:

1. On receipt of the guidelines note the department shall identify experienced official(s) and sector experts for preparation of the plan.
2. A Department Disaster Management Plan should aim to achieve the following objectives:
   ◆ Prevention and Reduction of disaster impact by undertaking prevention, mitigation, risk reduction measures by structural and non-structural measures (Prevention and Mitigation Plan)
   ◆ Preparation for effective response aimed to save lives, minimize loss and property damage (Emergency Response Plan)
   ◆ Quick recovery from disaster impacts. (Relief and Recovery)
   ◆ Resource Planning (HRD Plan and Department Wise Investment Plan)
3. Department Plan should clearly define:
   ◆ What actions should be taken in pre-disaster, during and post disaster situations (Define this hazard wise - fast onset and slow onset disaster types)
   ◆ Who should take action;
   ◆ When should action be taken and completed;
   ◆ What are the resources needed for taking action;
   ◆ Whether additional training is needed for taking action. (Indicate this under the HRD Plan)

Organizational Framework:

The next section should highlight details of the Organizational Framework which describes the organizational matrix/structure for implementation of the plan and coordination with all agencies.

The Organogram must be in the form of a flow chart which can define hierarchy of actions, jurisdiction arrangements, area of operations/responsibility and communication plan.

Departmental wise actions for identified hazards and vulnerabilities:

This section should highlight on indicative (very broad) Hazard Risk and Vulnerabilities in the State and broadly indicate the responsibility of the department to minimize the risks.

For example, the Public Health Department of the State could suggest the hazards as follows:

◆ Determine the infrastructure vulnerability of the departments to slow and fast onset hazards

 ◆ Medical assistance provision required for Quick Onset Hazards such as earthquake, landslide, flash floods, lightening, forest fire, traffic accidents which rapid medical response and deployment of medical first responders to the field to access and provide medical aid.

◆ Epidemics and other health disasters which arise in during monsoon or dry seasons

The vulnerabilities in Health Department could include difficulties in access to health facilities (then planning is needed for mobile teams or medical camps), improper or inadequate networking within the health sector as seen during disasters, poor transportation arrangements for emergency action, lack of communication plan/ inadequate communication facilities (then use wireless or police wireless or district EOCs), medical storage and stock pile locations and coverage issues etc.

The department must make a checklist of action to be taken in particular disasters (The department can study the experience of past disasters to prepare the plan. Some of the departments are required to prepare a report on losses and damages and for this methodology should be clearly spelt out.

This is only an illustrative case and not all details are discussed. The final decision is left to the department as the final responsibility for action will lie with department.

Roles of the Department and Roles of their Stakeholders:

This section shall clearly mention the Roles of the Department and their linkages with the Stakeholders. Taking the example of Health Department, this section must first begin with the role and responsibility enjoined (!) upon the health department during disaster and how this responsibility will be discharged during disasters and how the other stakeholders will collaborate in such an effort. The Department should identify all stakeholders who have a role to play in disaster management. Role of each of the stakeholders should be defined. The role of each agency can be specified in a table as follows:

Sl.				Role supposed to be played during

No	Name of the agency	Regular duty	Role during disaster situation	Emergency response (rescue, medical first aid, shelter)	Relief & recovery	Prevention	Mitigation	Prepared ness

Mapping of Resources:

Mapping of Resources (that are currently available and those that can be brought to use at short notice) that are available both within the department and outside at all levels is vital part of the plan. Mapping of resources should include mapping of all Human Resources, taking into account of all key assets within the government system and those outside the government that can be utilized in case of need. For example, the mapping of resources in the health department will include a comprehensive assessment of resources and should enlist as follows:

Sl.No.	Men / Material/ Equipment/ Services Description/ Specification each heading need to be elaborated	Date of entry*	Qty in Nos.	Qty in Wt./Vol.	Availability Location
1. Manpower					
2. Services					
3. Material					
4. Equipment					

* The resources shall be mapped twice in a year

Pre-contracts:

During a large scale disaster, the situation may demand large scale mobilization of resources. In order to meet this surge, it is suggested that line departments enter into pre-contracts with the local vendors/suppliers for immediate supply of materials which could be mobilized in a short period of time. (for example: if the health department is in requirement of additional 10000 saline bottles, the department can mobilize this with the support of the medicine shops/suppliers. It is hereby suggested that the department enters into an

agreement/contract with the suppliers with a payment commitment (say, within a maximum period of three months or earlier). The details can be highlighted in the plan as specified in the format below:

Sl.No.	Men / Material/ Equipment/ Services Description/ Specification each heading need to be elaborated	Qty. in Nos.	Qty in Wt./Vol.	Pre-contract Location	Pre-contract valid up to
1. Manpower					
2. Services					
3. Material					
4. Equipment					

As mentioned above there should be separate chapters on the following:

Prevention and Mitigation Planning,

Emergency Response Planning,

Relief and Recovery Plan and

Resource Planning (Financial and Human Resource)

These are briefly discussed below:

Note that the section written earlier can be directly pulled out and inserted under the following heads. Sections such as mitigation fund etc. should figure out in Resource Planning Section.

a. Prevention and Mitigation Planning

This section may include the prevention and mitigation that departments are taking to address the disaster risk management issues specially those mentioned in the Disaster Management Act 2005.For example ,the UD& Housing may mention the efforts in amendment of building bye laws to make the construction safe or Education department may mention the training of teachers and students, preparation of school safety plans, incorporation of structural safety features in construction of new schools or PWD may mention the incorporation of safety measures in all its construction projects and training of engineers and architects etc.(All examples suggested herewith can come in the form of bullet point) These are examples for the convenience of illustration.

Similarly, all the departments should make their own assessment of their roles and responsibilities as per the Disaster Management Act and their role in the disaster and crisis situations that they have been enjoined upon to play by the government. Another example is that the departments may mention the need and effort being made to create the mitigation fund within the department. Another example would be to assess the vulnerability of their infrastructure to ensure that during serious crisis situation the functioning of the department is not stopped and if the disaster is catastrophic, there is minimum disruption and plan is made to ensure that services are continued. This section may also mention the efforts to repair, strengthen, retrofit the physical infrastructure. And as far as human resources is concerned the requirement of capacity building of the staff through training needs to be addressed to.

◆ The dept. will need to examine the need to create fund within the dept. budget for addressing disaster mitigation and response activities. Departments may recall that it was suggested earlier by Revenue Department to keep aside the 10% of all developmental plan or nonplan budget for disaster management issues. (The above paragraph also mentioned about the fund. It is suggested to fuse them under one bullet point)

b. Emergency Response Planning

(i)   Constitution and Deployment of quick response team (QRT) to disaster affected site/ region:

Every department would do an analysis of their domain and then decide on the deployment of QRTs at the state, district, subdivision, block level and for various magnitude of the event. Experiences has shown that deployment of QRT's is vital for early relief efforts. Once the decision to constitute the QRT is taken the department should locate the manpower and train them to mount a response suo motto. MENTION FROM THE MHA EXAMPLES OF QRT

On the receipt of information about the occurrence of the disaster, these QRT teams is deployed quickly. For this the department should prepare a standard operation procedure (SOP) required for deployment of these teams and the SOP should also indicate the course of action if the QRT is not able to handle the situation on its own. In other words, the department should lay down an elaborate sequence that will ensure mobilization and deployment of QRT on the spot, sending of QRT to other line departments for assistance for handling their own crisis situations or for carrying out a joint operation as per the need of the situation, type of further response required, type of further support required from other departments and from higher levels than being handled. The Department should clearly identify the person/s who will start the wheels rolling and continuously moving till the situation is handled. While the situation is being handled by the QRTs, other level of the department may need to keep close coordination with other line departments, SEOC, and concerned field level offices. The response may also need the reverse way of action i.e. the department may need the support from other line departments, SEOC and field offices to carry out joint operation under the departmental jurisdiction. Another way of ensuring that these QRTs become the essential part of the system of response is to publicize the details of these teams, their location, their contact details with all the departments and with the press and public representatives. Care

should be taken for disseminating information related to terrorist attack or anything matters to security concerned for the State like publicizing may not always be good idea as terror groups can use this information for their benefit).

(ii) Mobilization of resources within the department and from outside as per pre-contract with the agencies: (During disaster, the situation may demand large quantity of materials, manpower to be mobilized immediately. In this regard, the line departments should assess whether they need to enter into pre negotiated contracts with the local vendors/suppliers for immediate supply of materials during the crisis. This prevents the crisis in supplies. (For example: if health Deptt. needs, additional 10000 saline bottles, these can be mobilized from local medicine shops at a pre negotiated rate.

(iii) Immediately after the disaster all the departments are required to do rapid loss and damage assessment. The department should devise formats and earmark men and machinery that would automatically set in motion as per the devised methodology. This would prevent in loss of time and would ensure obtaining supplies. It is possible that the state government may ask the Revenue Department machinery to make the damage and loss assessment also but the advance action by the concerned action will always save time and the information collected by the department can be given to Revenue Department which can be easily consolidated .If needed the damage assessment report can be sent to the EOC at the district and state level .This will help state govt. to consolidate the report and send to Govt, on India if immediate financial assistance is needed.

(iv)   Relief operations:

The department which participates in the extension of relief either on their own or in partnership with other departments will need to include in their plan the SOP of their participation and involvement in extension of relief operations. For example, the health department needs to include in their plan the mechanisms and manner of their participation in relief operations say after floods. If the assessment can be done with district administration about the requirements of possible supplies of medicines etc. Then health department can make advance plans. In this the experience of assistance provided in last of couple of years will greatly help. Even if the department does not participate in the relief operations directly, planning should be done for deputing officials, placing the vehicles, use of department storage facility at all levels and other possible uses for other available resources of the department.

(v)   Quick restoration of public utility:

The departments like PWD, WRD, PHED, Power, Telecommunication etc. have the specific responsibility for restoration of public utilities as early as possible. For this purpose, the concerned departments should have their standard SOPs indicating the course for undertaking restoration works so that life is brought back to near normal as early as possible without any loss of time and without waiting for further directions from higher authorities. The public utility departments like power, roads, water supply etc. need to have SOPs to

ensure continuation of services. The department should have the planning done in a way that some contingent funds are always available and are built into the budgetary heads.

A Table Indicating the Activity to be undertaken (Warning to communities, Evacuation of communities etc.); Agency responsible; Time schedule; Manpower requirement; Equipment requirement; Estimated Cost can be highlighted in this sub-section.

It is important to mention that Response Planning need to take into account of various types of disasters. Some disasters give sufficient lead-time for preparation whereas some disasters strike without warning. Therefore, the Disaster Management Information System has to take into account of relay of early warning messages for events with sufficient lead time and for the ones without warning the information system should be quick enough to plot the hazard intensity of the event. Disasters such as floods, droughts and tropical cyclones are seasonal in nature. The role and duties of the department should be worked out for seasonal events. If there is a prior warning, the department must take the advantage to mitigate the possible impacts or undertake prevention. If the disaster has a prior warning stage, various activities to be undertaken before occurrence of the event should be mentioned (for example cleaning of drains or water channels before the rainy season is an example observed in cities like Surat, Mumbai or vaccination or immunization or pre-positioning of health officials and medicines at pre-identified vulnerable locations before rainy or flood season etc. by the Health Department). If the disaster has a warning stage then the department needs to adopt a method of alerting the administrative machinery, communities, emergency responders, QRTs, volunteers etc. and the detail procedure needs to be mentioned in the plan along with an evacuation plan if necessary for the department. The plan also highlights to activate the departmental emergency operation centre (control room) with dedicated telephone and other communication lines and manpower to coordinate, collect and compile and sharing of information with field level including the community and nodal agencies after receipt of warnings. The important numbers of the control room and focal points need to be shared with public. Planning should be done for adequate no. of vehicles, alternate transportation arrangements, POL, manpower, equipment and other resources which would be required to be mobilized quickly. The department must have an activation plan highlighting the measures to be taken with time schedules

The thrust area of the response portion of the plan is post-disaster search, rescue and relief. Therefore, the plan needs to clearly indicate what should be done, who will do it, when and how it will be done. (If necessary, an activation matrix format can be used). These details in this section will vary from departments to departments and should include general details and details of mobilization of resources including man power and materials that are and may be available within the department and those that can be requisitioned at short notice from outsider from both from Govt. or private agencies as per pre-contractual agreement. The departments should also consider including details of the central govt. agencies. The departments should link with the district level database and inventory of resources namely Indian Disaster Resource Network (IDRN) and should get their resources incorporated into the

database. The literature of IDRN is enclosed with the write up. The State Govt has set up Emergency Operations Centres (EOCs) at the district and state level and, co-ordination with the EOC at District and State should be established. Departments should consider whether it is required to set up a 24X7 EOC (at least during the monsoon period). For example, Health Department in many states has their own SOP indicating opening of EOC. If the department decides to have a provision of setting up an EOC then they must have a Standard Operating Procedure (SOP) as well as a communication pan for smooth operations and for establishing linkages with the State EOC.

It is understood among the disaster management practitioners that the first 72 hours are most critical for mounting the search and rescue efforts, saving lives of trapped victims, providing medical support to the critically/severely injured. The attention span thereafter shifts towards specific relief and recovery efforts such as providing temporary shelters, food, medicines and other essential supplies. Of course it is not to deny that essential support such as food and medicines also continue to be given in the first 72 hours. Thus every department should lay down an a Activation Matrix clearly laying down the time frame for activation and identification and allocation/deployment of resources. - The task responsibility matrix shall spell out what actions should be taken and who should take action 72 hours before and after the disaster strikes. One such example of activation matrix table is given below;

Table : Activation Matrix for Slow Onset Hazards (this must be Hazard wise)			
Time	Specific Possible Situation	Activity	Responsibility
T-72 hrs			
T-48 hrs			
T-24 hrs			
T-12 hrs			
T-4 hrs			
T+15 min			
T+30 min			
T+1 hrs			
T+4 hrs			
T+6 hrs			
T+12 hrs			
T+24 hrs			
T+36 hrs			

Time	Possible Situation	Activity	Responsibility
T+48 hrs			
T+72 hrs			

Table : Activation Matrix for Fast Onset Hazards (this must be Hazard wise)

Time	Possible Situation	Activity	Responsibility
T+15 min			
T+30 min			
T+1 hrs			
T+4 hrs			
T+6 hrs			
T+12 hrs			
T+24 hrs			
T+36 hrs			
T+48 hrs			
T+72 hrs			

Relief and Recovery Plan

The next chapter of the response plan is towards addressing Relief and Recovery efforts. This section should reflects the departmental intervention towards the process of mobilization of relief materials as per need (if required), transportation and storage of relief materials (perishable items like food, medicines etc., non-perishable items like clothes, tents, tarpaulins, tents, utensils, shelter items etc./ allocation of funds to the departmental agencies and local administrations etc., process of distribution of relief materials to the affected communities by the department and departmental agencies. Many cases require air dropping of relief materials particularly to the inaccessible areas which needs to take help of air force helicopters and airport authorities. For this pre-agreement with the concerned department is required to carry out relief operation without losing precious time.

The department needs to lay down the procedures for acceptance of relief materials from other State Governments, foreign countries, donors and voluntary organizations. Issues on humanitarian assistance like inappropriate distribution of relief materials, gender, religious and unwanted materials have to be taken into consideration and long term relief operation should not be encouraged unless cleared by the state or central Govt as applicable. The relief and recovery plan should include reference to provisions of State Relief Norms or SDRF or any other such documents adopted by the department. The department laid down policy on relief and rehabilitation phases should be incorporated in the plan.

Relief activities of the department should be highlighted in terms of short, medium and long term as per the practice and policy of the department.

Department Recovery efforts in terms of restoration, rehabilitation and reconstruction should be outlined in this sub-section. The Roles and Responsibilities of the department recovery phase need to be highlighted clearly in bullet points/table. In this section, the department needs to prioritize the recovery activities in various phases like immediate (within 72 hrs), short term (3 days to 3 months) and long term (more than 3 months). The recovery activities should specify the areas of intervention, fund and expertise required and time line for completion of the work. Planning of restoration, rehabilitation and reconstruction activities may differ from department to department.

While addressing disaster management issues there is a unanimous agreement that the communities and the agencies involved towards rebuilding should not recreate the same risks during the phases of reconstruction and long term rehabilitation. For example, there is need to incorporate the disaster resilient elements/features while reconstructing the buildings in the affected area. Another example would be to undertake mitigation efforts by all the agencies involved and that there should be coordination amongst all the agencies. This strategy was adopted by the reconstruction agencies while undertaking works after Latur earthquake (1993) and Bhuj earthquake (2001) and by the coastal states which was severely hit by the 26th Dec 2004 Tsunami. Some planning on these issues need to be taken by the departments and these issues and policy would need to be mentioned in the plan so that other departments are involved and informed.

Resource Planning (Financial and Human Resource)

The department needs to indicate in the plan the financial mechanism and options for all the above 3 sub-sections (prevention & mitigation, emergency response and relief and recovery). The estimated budget for each activity should be indicated along with the overall budget for all three components. (it should be indicated whether funds are being sourced from plan/non plan budget of the State Government or from regular schemes of Govt. of India or from some other special funding provision). The departments are aware that Revenue Department, has advised all departments to allocate 10% of budgetary provision towards disaster preparedness, response and mitigation activities. This was meant to enable the department to utilize the fund for regular activities like conducting various disaster management training programmes and sending officials for training within and outside of the state, purchase of equipment etc.

The department should also incorporate details regarding incorporating DM concerns into developmental plans, programmes and projects to ensure that development planning is linked to disaster management issues. Hence the details of mitigation and capacity development measures must be clearly spelt out and elaborated in the plan itself and this will also ensure compliance with the statutory provisions of the national Disaster Management Act ,2005/. (Reflect the provision of adequate funds the requirements of relief materials when disaster strikes, estimated on the basis for past experience. Care should also be taken to make full

provision for the requirements of forces deployed on these occasions. Availability of funds for the agencies within the department from the plan should be ensured.)

Regarding human resource planning, the department needs to identify disaster management nodal officer, alternate nodal officer, quick response team (QRT), master trainers, identification personnel for specialized skills and details of the contacts needs to be provided in the plan. The specific roles and responsibilities should be laid down (suggested roles and responsibility of the nodal officer and QRT are annexed).

Roles and responsibilities of the nodal officer are as follows:
- Act as the focal point for disaster management activities of the Department. The department may ensure that he/ she have the mandate to work immediately without waiting for directions from above. This will save time
- Provide his/ her contact and alternate contact details to Revenue Department,
- State and District Emergency Operation Centres, all line departments and agencies
- Accountable to any communication/ actions related to disaster management of the department.
- Take lead to prepare the department disaster management plan, Emergency Support Function (ESF) plan and Standard Operating Procedure (SOP).
- Constitute the Quick Response Team (QRT) in the department as per the need and organize training for the members.
- Help the department to procure search & rescue, first aid and department disaster management equipment for the QRTs and for the department if required
- Provide regular information on disaster or task assigned to him to SEOC/ Disaster
- Management Department during and after disasters in consultation with the department head.
- Attend disaster management meetings, trainings, workshops or any related programme on behalf of the department
- Identify an alternate nodal officer and build his/her capacity.
- As per the need of the department, set up Control room and assign other official(s) for control room duty.
- Identification and staffs for deployment on site operation centres (on site control room during a disaster)
- In consultation with the department, make arrangement of alternative communication system for the department.
- Mobilize resources for disaster response activities as per the resource inventory put in the department DM plan if it is needed by the department or other line departments.
- Organize regular awareness programmes in the department

- Organize the periodic mock drills at least twice a year as per the suitability of the department and update the plans at all levels and ensure participation of the department in mock drills of other agencies and other departments.

Roles and responsibilities of QRT:

In QRT, one official should be designated as Team Leader.

The members of QRT should act as per the instruction of the team leader of QRT.

- The QRT will assess whether equipment is required for carrying out of search & rescue and first aid activities and accordingly the QRT will be equipped with the required equipment.

   For purchase of equipment, department can utilize departmental fund for the purpose. The department will finalize the type of equipment is required for the QRT. If assistance is required for identification and finalization of equipment, the department may seek that support from Revenue Department. However, the equipment required for search and rescue and first aid activities for a QRT having 10 members is annexed for reference.

- Attend training/ refresher courses how to respond after receiving of any information related to disaster/ emergency. For the training of QRT members on First Aid and Search and Rescue, the department will link up with ATI and SIRD

- QRT should be made familiarize with SOP/ ESF/ DM plan of the department as well as State DM plan and also about their roles and responsibilities

- QRT should involve in preparation and periodic updation of plan, by incorporating their view and suggestions for better effectiveness of the plan.

- Organize mock drills minimum twice a year as per the suitability of the department. The department will finalize/ fix up the dates of mock drill to be conducted. The date of conducting mock drill will vary from department to department as per the general involvement to the disasters.

- After the mock drill, the department will evaluate the performance of QRT and effectiveness of the Dept. DM plan and accordingly update the plan.

   The department needs to plan to depute officials for the purpose or to plan new recruitment of official if needed.

   During disaster, the department may need additional man power to handle the situation effectively. In this regard the department to plan to mobilize human resource support in coordination with other line departments or outside agencies/ NGOs/ communities.

Testing, Review and Updating of the Departmental Plan

This section will outline the testing of the plan in terms of Mock drills or Table Top exercises of the Plan. Mock drill will see whether the information given in the plan can work effectively during a time of crisis or not. This will also enhance the efficiency of personnel who will be involving on various activities as per the plan. It is suggested to conduct mock drill twice in a year for which the department needs to fix two dates. The mock drill may be conducted within the department and in coordination with the State Nodal Agency. Sometimes the mock

drill also organized in combination with the other line department for sectoral responses and based on the finding there has to be a fix timeline for review and updating the same.

Annexure:

The department needs to provide additional/ detailed information with annexure as suggested below. But these are not limited as suggested.

    a.   Important emergency telephone/ contact number and address.

    b.   List of resources (man power, materials, equipment etc.)

    c.   Rules, policies (techno legal guidelines) , government orders etc. which are related to disaster management

    d.   Formats

    e.   Maps

    f.   List of agencies within the department

    g.   List of field level offices and contact details

    h.   Checklists

Annexure -X

Checklist for DM/Deputy Commissioner for Disaster Preparedness in the District

Activities	(Y/N)	Remarks
Institutional Strengthening		
Whether DDMA is functioning on quarterly basis		
Whether district DM Cell, district nodal officer and Dept. Nodal Officers have been identified and oriented		
Whether the DM activities are delineated and assigned to the concerned Officials		
Awareness		
Whether regular awareness programme organized at all levels		
Whether resource materials in CD/ DVDs shared with ADC/SDMs/BDOs/ Schools/ Panchayat/ Depts		
IEC materials like posters, hoardings handouts, resource materials prepared/ collected and shared with ADC/SDMs/ BDOs/ Schools/ Panchayat/ Depts		
Whether line Depts like health, education etc. incorporated disaster safety components in their awareness programms.		
Whether flood awareness programme conducted at all levels in the district		
Whether print and electronic media been involved for dissemination of warnings, awareness to the public		
Whether Dy. Commission / ADC/ SDM/ BDO given flood/ flash flood preparedness talk in radio/ DDK etc.		
EOC (Control Room)		
Whether District EOC is functioning round the clock		
Whether other control rooms like hospitals, police, fire service, water resource, CWC linked up with the DEOC.		
Whether OIC-DEOC identified and his/her contact no. shared with all stakeholders		
Whether four digit telephone (1077) and IP phones other than the normal telephone installed in DEOC and publicised		

Whether weather report, rainfall info, river flow info etc.are being received from IMD, CWC, Water Resource Depts. on daily basis		
Whether the DEOC has communication redundancy (telephone, wireless phone, VHF, UHF, IP phone, internet, mega phone, mobile phone)		
Whether daily situation report is being sent to SEOC		
Whether the DEOC receives daily weather report from IMD by email/ fax/ phone		
Whether the district level hazard and risk maps, maps showing resources, equipment, safe shelters etc.available and displayed in EOC		
Equipment		
Whether the equipment available in the district have been physically tested		

ANNEXURE-XI

Format for Helipads/Landing Grounds in Goa

Sl/No.	Name of helipad /landing group	Co-ordinates		Size (length x breadth) (Metres)	Altitude (Metres)	Remarks
		Latitude	Longitude			
(A) NORTH GOA DISTRICT						
1.						
2.						
3.						
4.						
5.						
(B) SOUTH GOA DISTRICT						
1.						
2.						
3.						
4.						
5.						
6.						
7.						

N.B. - Accuracy of co-ordinates and latest status & condition of helipads/landing grounds to be ascertained before conduct of flying operation by any operator. Details of helipads collected from Deputy Commissioners and Public Works Department, Government of Goa.

Mock Drill - Concept and Process

What is Mock drill?

◆ It is process

- To get acquainted with a plan prepared for the specific purpose.

- To evaluate the practicability and suitability of the plan.

- To get prepared for any on to do situations.

Where?

The concept has been used by the Armed forces/ Para Military Forces.
It is needed because;

◆ Perfection/accuracy is need to save loss of life and property.

◆ In war there is no second chance, means kill or get killed.

◆ War Fitness.

◆ To get acquainted with situations, mass destructive weapons and commands.

Why mock drill in Disaster Management?

◆ To achieve accuracy for saving lives and property.

◆ To make Response more cost effective.

◆ To minimize response time.

◆ To create trained manpower to deal with disasters.

◆ Awareness generation leads to acceptance by the community.

◆ To evaluate suitability/ practicability of the DM plan.

◆ To get acquainted with the roles and responsibilities.

Requirements

◆ A complete Response/ESF plan

◆ Incident/ event

◆ Managers/ Teams

◆ Venue/ place of occurrence

◆ Any fixed date

◆ Organizers

◆ Observers/Evaluators/ experts from external agencies.

◆ Documentation team.

Process

◆ Meeting of the DMC members/ command heads.

◆ Discuss and draw a plan for mock drill.

- When, where, on which event, area of coverage, process of documentation, delegation of responsibility to organize etc.

- Discuss on the response plan of each team.
- DMTs to be ready with all necessary equipment, stationary and check list for the drill.
- Finalize duration for pre, during and post disaster activities.
- Inform the community people in advance and ensure their participation.
- Make security arrangement for the location where the drill has to be conducted.
- Verify all the arrangements on the presiding day.
- Discuss details of mock drill plan with the expert team in advance.
- Organize the drill as per the plan.

Important points

- Give your 100%.
- Get involved seriously.
- Community around should be informed about the drill to avoid panic.
- Follow the plan.
- Stick to time.
- If possible record the drill with the help of Video Camera.
- Discuss the comments given by the experts and rectify the plan.
- Share report of the drill with others.
- Plan for a next drill.
- Link the drill with the local festivals/ functions.
- Do not use the term "Drama"
- Invite nearby Village DMC members to see the entire process.
- Involve all the institutions in and around the village.

References:

1. National Disaster Management Plan-2019
2. Goa Disaster Management Rules 2008 Official Gazette Government of Goa
3. Statement on Climate for the State of Goa: 2023 IMD Pune
4. Forest Survey of India (Ministry of Environment, Forest & Climate Change)
5. Disaster Management Plan-2020 of the Directorate of Animal Husbandry & Veterinary Services, Government of Goa.
6. Bhatla, Rajjev & Verma, Shruti & Pandey, Ritu & Tripathi, A. (2019). Evolution of extreme rainfall events over Indo-Gangetic plain in changing climate during 1901–2010. Journal of Earth System Science. 128. 10.1007/s12040-019-1162-1.
7. Phases of Disaster Management_AkitaBox
8. UNDP, Sustainable Development Goals, https://www.undp.org/content/undp/en/home/sustainable-development-goals.html (accessed Sep 20, 2019)
9. Integrated monitoring of the global targets of the SFDRR and SDGs, h_ps://www.preven_onweb.net/sendaiframework/sendai-framework-monitor//common-indicators
10. Kerala State Disaster Management Plan.
11. Arunachal Pradesh State Disaster Management Plan
12. District Disaster Management Plans of North and South Goa Districts
13. Forest Fire Report of Goa Forest Department
14. Departmental Disaster Management Plan of AH&VS Goa
15. Web Dynamic Risk Composite Atlas-Web DCRA
16. National Guidelines on Incident Response System
17. Guidelines on Constitution and Administration of the State Disaster Mitigation Fund (SDMF) based on the recommendations of the Fifteenth Finance Commission 2021-22 to 2025-26
18. Guidelines on Constitution and Administration of Preparedness and Capacity Building Funding Window under National Disaster Response Fund (NDRF) and State Disaster Response Fund (SDRF)

****