ASSAM
STATE DISASTER MANAGEMENT PLAN 2022

Volume-1
(Perspective Plan)

ABBREVIATIONS

ACSP	Assam Community Surveillance Plan
ADPC	Asian Disaster Preparedness Centre
ADRC	Asian Disaster Reduction Centre
ASDMA	Assam State Disaster Management Authority
ASDMP	Assam State Disaster Management Plan
BBB	Building Back Better
BIS	Bureau of Indian Standards
BL	Base Line
BLEVE	Boiling Liquid Expanding Vapor Explosion
CBOS	Community Based Organizations
CCA	Climate Change Adaptation
CCIS	Child Care Institutions
CCM	Climate Change Mitigation
CDR	Contractor Driven Approach
CFR	Case Fatality Rate
CFS	Child Friendly Spaces
CMPA	Coastal and Marine Protected Areas
CNCP	Children in Need of Care and Protection
COP21	Conference of Parties
CPS	Child Protection Services
CSOS	Civil Society Organizations
DALA	Damage and Loss Assessment
DDM	Departmental Disaster Management
DDMA	District Disaster Management Authority
DDMPS	District Disaster Management Plans
DDR	Donor Driven Approach
DM	Disaster Management
DOS	Department of Space
DPRS	Detailed Project Reports
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSS	Decision Support System
EFC	Expenditure Finance Committee
EIA	Environmental Impact Assessment
EPIP	Export Promotion Industrial Park
GACC	Global Agreement on Climate Change
GOA	Government of Assam
GO	Government Organization
GSHAP	Global Seismic Hazard Assessment Program
HAZMAT	Hazardous Material
HFA	Hyogo Framework of Action 2005-2015
HRNA	Human Recovery Needs Assessment
HRVA	Hazard Risk and Vulnerability Assessment
HRVCA	Hazard Risk Vulnerability and Capacity Assessment

ICPS	Integrated Child Protection Scheme
ICSU	International Council of Scientific Unions
ICT	Information and Communication Technology
IID	Industrial Infrastructure Development
ILI	Influenza Like Illness
IOC	Indian Oil Corporation
MAH	Major Accident Hazard
ME	Monitoring and Evaluation
MEA	Millennium Ecosystem Assessment
MES	Ministry of Earth Sciences
MGNEGA	Mahatma Gandhi National Employment Guarantee Act
MHRD	Ministry of Human Resource Development
MHRVA	Multi-Hazard Risk & Vulnerability Assessment
MIS	Management Information System
MJS	Ministry of Jal Shakti
MMI	Modified Mercalli Intensity
MOEFCC	Ministry of Environment, Forests and Climate Change
NBC	National Building Code
NCCD	National Calamity and Contingency Duty
NCPCR	National Commission for Protection of Child Rights
NCRB	National Crime Records Bureau
NDMA	National Disaster Management Authority
NDMF	National Disaster Mitigation Fund
NDMG	National Disaster Management Guidelines
NDMP	National Disaster Management Plan
NEH	North Eastern and Himalayan
NETA	North Eastern Tea Association
NGOs	Non-Governmental Organisations
NPDM	National Policy on Disaster Management
NRHM	National Rural Health Mission
ODR	Owner Driven Reconstruction
OIL	Oil India Limited
PDDNA	Post-Disaster Damage and Needs Assessment
PDR	Post Disaster Reconstruction
PESA	Panchayat Extension in Scheduled Areas
PGA	Peak Ground Acceleration
PPR	Public-Private Partnerships
PRI	Panchayat Raj Institutions
PWDS	Persons with Disabilities
RO	Responsible Officer
SAADME	South Asian Annual Disaster Management Exercise
SAGS	Scheme for Adolescent Girls
SAPCC	State Action Plan for Climate Change
SARI	Severe Acute Respiratory Infections
SCS & STS	Scheduled Castes and Scheduled Tribes
SCZMP	State Coastal Zone Management Plan
SDGS	Sustainable Development Goals

SDMA	State Disaster Management Authority
SDMF	State Disaster Mitigation Fund
SDMG	State Disaster Management Guidelines
SDMP	State Disaster Management Plan
SDRF	State Disaster Response Force
SDRMF	State Disaster Risk Management Fund
SDRN	State Disaster Resource Network
SEAS	Strategic Environmental Assessments
SEC	State Executive Committee
SFDRR	Sendai Framework for Disaster Risk Reduction
SFGS	Self-Help Groups
SGDP	State GDP
TAA	Thematic Area for Action
UNIDNDR	United Nations International Decade for Natural Disaster Reduction
UNISDR	The United Nations International Strategy for Disaster Reduction
VCE	Vapor Cloud Explosion
WAP-3	The Third Wildlife Action Plan
WFA	World Fire Atlas
WHO	World Health Organization

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PREFACE

Assam State Disaster Management Plan (ASDMP) 2022 is an updated version of the earlier ASDMP prepared in 2014. In 2015, three historic global agreements were signed that include: Sendai Framework for Disaster Risk Reduction (SFDRR); Sustainable Development Goals (SDGs); and COP 21 Paris Agreement on Climate Change. This was followed up by the preparation of National Disaster Management Plan (NDMP) in 2016 and Prime Minister's Ten Point Agenda on Disaster Risk Management, as announced during the Asian Ministerial Conference on Disaster Risk Reduction in New Delhi in November 2016.

The two volumes of ASDMP 2022 embody the national policy, plan and priorities on Disaster Risk Reduction on the one hand and India's commitment to global goals on the other. Volume 1 of ASDMP is a perspective plan that gives an overall historical, ideological and technical overview of the disaster management plan of the state of Assam with a long-term perspective for the period 2022-2030. The DRR Roadmap prepared by ASDMA, which forms an integral part of this plan, is for the period 2021-2030. The perspective plan includes the following: state's hazard, risk and vulnerability profile; emerging challenges in the wake of changing climate and its impact; the rationale and outline of a risk management and risk governance approach for disaster management in the state; need for mainstreaming DRR in development; social inclusion; strategies for building resilience of institutions and communities; capacity development etc. The overall perspective of the state plan is to build a resilient state entailing resilient infrastructure, resilient services, resilient livelihoods, resilient institutions, and resilient cities and villages, as outlined in the DRR Roadmap for the state as well.

The second volume of Assam State Disaster Management Plan (ASDMP) is conceived and organized as a strategic action plan. Volume II seeks to present an action plan with a strategic approach and perspective, as outlined in Volume 1. In view of the unprecedented challenge of emergency management as posed by the global pandemic of COVID-19, the first chapter of this volume presents a long-term strategy for dealing with pandemic/endemic like situations, with focus on COVID-19. The inspiration for this Chapter is drawn from the State Disaster Management Plan (SDMP) of Karnataka, which was prepared and finalized during 2020, the year of the pandemic and is the first state to do so. The second chapter presents a detailed action plan on preparedness and response. The third chapter presents a hazard wise responsibility matrix for different departments at the state level, which could feed into various departmental disaster management plans, as a follow-up to this updated and revised ASDMP 2022.

In view of the critical connections across sustainable development goals, climate change adaptation and disaster risk reduction, ASDMP 2022 seeks to achieve coherence and mutual reinforcement across Agenda 2030, Assam State Plan of Action for Climate Change (SPACC) and DRR Roadmap for the state of Assam.

It will be pertinent to add here that ASDMP 2022 is a live and dynamic document open to suitable modifications during the annual review and revision of the Plan as mandated by Disaster Management Act 2005.

CHAPTER 1: INTRODUCTION

1.1 Background and Rationale

This is the revised and updated version of Assam State Disaster Management Plan (ASDMP), first prepared by Assam State Disaster Management Authority (ASDMA) in 2014. The process of revision was initiated in February 2020, which experienced multiple disruptions due to the outbreak of COVID-19 pandemic and related lockdown in the following months to begin with, followed by other factors over 2020-22 including assembly elections held in 2021 just before the second wave of the pandemic during April-June 2021. This period of over more than two years also witnessed massive floods, landslides and fire in the oil rig at Tinsukia in the state, culminating in the widespread damage and loss caused due to floods of June-July 2022.

Floods, landslides, fire and the pandemic, all over a period of two years, clearly underline the fact that the state of Assam is prone to multiple hazards and disaster related emergencies. This obviously calls for a strategic and robust planning exercise at the state level that can address the existing and future disaster challenges in a concerted and effective manner across multiple hazards that the state of Assam faces and is likely to face in future. Public health emergency, triggered by an unprecedented event such as COVID pandemic, has emerged as a major area of concern that needs to be addressed upfront, which was not so very prominent, when the original planning exercise was undertaken in 2014, as also in some subsequent revisions since then.

Moreover, since the original preparation of the ASDMP in 2014, National Disaster Management Plan (NDMP) was prepared in 2016 and further updated in 2019, following India's commitment to three major global goals, framework and agreement, namely: Sustainable Development Goals (SDGs) 2015; Sendai Framework for Disaster Risk Reduction (SFDRR) 2015; and COP21 Paris Agreement on Climate Change, 2015.

This forms the larger backdrop against which the revision and updation exercise of ASDMP was undertaken and accomplished during 2020-22. One of the major challenges of this revision exercise has been to strike the right balance in the conceptual and practical dimensions of the disaster management planning and action at the state level and to do so in a manner that makes the plan more user friendly for its end users, mainly the ASDMA and various line departments of the State Government of Assam. However, the districts are also encouraged to refer to this state plan in the process of preparing and/or revising their district disaster management plans (DDMPs) at the local level.

1.2 Process and method

The process of revising and updating the State Disaster Management (DM) Plan of Assam entailed the two main methods of comprehensive data and literature review and consultations with the concerned government departments. The revised draft of the Plan was presented to all the concerned stakeholders

at ASDMA and at the state level in March 2021 and April 2022 and their comments and feedback were elicited and referred to before finalizing the Plan in July 2022.

As per the mandate of the DM Act 2005, this SDMP assigns specific and general responsibilities to all departments of the State for disaster management. The DM Act enjoins the SDMP to assign necessary roles and responsibilities to various departments for measures to be adopted for prevention and mitigation of disasters; the manner in which the mitigation measures shall be integrated with the development plans and projects; and the capacity building and preparedness measures to be undertaken for responding to any threatening disaster situation or disaster.

Therefore, it is incumbent on all the departments to accept all the implicit and explicit responsibilities mentioned in the SDMP, even if they are beyond what are explicitly within the normal rules of business. Disaster management requires assumption of responsibilities beyond the normal functioning of a department of the state. 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 of Assam.

1.3 Main Pillars of SDMP

In order to make sure that ASDMP is in line with the national policy, plan and priorities both in its design and implementation strategy, it is built on sturdy pillars that can hold it firm and make it functional over the envisaged plan period of 5-10 years, with annual review and revision of the plan in response to changing realities and emerging challenges across years.

The main pillars of the Assam State Disaster Management Plan are as under:

i. Disaster Management Act (2005), National Policy on Disaster Management (NPDM 2009), and National Disaster Management Plan (NDMP 2019)

ii. Prime Minister's 10 Point Agenda

iii. Participating proactively to realizing the global goals as per agreements to which India is signatory—Sendai Framework for Disaster Risk Reduction DRR (SFDRR), Sustainable Development Goals (SDGs) and Conference of Parties (COP21) Paris Agreement on Climate Change.

iv. Social Inclusion as a cross-cutting issue, and

v. Mainstreaming DRR into all streams of development

The State plan has been prepared to be responsive to the national commitments in the domain of Disaster Risk Management (DRM) in general and to the three major post- 2015 global frameworks and the PM's Ten Point Agenda in particular.

The 10-point agenda for Disaster Risk Reduction enunciated by the Prime Minister at the Asian Ministerial Conference on DRR at New Delhi in November, 2016 includes the following:

i. All development sectors must imbibe the principles of disaster risk management.

ii. Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states.

iii. Women's leadership and greater involvement should be central to disaster risk management.

iv. Invest in risk mapping globally to improve global understanding of nature and disaster risks.

v. Leverage technology to enhance the efficiency of disaster risk management efforts.

vi. Develop a network of universities to work on disaster-related issues.

vii. Utilize the opportunities provided by social media and mobile technologies for disaster risk reduction.

viii. Build on local capacity and initiative to enhance disaster risk reduction.

ix. Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster.

x. Bring about greater cohesion in international response to disasters.

These 10 points of the Prime Minister's Agenda for Disaster Risk Reduction have been clearly elaborated in the recent version of National Disaster Management Plan, 2019 and inform the overall design and framework of the ASDMP 2022.The Prime Minister's 10 point agenda for DRR also subsumes the national priorities as expressed through the Disaster Management Act, 2005 and the National Policy on Disaster Management as also the salient concerns articulated through three global frameworks of 2015; SFDRR, SDGs and COP 21.

1.4 Design and Structure of the Plan

In line with the provisions of Section 23 of the Disaster Management Act 2005 and Section 5 (State Plan) of Assam State Disaster Management Rules 2010, the State Plan is prepared by the State Executive Committee and approved by the State Authority.

Assam State Disaster Management Plan (SDMP) provides an over-arching planning framework for Disaster Management for Assam which would need to be reviewed and updated periodically as indicated above. As per the Disaster Management Act 2005 (DM Act,2005), disaster management means a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for prevention of danger or threat of any disaster; mitigation or reduction of risk of any disaster or its severity or consequences; capacity-building; preparedness to deal with any disaster; prompt response to any threatening disaster situation or disaster; assessing the severity or magnitude of effects of any disaster; evacuation, rescue and relief; and rehabilitation and reconstruction.

The State Plan provides a framework and direction to the Government agencies for all phases of disaster management cycle. The ASDMP is intended to be a 'dynamic document' that needs to evolve with time to address the emerging disaster risks stemming from ever changing nature of hazards, risks,

vulnerabilities and capacities of the institutions and communities in order to make development resilient and sustainable.

The revision of the planning process has been attuned to 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, as embodied in current global goals and frameworks.

The original State Disaster Management Plan (SDMP) document of 2014 and their subsequent revised versions have been reviewed and substantially restructured. The revised ASDMP is now available in two volumes: Volume 1 is essentially in the form of a Perspective Plan with a time horizon of 8 years (2022-2030) in view; Volume II is in the form of a Strategic Action Plan, which can be quickly referred to by its intended users at various levels in the state for initiating the required action.

The vision, mission, aim, objectives and scope of the ASDMP as inherent in these two volumes are as follows.

1.5 Vision

Make Assam a disaster resilient State (resulting in: substantial and inclusive disaster risk reduction; reduction in loss of lives and livelihoods; increased protection of property and assets; and enhanced capacity to cope with disasters).

1.6 Mission

Create disaster resilient institutions and communities by "supporting people and communities to protect themselves from disasters, and substantially reduce disaster risks and losses to lives, livelihoods and health at the local level and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities."

1.7 Aim

The **aim of ASDMP 2022 is to realize its vision and mission** by pursuing some well-defined objectives as described in the paragraph 1.8. It is envisaged that this would entail **guiding the multi-hazard risk reduction and management of disaster risk in development processes at all the levels and across all the sectors in Government of Assam.** It seeks to strengthen DRR in Assam and its integration into policies of the Government of Assam as per the DRR Roadmap approved by ASDMA.

1.8 Objectives

In view of the agreed vision, mission and aim of the SDMP, its five broad objectives and the related sub-objectives are articulated as under:

i. **Improve the understanding of disaster risks, hazards, and vulnerabilities.**
- Design and undertake studies for understanding the multiple hazards and disaster risks in the state and their underlying dynamics, especially in the context of changing climate and its impact on forests, environment and river systems in general and newly emerging public health emergencies, such as in the wake of on-going COVID-19 pandemic in the country and in the state in particular
- Promote comprehensive surveys on multi-hazard disaster risks and development of regional disaster risk assessments and maps, including climate change scenarios.
- Design and carry out safety audits for all the major development initiatives and interventions being designed and undertaken in the state.

ii. **Strengthen disaster risk governance at all levels from local to the state level.**
- Promote the culture of disaster risk prevention and mitigation at all levels.
- Provide clarity on roles and responsibilities of various Departments and Officers involved in different aspects of disaster management.
- Enhance resilience to existing and emerging risks by preventing the emergence of new disaster risks and reducing the existing risks.
- Facilitate the mainstreaming of disaster management concerns into the developmental planning and processes.
- Ensure that DRM is socially inclusive, gender sensitive and empowering.

iii. **Invest in disaster risk reduction for resilience**
- Make upfront investment in disaster risk reduction (DRR) initiatives aimed at preventing disasters and achieving substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental).
- Promote the implementation of integrated and inclusive economic, structural, legal, social, cultural, educational, environmental, technological, political and institutional measures to prevent and reduce hazard exposure and vulnerabilities to disaster.
- Empower both local authorities and communities as partners to reduce and manage disaster risks.
- Strengthen scientific and technical capabilities in all aspects of disaster management.
- Capacity development at all levels for effective response to multiple hazards and for community-based risk reduction and resilience building.
- Build and strengthen the resilience of poor communities to prevent disasters from aggravating poverty and to protect livelihoods.
- Enhance mainstreaming of disaster risk reduction and climate adaptation strategies within the agriculture sector including sustainable farming.
- Enhance resilience of health systems by integrating DRM into all levels of healthcare.
- Promote disaster-resilient schools, colleges and other educational facilities.

- Special focus on disaster risk reduction measures for agriculture and livestock.
- Strengthen efforts to mainstream DRR into water management and reduce the likely impacts of water-related hazards.
- Strengthen and promote the resilience of new and existing critical infrastructure.
- Integration of disaster risk reduction considerations and measures into financial and fiscal instruments.
- Mainstream DRR into land-use and design and implementation of (rural and urban) development programmes and projects.

iv. **Enhance disaster preparedness for effective response.**

- Strengthen disaster risk modeling, assessment, mapping, monitoring and multi-hazard early warning systems.
- Implementation of ecosystem-based approaches regarding shared resources, such as within river basins and mountainous regions.
- Effective use of science, technology and traditional knowledge in all aspects of DRM.

v. **Promote "Build Back Better" in recovery, rehabilitation and reconstruction.**

- Build community capacity to function as disaster managers during recovery, rehabilitation and reconstruction.
- Promote women's leadership and active participation in disaster management planning and action at the local level.

1.9 Scope

In pursuance of the provisions of the sub-section (4) of section 23 of the Disaster Management Act 2005, the plan shall include—

(1) The vulnerability of different parts of the State to different forms of disasters;
(2) The measures to be adopted for prevention and mitigation of disasters;
(3) The manner in which the mitigation measures shall be integrated with the development plans and projects;
(4) The capacity-building and preparedness measures to be taken;
(5) The roles and responsibilities of each department of the Government of the State in relation to the measures specified in clauses (2), (3) and (4) above;
(6) The roles and responsibilities of different Departments of the Government of the State in responding to any threatening disaster situation or disaster.

Based on the above salient objectives of the State Disaster Management Plan in line with the Disaster Management Act, 2005, and the National Disaster Management Plan, the scope of the SDMP may be articulated as below:

i. Strengthening coherence and integration between DRR, Climate Change Adaptation (CCA) and mitigation, ecosystem management, and other development imperatives to contribute to the implementation and achievement of the goals and aspirations of the nationally and locally (at the

state level) identified Sustainable Development Goals (SDGs), the goals agreed under the Paris Agreement and other development related goals and targets set by the Government of Assam.

ii. Strengthening long-term capacities, including coordination mechanisms, at state and district levels, among departments and all other relevant agencies/institutions to support the implementation of the SDMP and to systematically contribute to building resilience to disasters, with special focus on the most vulnerable groups in the state.

iii. Strengthening mechanisms, frameworks and capacities at state, district and ULB/GP levels for mainstreaming, implementing and coordinating disaster risk reduction strategies and programmes that also address risk drivers, such as poverty, public health, climate change and variability, poorly managed urbanization, conflict and migration, environmental degradation.

iv. Embedding a holistic approach to systematically incorporate risk reduction measures into design and implementation of disaster preparedness, response and recovery programmes.

v. Developing practical tools and mobilizing resources to contribute to the implementation of disaster risk reduction (DRR) programmes and projects.

The State Government shall make the appropriate provisions for financing the plan implementation on an annual basis. The disaster management, covering the prevention, preparedness, response, and recovery, necessarily involves multiple agencies. Hence, the inter-agency coordination and collaboration among stakeholders will be of utmost importance for the successful implementation of the SDMP and in ensuring the effective disaster risk reduction, response and recovery.

As mentioned earlier, the Assam State Disaster Management Authority is in the process of preparing a DRR Roadmap. As per the available draft, 'the roadmap is categorised into seven thematic groups which includes resilience of the social service sector and infrastructure, critical infrastructure, cities and towns, livelihoods, emergency response systems, recovery mechanisms and enabling environment towards achieving shared results. These thematic groups are aligned to four major priorities which focus on understanding risks, strengthening of risk governance apparatus, investment for resilience and enhancement of preparedness for response and recovery. These alignments are guided by some pertinent principles such as building on existing governance system, integrated all hazards approach; multi-stakeholder orientation to DRR outcomes, coherence & convergence, equity& Inclusion, resilient development and the principle of no harm.

1.10 Guiding Principles

The guiding principles for the preparation and implementation of ASDMP 2022 are as follows:

1. Integrating Sendai Framework, SDG and Paris Agreement to SDMP

The adoption in 2015 of three landmark global agreements - the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs) and COP21 Paris Agreement on Climate Change, to which India is a signatory, have opened up significant opportunities to build coherence across the DRR, sustainable development and response to the climate change domains. The adoption of agenda of Sustainable Development Goals (SDGs) 'Transforming Our World' is a global transformative plan of action that has poverty eradication as an overarching aim.

2. Resilience-building

It is at the heart of the National Disaster Management Plan (NDMP) and therefore, it is important not only for the Government of Assam and partner organizations but also for all the stakeholders working in Assam, to ensure mainstreaming and integration of disaster risk reduction and resilience in all sectors and also to ensure vertical and horizontal coordination across various policies and programmes. NDMP puts special emphasis on Local Actions. The practical application of coherence of the multiple international frameworks is particularly relevant at the level of local implementation in collaboration with the capacity of local authorities, local systems and communities to understand, prevent and reduce disaster risk, and prepare for and recover from disasters. These aspects will be further strengthened at the local level. The Assam SDMP is intended to empower the local authorities and local communities, through appropriate resources, incentives and decision-making responsibilities, as appropriate for supporting local leadership.

3. Enable others to take action (Shared Responsibility)

The state and its institutions cannot act alone to manage risk. It is important to work together with all identified relevant stakeholders and across sectors at the central and sub-national levels, in order to realize the most effective risk informed disaster preparedness and response, as appropriate.

4. Gender equity and inclusiveness

Assam appreciates the preamble of NPDM 2009 which inter alia states that in disasters, the vulnerable groups, elderly persons, women, children - especially women rendered destitute and children orphaned on account of disasters and the differently-abled persons are exposed to higher risks.

The ASDMP emphasizes social inclusion, dignity of the individual, acknowledging diversity, and contributing to resilience for everyone, not leaving aside the members of a community, on the basis of age, gender, disability etc.

5. “Leave no one behind”

‘Leave No One Behind’ is the cornerstone of the 2030 Agenda for Sustainable Development. This constitutes the core guiding principle of Assam State Disaster Management Plan as well. ASDMP is focused on a people-centered approach and is based on this explicit recognition that it is critical to engage with the most vulnerable for ensuring risk-informed development and disaster management.

6. Coordination

Orderly coordination of disaster preparedness within and across sectors at all levels, with clear mechanisms at each level and across levels, as well as across organizations.

7. Sustainable Development

Planning and management of disaster preparedness actions in coherence, across relevant sectors such as agriculture, education, health, housing and urban development, among others. Disaster preparedness forms part of wider disaster risk reduction as it allows people, communities and institutions to take pre-emptive action and respond effectively to reduce the impact of disasters, while contributing to sustainable development.

1.11 Time Frames: Short, Medium and Long-term

In view of the differential needs of various departments in general and of ASDMA in particular, activities have been conceived and planned in terms of short term, medium term and long-term time frames. The reference to 'Short', 'Medium' and 'Long' are the timeframes required for completion of different activities planned and do not signify any order of priority, as such. The time frames for short term actions may be 0-2 years; for medium term actions, it may be 2-4 years and for long term actions it is 4-8 years or more. These actions are agreed in view of the existing needs and are subject to changes depending on many factors including changing needs, advances in technology etc. Some of the actions envisaged could be shifted from a longer time frame to a shorter one, if required. However, all out efforts are needed to ensure that those under smaller time frames are not taking additional time for completion.

While some of the suggested measures in all categories – short, medium, and long-term – are already under the implementation or in need of up gradation, many need to be initiated afresh. The timeframes short, medium and long, do not mean that these are necessarily sequential in all cases. In fact, in many cases, they may be over-lapping, 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.

1.12 Plan Implementation

Section 23 of the DM Act 2005 enjoins that the State Government is responsible for implementation of State Disaster Management Plan. Accordingly, the Departments of Government of Assam have been developing and updating their DM Plan as per the needs and priorities identified during the course of implementation. They are encouraged to adopt a holistic approach and build multi-stakeholder partnerships at all levels, as appropriate, for the implementation of the DM plans.

The SDMP is not a department centric Plan. It is the overall State Plan that will be financed from the State budget through various Departments and Government agencies contributing to the overall planning agenda and priorities. The centrally allocated finances are limited to National Disaster Response Fund and State Disaster Response Fund meant for immediate relief and emergency response after a disaster. Since DRR mainstreaming is an integral part of the main plans of Centre, Central ministries, States/UTs and State/UT-level agencies, there cannot be a separate financial allocation for it.

This is an ambitious and aspirational plan whose total implementation, as intended, is likely to be challenging in various ways and at various levels. However, it must be underlined here that both the ASDMA and Departments have already made considerable progress since the preparation of the first ASDMP in 2014 and are committed to making sincere efforts for the implementation of ASDMP 2022, along with respective Departmental Disaster Management (DDM) plans, already in place, or being prepared**.**

CHAPTER 2: COHERENCE AND MUTUAL REINFORCEMENT OF POST-2015 GLOBAL FRAMEWORKS FOR DRR

2.1 Background

The State of Assam has been keenly aware and responsive to India's global commitments. As a result, Assam was the first state in India to adopt Sustainable Development Goals (SDGs), in the form of Agenda 2030, which lays down the road map for achieving the SDGs for the state. This Plan seeks to ensure perfect coherence and mutual reinforcement with Agenda 2030, as also with Assam State Action Plan on Climate Change (SAPCC) 2015-30, and DRR Roadmap 2021-30 as essential components of ASDMP 2022. Specific emphasis is on the resilience-building measures, and a shift away from managing crises to proactively reducing their risks. The agreements have varying degrees of emphasis on the sustainable development, DRR, resilience and climate change.

The key principles followed while developing the Assam SAPCC and Agenda 2030 are as follows:

i. **Ensuring sustainability of water resources**
   Water being essential to all economic activities, the SAPCC looks at how water resources can be augmented and best utilized in a changing climate scenario and what necessary institutional changes will be required to make these strategies come into effect.
ii. **Ensuring sustainability of agriculture systems**
   Major concerns are sustainability of critical ecosystems including agro-ecosystems (agriculture, fishery, and livestock) to ensure livelihood security in a changing climate scenario.
iii. **Protection and conservation of forests and bio-resource within**
   Focus areas are sustainable management of forest, wild life and biodiversity and developing resilience of eco-system services.
iv. **Making habitats climate resilient**
   Major concern is the expanding and high-density urban human settlements were providing sanitation, drinking water, transportation, health, waste management and other amenities will be a challenge in the future as per the changing climate scenario.
v. **Ensuring energy sufficiency and efficiency**
   Major concerns will be technological initiations and intervention with more focus on harnessing new and renewable energy, energy efficiency and conservation.
vi. **Addressing enhanced impacts of anticipated extreme events**
   Adaptation planning in anticipation of intensification of extreme events to ameliorate the exacerbated impacts will be the underlying motto here.

2.2 Approach to Coherence and Mutual Reinforcement

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

The 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.

Assam's initiatives relevant for DRR across the three Global Frameworks are summarized in Table1.

TABLE 1: State Initiatives Relevant for DRR across the three Global Frameworks.[1]

S.N.	Sendai (SFDRR) Global Targets	Sustainable Development Goals[2] (SDGs)	COP21 – Paris Agreement on Climate Change[3]	Assam's 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 disasters 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**

[1] National Disaster Management Plan 2019

[2] For details see SDG at https://www.globalgoals.org/

[3] For details see COP21 at https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement

				DRM at all levels. Promoting disaster-resilient development. **Mainstreaming DRM and adaptation to GACC in development.**
3	Substantially reduce direct disaster economic loss	SDG 1, 11	The Paris Agreement aims to hold global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C, recognizing that this would significantly reduce the risks and impacts of climate change.	**State commitment to DRM as per the PM Ten Point Agenda** **State commitments for mitigation of and adaptation to GACC as per Intended Nationally Determined Contributions (INDC).**
4	Substantially reduce damage to critical infrastructure and disruption of basic services (health, education, etc.)	SDG 1, 4, 9, 11,	Global adaptation of goals for enhancing adaptive capacity, strengthening resilience and reducing vulnerability to ensure adequate adaptation response in the context of the global temperature goal.	**Enhance the resilience of State health systems by integrating DRM into primary, secondary and tertiary health care, and by promoting and enhancing training capacities in the field of disaster medicine.**
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.	**SAPCC for mitigation and adaptation to GACC as per:** **a) National Mission on Sustainable Agriculture (NMSA).** **b) 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	**State as a pro-active member in the implementation of the post-2015 and other global frameworks**
7	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments	SDG 3, 13	Emphasis on improving early warning systems, risk assessment and management.	**States investments to improve the early warning and information systems in different sectors and for multi-hazards.**

The Government of Assam has adopted a series of consultative processes while developing and adopting the SDMP, SAPCC and Agenda 2030 for the state. However, for strengthening coherence and synergy of state level actions across these interventions in correspondence to SDMP, SAPAC and Agenda 2030, the following measures will be taken into consideration[4] which would facilitate achievement of set goals and targets for the state:

- Raising awareness at the state and district level, on how the different frameworks align, is critical; the relative political weight of frameworks may affect collaboration and coherence.
- Facilitating key partnerships among departments which help avoid duplication and maximize gains. Institutional incentives to work together may also be required to reinforce joint working across agreements.
- Instituting clear governance arrangements to ensure successful collective action and accountability.
- Promoting the science and technology involvement by funding the national / state level research projects. The Sendai framework specifically calls for enhanced scientific work in disaster risk reduction and a better coordination of existing networks and scientific research institutions.
- Exclusive monitoring processes which would track progress on implementation of the frameworks. This will also help minimize the reporting burden on countries, making data collection achievable.
- Ensuring State ownership and leadership, addressing all of these frameworks will also be fundamental to success.

[4] The United Nations General Assembly endorsed the Report of the Open-ended Intergovernmental Expert Working Group (OIEWG) on Indicators and Terminology Related to Disaster Risk Reduction and the recommendations for indicators and terminology relating to disaster risk reduction (UNISDR 2017)

It is envisaged that this SDMP of Assam will facilitate the efforts to achieve the desired coherence across different global goals and frameworks at the local level in the state, integrating it with the national priorities articulated through the Disaster Management Act, 2005; National Policy on Disaster Management, National Disaster Management Plan, 2019 and the Prime Minister's 10-Point agenda for disaster risk reduction.

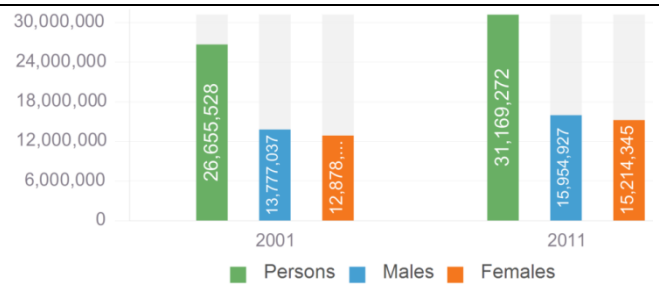
CHAPTER 3: STATE PROFILE

The State of Assam, popularly known as the land of the red river and blue hills is the gateway to the North East India. Geographically the state extends from 22°19' to 28°16' North Latitude and 89°42' to 96°30' East Longitude between the foot hills of the Eastern Himalayas and the Patkai and Naga Hill Ranges. The state is bordered in the North by Bhutan and in the East by Arunachal Pradesh. Along the south lie Nagaland, Manipur and Mizoram. Meghalaya lies to the Southwest, West Bengal and Bangladesh to the West. The State is divided into 35 administrative districts.

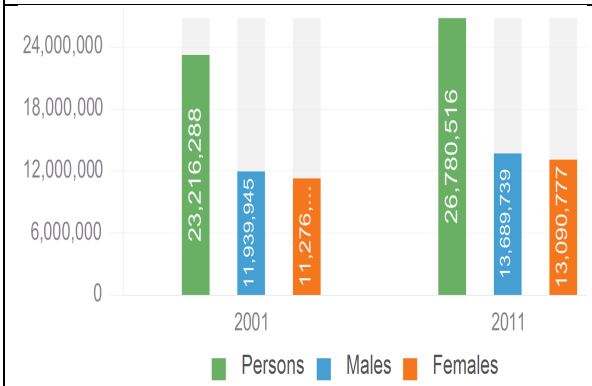
3.1 Demography

Total population of Assam is 31.17 million (2011 Census). Population grew steadily from 3.29 million in 1901 to 6.70 million in 1941, while it has increased unprecedentedly to 14.63 million in 1971, 22.41 million in 1991, and 26.66 million in 2001 to reach the present level. Population Density stands as 398/km2 and Literacy rate is 72.19%. (As per the Statistical Handbook of Assam, 2018).

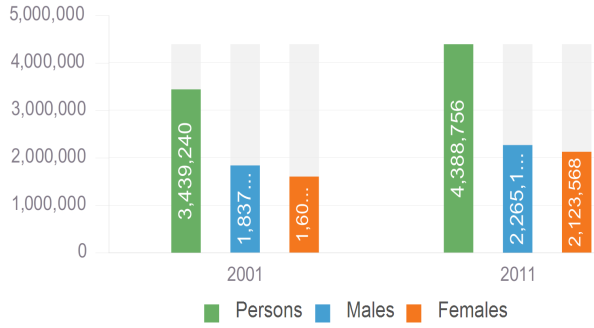
Figure A: Population Size (Total)



Population Size (Rural)



Population Size (Urban)



Source: Census of India (http://censusindia.gov.in/2011census/censusinfodashboard/index.html)

Figure B: District wise details of State in respect of villages, population, sex ratio, literacy, housing

Sl. No.	Districts	No. of villages	Population (%)		Sex Ratio	Distribution of Population (%)		Pop^{n}. Density	Literacy Rate	No. of Kutcha Houses #	No. of Pucca Houses #	Total No. of Pucca & Kutcha Houses #
			Male	Female		Urban	Rural					
1	Kokrajhar	1068	51.05	48.95	959	6.19	93.81	269	65.22	136000	36145	172145
2	Dhubri	1091	51.19	48.81	953	10.45	89.55	896	58.34	299855	85053	384908
3	South Salmara*											
4	Goalpara	829	50.91	49.09	964	13.69	86.31	553	67.37	146624	40604	187228
5	Barpeta	835	51.19	48.81	953	8.70	91.30	742	63.81	251332	69635	320967
6	Morigaon	632	50.83	49.17	967	7.66	92.34	617	68.03	142989	39995	182984
7	Nagaon	1412	50.96	49.04	962	13.09	86.91	711	72.37	374661	120866	495527
8	Hojai*											
9	Sonitpur	1876	51.14	48.86	956	9.04	90.96	370	67.34	251122	98539	349661
10	Biswanath*											
11	Lakhimpur	1184	50.83	49.17	968	8.76	91.24	458	77.20	149279	37539	186818
12	Dhemaji	1319	51.19	48.81	953	7.04	92.96	212	72.70	113883	14896	128779
13	Tinsukia	1168	51.22	48.78	952	19.94	80.06	350	69.66	148609	72427	221036
14	Dibrugarh	1348	51.00	49.00	961	18.38	81.62	392	76.05	164899	77334	242233
15	Sivasagar	875	51.19	48.81	954	9.56	90.44	431	80.41	157050	66999	224049
16	Charaideo											
17	Jorhat	848	50.98	49.02	962	20.19	79.81	383	82.15	141957	63658	205615
18	Majuli*											
19	Golaghat	1125	50.91	49.09	964	9.16	90.84	305	77.43	173805	34509	208314
20	Karbi Anglong	2921	51.26	48.74	951	11.81	88.19	92	69.25	142125	11425	153550
21	West Karbi Anglong*											
22	Dima Hasao	695	51.75	48.25	932	29.19	70.81	44	77.54	28245	2737	30982
23	Cachar	1040	51.04	48.96	959	18.17	81.83	459	79.34	236414	86708	323122
24	Karimganj	936	50.94	49.06	963	8.93	91.07	679	78.22	146623	78403	225026
25	Hailakandi	331	51.25	48.75	951	7.30	92.70	497	74.33	100733	31064	131797
26	Bongaigaon	563	50.87	49.13	966	14.86	85.14	676	69.74	106181	28780	134961
27	Chirang	508	50.78	49.22	969	7.33	92.67	251	63.55	76808	14434	91242
28	Kamrup	1068	51.30	48.70	949	9.38	90.62	489	75.55	205285	97566	302851
29	Kamrup-M	216	51.64	48.36	936	82.70	17.30	1313	88.71	33024	24771	57795
30	Nalbari	456	51.32	48.68	949	10.72	89.28	733	78.63	106938	45799	152737
31	Baksa	690	50.66	49.34	974	1.29	98.71	387	69.25	171274	23756	195030
32	Darrang	561	51.19	48.81	954	5.98	94.02	586	63.08	146415	38462	184877
33	Udalguri	800	50.70	49.30	973	4.52	95.48	413	65.41	120912	39518	160430
Total		**26395**	**51.08**	**48.92**	**958**	**14.10**	**85.90**	**398**	**72.19**			

*Newly bifurcated Six (6) districts

(Source: Statistical Handbook Assam-2018)

(# Source: Socio Economic and Caste Census, 2011)

Source: Statistical Handbook Assam-2018

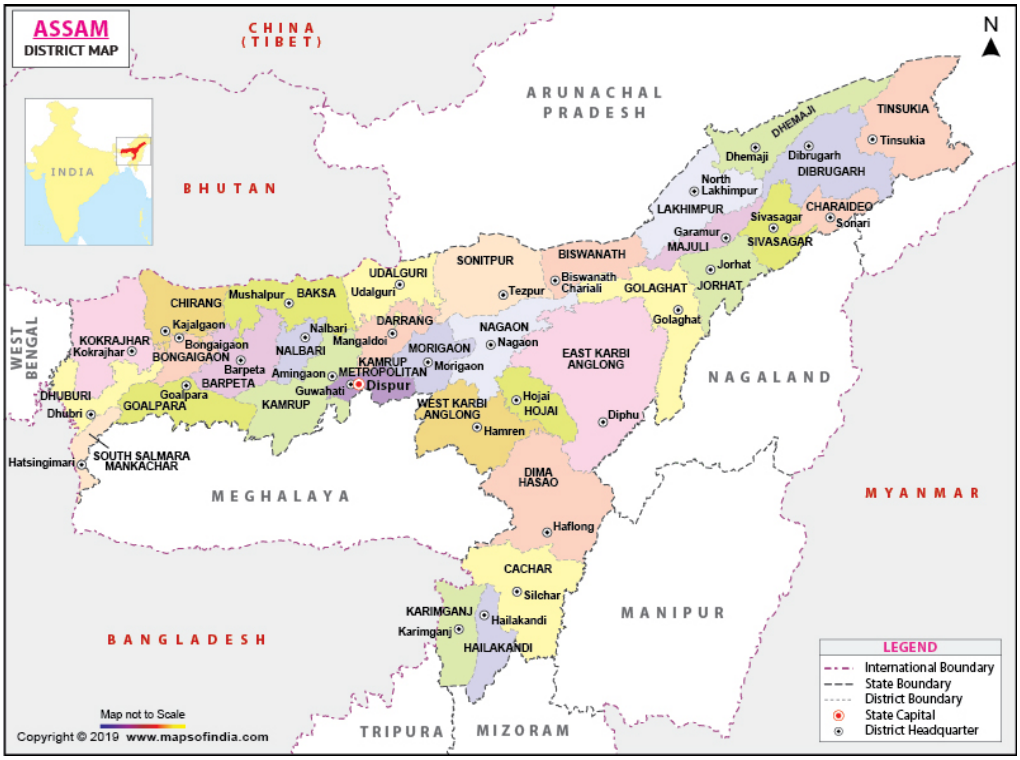
(Note:Bajali carved out of Barpeta district was established on 12th January 2021 as the 34th District and population of 2,53,876) and Tamulpur is the 35th district carved out of Baksa district on 23rd January 2022.(Population of 3,89,150) Being the new districts, dissegregated population and habitation data of Bajali and Tamulpur is yet to be officially notified.

3.2 Administrative Profile

The State of Assam has 5 Administrative Divisions and 35 administrative districts

Name of Division	Division Headquarter	Districts under Jurisdiction
North Assam	Tezpur	Udalguri, Darrang, Sonitpur, Biswanath, Lakhimpur, Dhemaji
Lower Assam	Panbazar, Guwahati	Dhubri, Kokrajhar, Bongaigaon, Goalpara, Baksa, Tamulpur, Chirang, Barpeta, Nalbari, Kamrup Rural, Kamrup Metro, South Salmara-Mankachar, Bajali
Central Assam	Nagaon	Dima Hasao, East KarbiAnglong, West KarbiAnglong, Nagaon, Morigaon, Hojai
Upper Assam	Jorhat	Dibrugarh, Tinsukia, Sibsagar, Jorhat, Golaghat, Charaideo, Majuli
Barrak Velley	Silchar	Cachar, Hailakandi, Karimganj

Figure C: Administrative Divisions



Source: Census of India 2011

3.3 Economy

i. Agriculture

The economy of Assam continues to be predominantly agrarian. The contribution of Agriculture sector to the State Domestic Product was more than 19.34 per cent during 2016-17. The chief agricultural products of the state are varieties of rice, tea, jute, mustard, pulses, sugarcane, potatoes, oranges, pineapples, coconut, areca nut, black pepper, citrus fruits, banana, papaya, turmeric, spices, flowers, medicinal & aromatic plants, besides many types of vegetables thus contributing significantly towards food and nutritional security of the State.

ii. Fishery

There are about 2.86 lakh hectare of water area in the State in the form of rivers, beel (Lake like wetland with static water), derelict water bodies and ponds and tanks. There is a positive trend in fish productivity during recent past. During the year 2016-17, the fish production has reached to 3.07 lakh metric tons against 2.06 lakh metric tons fish produced in 2008-09.

iii. Livestock and Veterinary

As per Livestock Census 2012, the number of Indigenous Cattle populations is 99, 11,702 and Crossbreed Cattle are 3, 95,902 in the State. The AH & V Department has also published the estimated figure of Fowl and Duck as 18,718,209 and 730,042 respectively during the same year. The milk production in the State during 2016-17 was estimated at 904 million liters. The egg and meat production were estimated at 477 million and 47000 M.T. respectively during the same period. *(Source: Directorate of Animal Husbandry & Veterinary Department, Assam).*

iv. Industry

The Industrial scenario of the State is mainly confined within the growth of employment oriented Small-Scale Sector, which comprises of manufacturing and processing industries. The contribution of manufacturing sector to Gross State Domestic Product is quite significant (estimated at around 9.32% in recent years). There are 20 Industrial Estates, 8 Mini Industrial Estates, 20 Industrial Areas and 18 Growth Centers in the State where 800 Industrial units are functioning. One Export Promotion Industrial Park (EPIP) has also been established with world class infrastructure at Amingaon in Kamrup (Rural) district, where 44 industrial units are producing export quality products of various kinds. In addition, 11 Industrial Infrastructure Development (IID) Centre in different districts and 3 Industrial Growth Centre, one Food Park at Chaygaon in Kamrup District and one North East Mega Food Park at Nalbari District have been established. The Department has established 3 (three) Industrial Growth centre (under a centrally sponsored project) at Balipara (Chariduar), Matia and Chaygaon. *(Source: Directorate of Economics and Statistics, Government of Assam).*

In the North-East, the State of Assam is the main hub of industries and commercial activities. In Assam, there are 4 Refineries producing petroleum, oil & gas products, 27 Major Accident Hazard (MAH) based chemical industrial Units spreading across 10 Districts, 110 Large Industries, 102 Medium Industries, 41,777 MSME Industries, and 50 number of Industrial Estate/Areas in Assam.

The Tea Industry of Assam, which is about 170 years old, plays a vital role in the State as well as in the national economy. The Assam's Tea industry also possesses a significant reputation in the global economy. The total area under tea cultivation accounts for more than half of the country's total area

under tea and the Tea Industry of Assam provides average daily employment to more than 6.86 lakh persons in the State, which is around 60 percent of the total average daily number of labour employed [on an average 11.1 lakh labour employed per day in the country] under Tea Industry. Assam has witnessed a spurt in the growth of small holdings during the last three decades and there are more than 1.0 lakh small holdings accounting for 200 million kgs of tea. The tea production in Assam constitutes more than 50 percent of the total production of the country. (Source: Directorate of Economics and Statistics, Government of Assam).

Among the plantation crops, rubber cultivation is also gaining its popularity in the State due to congenial agro climate as well as its eco-friendly activities. Assam has ample scope for bamboo based industry like paper manufacturing industry, since this region has highest concentration of bamboo i,e, around 60% of the total Bamboo of the country. Under the National Bamboo Mission, it is proposed for plantation of selected species of Bamboo in the State, in an area of 176000 Hectare, as a raw material for bamboo-based industry.

Sericulture, a major cottage industry of the State, is practiced in more than 9935 villages at present and provides employment to 3.19 lakh families in the State. The production of silk in the State was 3647.49 MT during the year 2016-17 which is 34.45 percent higher than the previous year. Assam has also achieved the right of "Geographical Indication" in Muga Silk. (Source: Directorate of Economics and Statistics, Government of Assam).

3.4 Geography

As per plate tectonics, Assam is in the eastern-most projection of the Indian Plate, where the plate is thrusting underneath Eurasian Plate, creating a subduction zone in Himalayas. Assam possesses a unique geomorphic environment, with plains, dissected hills of the South Indian Plateau system and with the Himalayas all around its north, north-east and east. Geomorphic studies conclude that the Brahmaputra, the life-line of Assam is an antecedent river, older than the Himalayas. The river with steep gorges and rapids in Arunachal Pradesh entering Assam, becomes a braided river (at times 16 km wide) and with tributaries, creates a flood plain (Brahmaputra Valley: 80–100 km wide, 1000 km long). The hills of Karbi Anglong, North Cachar and those in and around Guwahati (also Khasi-Garo Hills) now eroded and dissected are originally parts of the South Indian Plateau system. In the south, the Barak originating in the Barail Range (Assam-Nagaland border) flows through the Cachar district with a 40–50 km wide valley and enters Bangladesh with the name Surma. The State is one of the richest biodiversity zones in the world. Total Forest cover stands as 35.48% and consists of tropical rainforests, deciduous forests, riverine grasslands, bamboo, orchards and numerous wetland ecosystems. The state has 5 national parks, 13 wildlife sanctuaries and 2 bird sanctuaries (Official website, Government of Assam).

3.5 Physiographic Divisions

The evolution of the modern day topographic and physiographic architecture of Assam, leading to development of the mighty Brahmaputra Valley, the Central Assam range comprising of the Mikir and North Cachar (Barail) hills and the Barak Valley extending south-westward into alluvial plains of Bangladesh are due to the effect of several complicated cycles of geological events of the North East India.

The state has been broadly divided into the following physiographic domains:

i. **Brahmaputra valley**- The vast alluvial plains of Brahmaputra valley occupy most of the North Assam covering Goalpara, Kokrajhar, Dhubri, Kamrup, Nalbari, Barpeta, Nagaon, Darrang, Sonitpur, Sibsagar, Jorhat, Golaghat, Lakhimpur and Dibrugarh districts. The Brahmaputra valley is bounded by Arunachal Himalaya in the north and northeast, Patkai – Naga - Lushai range of Nagaland and the Shillong Plateau in the south and southeast. The Brahmaputra valley with an average elevation from 50 to 120 m above m.s.l. represents unique landscape comprising of an 800 km long and 130 km wide valley, the Karbi Anglong hills and Barail range comprising the North Cachar hills in the central part.

ii. **Central Assam Hills**-The Central Assam which essentially is a hilly terrain comprised of Mikir Hill in Karbi Anglong and North Cachar Hill districts.

iii. **Barak valley**- The hilly and alluvial terrain in the south covering the Cachar and Karimganj districts in the Barak valley.

3.6 Major River Systems

All the rivers in Assam are liable to floods, mainly because they receive heavy rainfall within a short time. These rivers are in their early stage of maturity and are very active agents of erosion. The river waters collect a tremendous amount of silt and other debris and raise the level of the river beds. Therefore, it becomes impossible for the main channel to cope with the vast volume of water received during the rains[5].

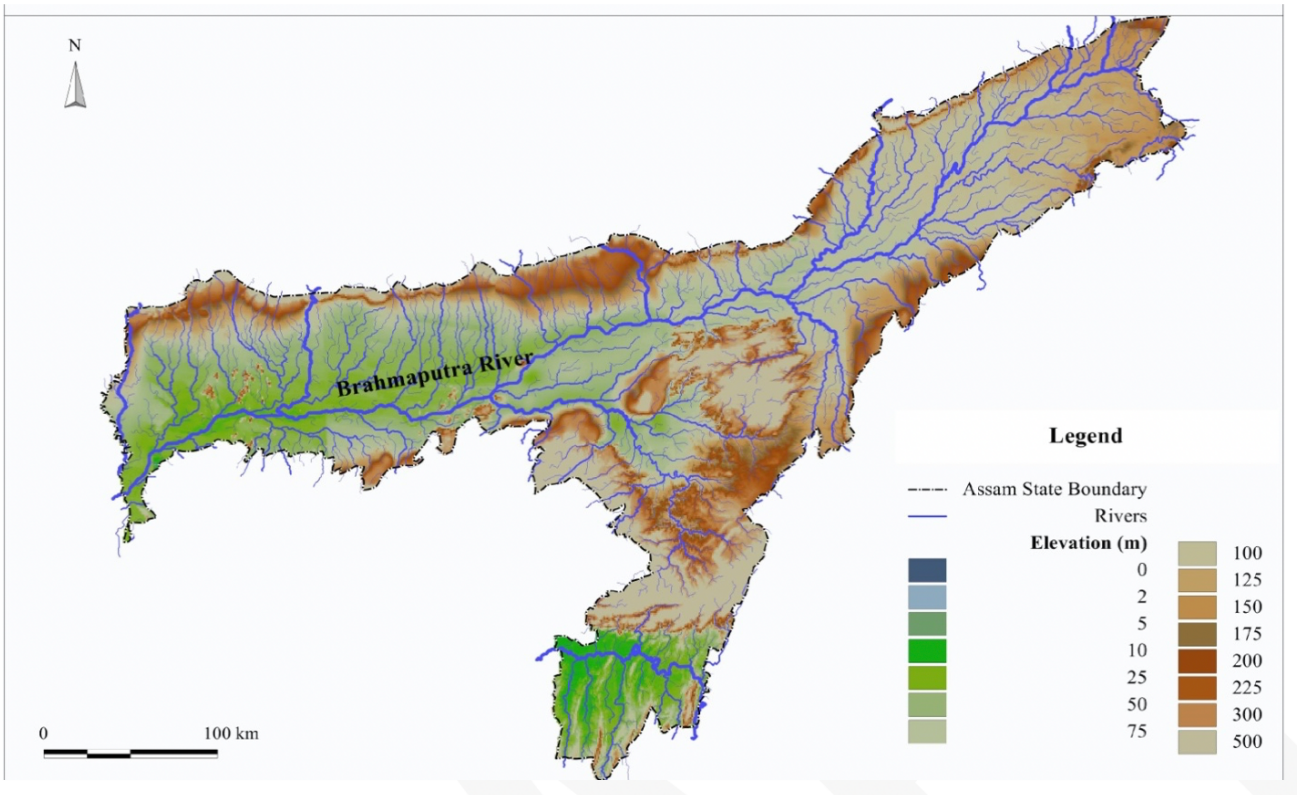
The Brahmaputra and the Barak are the two major river systems of the State. The Brahmaputra River originates at an elevation of about 5,000 m above mean sea level (AMSL) in Tibet. The Brahmaputra River, known as Tsang Po in Tibet, after a long eastward course of 1,600 km abruptly veers towards south around Namcha Barwa peak (7,710 m) in Eastern Himalaya. This southward course of the river flowing through Arunachal Pradesh is known as Siang River. It passes through tortuous course across the mountains of Arunachal Pradesh and then emerges on to the plains of Assam, where downstream

[5] *(State and Union Territories – Assam, http://www.webindia123.com/Assam/LAND/Rivers.htm).*

it is met by the Dihang, which is known as the largest tributary of the Brahmaputra, further fed by tributaries like Dibong, Sessiri, Lohit and Noa-Dihing around Saikhowaghat. The river known as Brahmaputra in Assam initially flows south-westward and thereafter towards west in the Brahmaputra Valley. Further down streams, the river swings towards south and passes on to the plains of Bangladesh. The Brahmaputra River between Namcha Barwa and the confluence with Dihang descend by about 2,200m and its water power resources have been estimated to be the third biggest in the world coming after Congo and Amazon basins. Along the northern bank, the Brahmaputra River is joined by the tributaries like Subansiri, Ranga Nadi, Dikrong, Gabharu, North Dhansiri, Pagladiya, Manas, Aie, Beki, Champamati, Gangadhar, and Raidak.

All these tributaries more or less flow in straight courses up to the junction of the main river. On the south bank tributaries like Burhi-Dihing, Disang, Dikhau, and South Dhansiri originate from Naga-Patkai Hills. The Kopili River originates from North Cachar Hills, while the Digaru, Bharalu, Kulsi, Singra, Dudnai and Krisnai originate from Meghalaya Plateau. Some of the rivers and tributaries originating from the south flow for quite a distance almost parallel to the Brahmaputra River before joining the main river. The often-changing meandering course of the Brahmaputra and its tributaries are not only due to lateral erosion because of the low gradient of the rivers but also due to periodic, local and sudden changes in the basement levels due to the tectonic activity (Geology and Mineral Resources of Assam, GSI, 2009).

Figure D: Major River Systems



Source: Geology and Mineral Resources of Assam, GSI, 2009

3.7 Geology

Assam has a diversified geological spectrum. It is located near the hairpin bend of the Himalayas. Hence, the extreme geostatic pressures exerted on the landmass during the creation of the Himalayas have resulted in Assam having large areas of sedimentary deposits. This leads to the huge amount of oil found in places like Digboi, Bongaigaon etc.

Cachar district of Assam is a huge storehouse of limestone. Limestone, which is basically Calcium Carbonate, is primarily a sedimentary rock which is used in a plethora of purposes namely construction, interior decoration etc. Karbi Anglong District and North Cachar hills have substantial reserves of coal. Of the four types of coal namely Peat, Lignite, Bituminous and Anthracite, the third type is readily available here.

Karbi Anglong is also rich in Kaolin (China Clay) deposits. Another district, Morigaon, contains extensive reserves of granite. The famous Dhubri district has an approximate reserve of more than ten million tons of Iron Ore. Of the four kinds of Iron ore, Haematite, Magnetite, Limonite and Siderite, the region is predominant in Haematite deposits. Not to be outdone, Nagaon district has got very high reserves of Glass Sand.

The geology of Assam depicts a rich repository of minerals with its diversified geographical structure. (Information collected from Geology of Assam – http://www.mapsofindia.com/assam/geography/geology-of-assam.html).

3.8 Climate

Assam experiences the predominant influence of the southwest tropical monsoon which is normally active from April to October with occasional winter showers. The approach of the monsoon is usually marked by strong winds, overcast skies accompanied by occasional thunder showers, hailstorms and at times by cyclones between April and May. Thunderstorms known as Bordoicila are frequent during the afternoons. Heavy downpour starts from June. The annual average rainfall of the state varies between 1600mm and 4300mm from place to place. The average rainfall for the state as a whole is about 2900mm with maximum precipitation during June and July. The average temperature in the state varies from 4°C to 19°C during the winter and 26°C to 37°C during the summer, accompanied by high humidity.

The unique geo-climatic, geographic and physiographic position of the state of Assam endows it with abundant forest, water, bio-diversity and natural resources. The mighty Brahmaputra and Barak rivers are the perennial sources of water and support the unique ecology and environment of the state. Geo-physically, the state is situated in seismic sensitive zone; the river systems, the mountain terrains and excess rainfall in the region make the state more vulnerable to frequent earthquakes, landslides, floods, forest fire and other natural hazards. With global warming and climate change, the frequency and magnitude of these hazard events are going to be increased impacting further the lives, livelihood and development of the state in the coming decades. In the following chapter, the hazard, risks and vulnerability profile of the state are dealt with in detail.

CHAPTER 4: HAZARDS, RISKS AND VULNERABILITIES

4.1 Introduction

This Chapter presents a macro profile of the hazards, risks and vulnerabilities of the State of Assam. It is envisaged that the micro assessment of the hazards and risks that the vulnerable communities face on the ground will be mapped out and included in the District Disaster Management Plans (DDMPs) and Disaster Management Plans (DMPs) prepared at the Gram Panchayat (GP)/village level.

Assam, due to its unique physiographic and climatic conditions, is one of the most disaster-prone areas in the country. The state of Assam is prone to multiple natural hazards such as earthquakes, floods, landslides, cyclones and occasional droughts.

The Disaster Management Act, 2005 does not specifically define hazard, risk or vulnerability though these find references in the body of the Act. The State Plan inter alia states that it shall include the vulnerability of different parts of the State to different forms of disasters.

4.2 Natural Hazards

A. Earthquakes

Assam falls within an earthquake prone zone (BIS Seismic Zone IV and V). The State of Assam has experienced several devastating earthquakes in the past resulting in a large number of deaths and severe property damage. Active seismicity of the North Eastern region has caused extensive landslides, rock falls on the hill slopes, subsidence and fissuring of ground in the valley, and changes in the course and configuration of river tributaries of Brahmaputra and Barak river systems. These changes, especially in river morphology have a significant impact on the hydrologic regime and vulnerability of the communities which are in its proximity and are dependent upon this natural system as their source of livelihood.

There is a recorded history of around twenty destructive earthquakes which have affected this region in the past century. Earthquakes, during non-instrumental period in Assam, occurred in the years 1548, 1596, 1601, 1642, 1663, 1696, 1756, 1772, 1838, & 1841. The complex tectonic and geology set up of the region can produce earthquakes of magnitudes 8 and above every few hundred years (Mahajan, 2010). The earthquakes of Magnitude 6 and above measured during instrumental period in Assam are presented in table 2;

Table 2: Earthquake Hazard History of Assam State (M>6.0)					
Date	**Epicenter**	**Latitude**	**Longitude**	**Origin Time**	**Magnitude**
10 Jan 1869	9.4 Km N of Kumbhir (Assam)	25.00 N	93.00 E	11:45 UTC/ 17:15 IST	7.5
12 June 1897	14 Km ESE of Sangsik (Meghalaya)	25.50 N	91.00 E	11:41 UTC/ 17:11 IST	8.7
9 September 1923	South Meghalaya, India	25.25 N	91.00 E	22:03:42 IST	7.1
2 July 1930	3.9 kms NNW of Dabigiri (Meghalaya)	25.80 N	90.20 E	21:03:34.4 UTC/ 03:23:34.4 IST	7.1
21 January 1941	Near Tezpur, Assam	26.50 N	92.50 E	02:30:16.0 UTC	6.5
23 October 1943	13.6 kms E of Hojai (Assam)	26.00 N	93.00 E	17:23:17 UTC/ 22:53:17 IST	7.2
29 July 1947	Arunachal Pradesh	28.80 N	93.70 E	13:43:20 IST	7.7
15 August 1950	20.7 kms NW of Tajobum (Arunachal Pradesh)	28.50 N	96.50 E	14:09:28.5 UTC/ 19:39:28.5 IST	8.7
31December 1984	SSE of Silchar (Assam)	24.64 N	92.89 E	23:33:37 UTC	6.0
6 August, 1988	Indo Myanmar Border	24.14 N	95.12 E	05.03 IST	7.3

Source: Centre for Natural Disaster Management (CNDM), Assam Administrative Collage, Assam,2014

Table 3: Some of the recent earthquakes					
Date	Epicenter	Latitude	Longitude	Origin Time	Magnitude
18 Aug 2003	Upper Tsangpo, Xizang, Eastern Tibet	29.547 N	95.562 E	09:03:02 UTC	Mw 5.5

9 Dec 2004	Silchar Region, Assam	24.710 N	92.523 E	08:49:00 UTC	Mw 5.4
1 June 2005	Upper Dibang Valley, Arunachal Pradesh	28.871 N	94.598 E	04:16:48 UTC	Mw 5.7
14 Feb 2006	Mana, North Sikkim,	27.377 N	88.362 E	00:55:23 UTC	Mw 5.3
23 Feb 2006	Bhutan	26.863 N	91.632E	20:07:26 UTC	Mw 5.2
18 May 2007	Nambu, North Sikkim,	27.302 N	88.159 E	12:40:02 UTC	Mb 4.6
20 May 2007	Singyang, North Sikkim	27.303 N	88.191 E	14:18:18 UTC	Mb 5.0
2 Dec 2008	India Nepal Border Region	27.373 N	88.051 E	05:11:42 UTC	Mw 5.2
19 Aug 2009	Assam Region	26.556 N	92.470 E	10:45:13 UTC	Mw 5.0
21 Aug 2009	Bhutan	27.332 N	91.437 E	08:53:05 UTC	Mw 6.1
29 Oct 2009	Bhutan	27.262 N	91.417 E	17:00:38 UTC	Mw 5.1
31 Dec 2009	Bhutan	27.319 N	91.510 E	09:57:29 UTC	Mw 5.5
4 Feb 2011	Myanmar region	24.618 N	94.680 E	13:53UTC	Mw 6.2
18 Sept 2011	India Nepal Border Region	27.723 N	88.064 E	12:40 UTC	M6.9
18 Dec 2011	Sikkim-Nepal border			21:35UTC	M4.6
30 Dec 2011	Central Assam region			15:14:0 UTC	M3.6
25 Sept 2018	Barpeta			03.47 UTC	M4.3
27 April 2019	Tejpur			06.27 UTC	M4.8
13 Nov 2019	Diphu			13.10 UTC	M 4.7
8 Feb 2020	Abhayapuri			12.47 UTC	M5.0
3 Oct 2020	Hajo			15.36 UTC	M4.2
10 Dec 2020	Goalpara			16.56 UTC	M4.3
17 Feb 2021	Dhekiajuli			12.24 UTC	M4.7
28 April 2021	Tejpur			02.21 UTC	M6.4
Source: www.asc-india.org (Last assessed on 20 May 2021), USGS & Results of NEIC Catalogue Search					

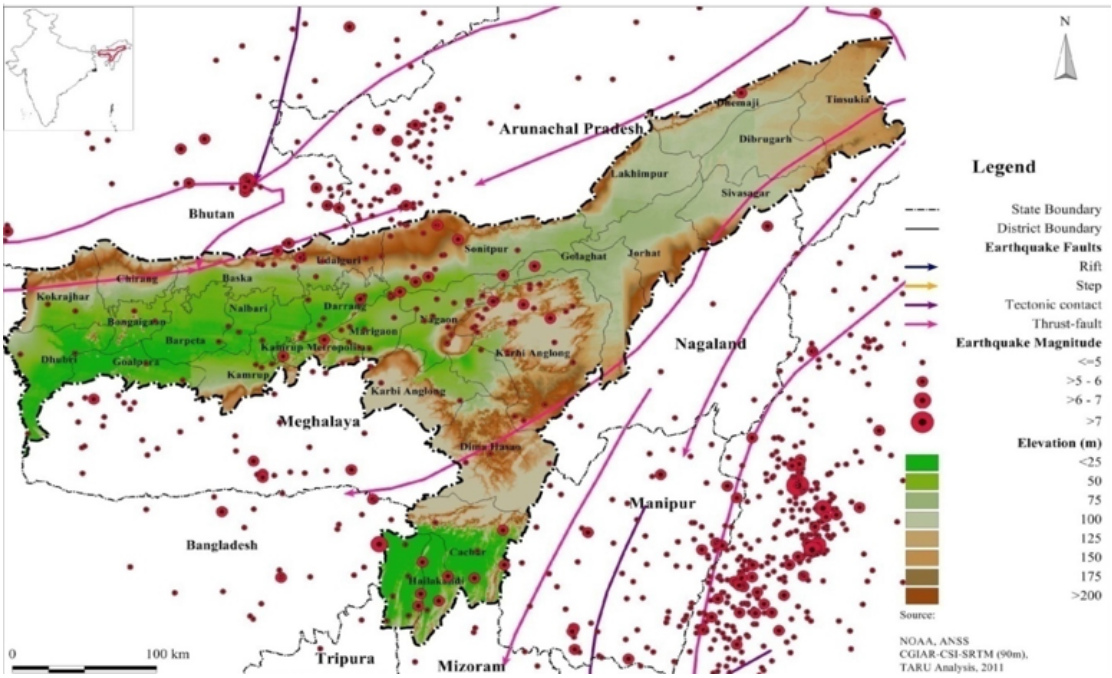
Table 3 above clearly indicates the frequency of past earthquake incidents and high seismic vulnerability of Assam. Among the above listed earthquake events, the 1950 Assam earthquake with 8.6 magnitude was the most destructive in the last century. The epicentre was located in the Mishmi Hills south of the Kangri Garpo and just east of the Himalayas in the North-East Frontier Agency part of Assam, India. Occurring on the evening at 7:39 PM (IST) on 15th August 1950 earthquake claimed lives of approximately 4,800 people. The earthquake is notable as being the largest recorded quake caused by continental collision rather than subduction, and is also notable for the loud noises produced by the quake and reported throughout the region.

The latest earthquake witnessed by the state and other North Eastern states was seven back-to-back earthquakes on 28th April 2021. The magnitude of the earthquake was 6.4 on the Richter Scale with its epicenter at 43 km west of Tezpur, the district headquarters of Sonitpur district in Assam. It was followed in quick succession by lesser intensity tremors of 4.7, 4, and two 3.6 magnitudes at 8.03 am,

8.13 am, 8.25 am and 8.44 am respectively. The earthquake caused extensive damage to buildings and forced people to scamper out of their homes.

According to studies, 70 percent of the Himalayas could experience an extremely powerful earthquake. The prediction came from research of the historical records from the area as well as the presumption that since the 1950 Medog earthquake, enough slippage has taken place for a large earthquake to occur.

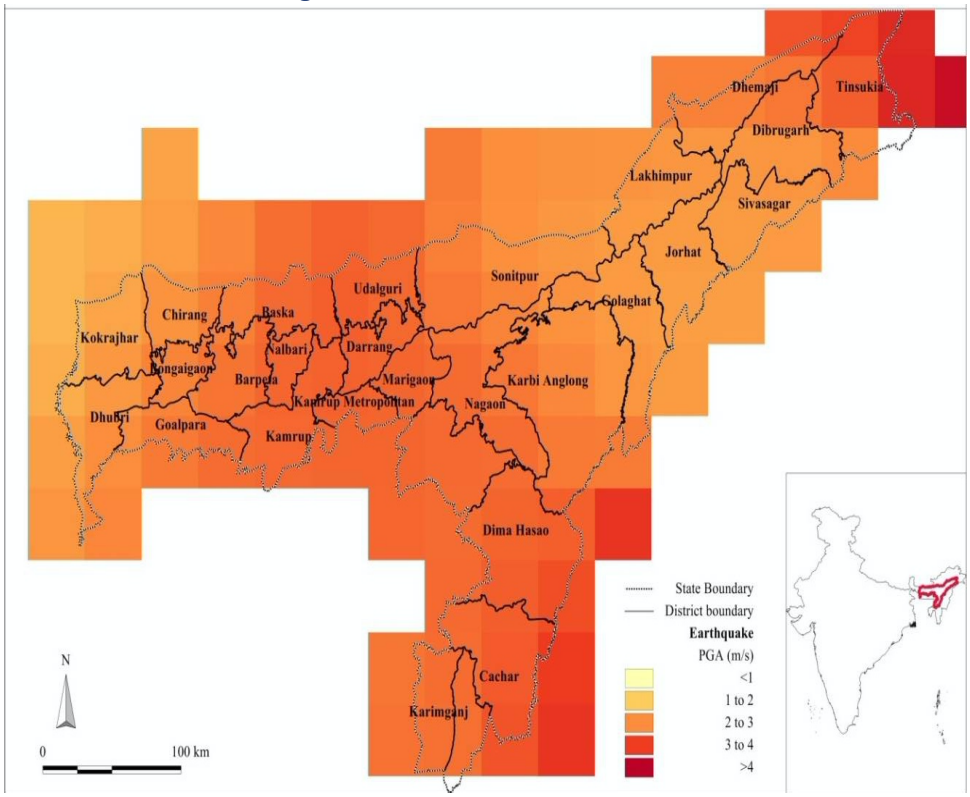
Figure E: Seismo-tectonic Setup of Assam



Source : Global Seismic Hazard Assessment Programme (GSHAP)

Figure E- given above represents the seismo-tectonic setup of Assam and indicates the location of historical earthquakes within the region. Similarly, Figure F below indicates probable earthquake peak ground acceleration (PGA) map as described by Global Seismic Hazard Assessment Program (GSHAP), an initiative undertaken with the support of the International Council of Scientific Unions (ICSU), and endorsed as a demonstration program in the framework of the United Nations International Decade for Natural Disaster Reduction (UN/IDNDR).

Figure F: Peak Ground Acceleration



Source: Global Seismic Hazard Assessment Programme (GSHAP)

According to the Global Seismic Hazard Assessment Programme (GSHAP) data, the state of Assam lies in a region with high to very high seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, this state also falls in Zone-V. Based on the hazard history and its zonation, much of Assam falls within high intensity[6] zone i.e. IX or more based on Modified Mercalli Intensity (MMI) scale (which is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence).

B. Floods

Assam comprises of a large network of rivers and tributaries originating from the upper catchments of the state with high gradient which joins the Brahmaputra and Barak rivers to form a highly dynamic and complex river system. High rainfall ranging from 1750 mm in the plains to about 6400 mm in the hills in the state and upper catchment which includes Arunachal Pradesh, Meghalaya, Nagaland, Mizoram and Manipur and neighbouring country Bhutan causes severe floods in Assam. Multiple factors, such as excessive sediment load, large and variable flow, easily erodible bank materials, and aggradations of the channel, have been the possible underlying factors. Further, deforestation and human intervention in upstream and downstream areas of surrounding Hill States and Assam respectively have caused excessive siltation and runoff rate resulting in abnormal rise in the surfaces of major rivers.

[6]Magnitude and Intensity measure different characteristics of earthquakes. Magnitude measures the energy released at the source of the earthquake. Magnitude is determined from measurements on seismographs. Intensity measures the strength of shaking produced by the earthquake at a certain location. Intensity is determined from effects on people, human structures, and the natural environment.

Apart from the geo-climatic setting, high rate of population growth in the form of high birth rate and immigration from border countries has led to unplanned settlements. Human activities like deforestation, accelerated rate of change in land use, unplanned settlements, filling up low lying areas for the construction of buildings, urban development and temporary flood control measures are some changes which do contribute to the overall vulnerability of the state to floods.

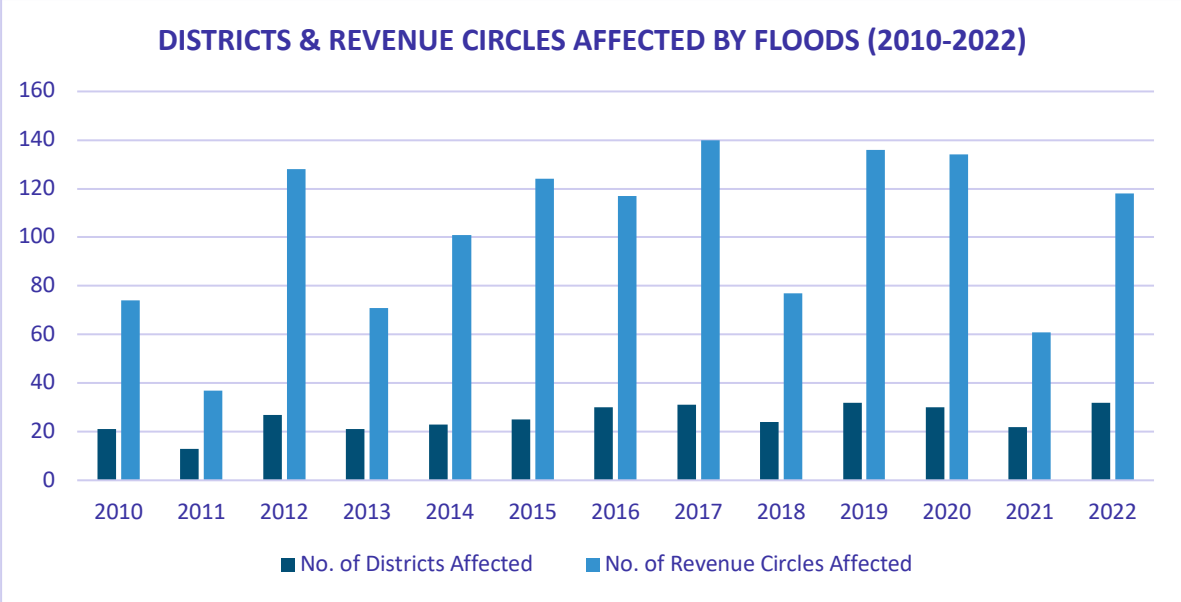
The flood prone area of the state is 31,500.00 Sq Km as assessed by the Rashtriya Barh Ayog which is about 39.58 % of the total land area of Assam. This is about 9.40% of total flood prone area of the whole country. (Source: Flood Hazard Atlas, 2016, Assam).

Table 4: Flood Hazard Affected Area in Assam (1998-2015)

Hazard Severity	**Flood Hazard Area (ha)**	**% Flood Hazard (w.r.t. State Geographic Area)**	**% Flood Hazard (w.r.t. Total Flood Hazard Area)**
Very High	48,490	0.62	2.16
High	1,06,659	1.36	4.73
Moderate	2,82,783	3.61	12.54
Low	5,56,080	7.09	24.66
Very Low	12,60,562	16.07	55.91
Total	**22,54,574**	**28.75**	**100**

Source: Flood Hazard Atlas of Assam, ISRO 2016

Figure G: Districts and Revenue Circles Affected by Floods (2010-2022)



Source: Flood Memorandum, Assam, 2022

C. Dam Induced Flooding:

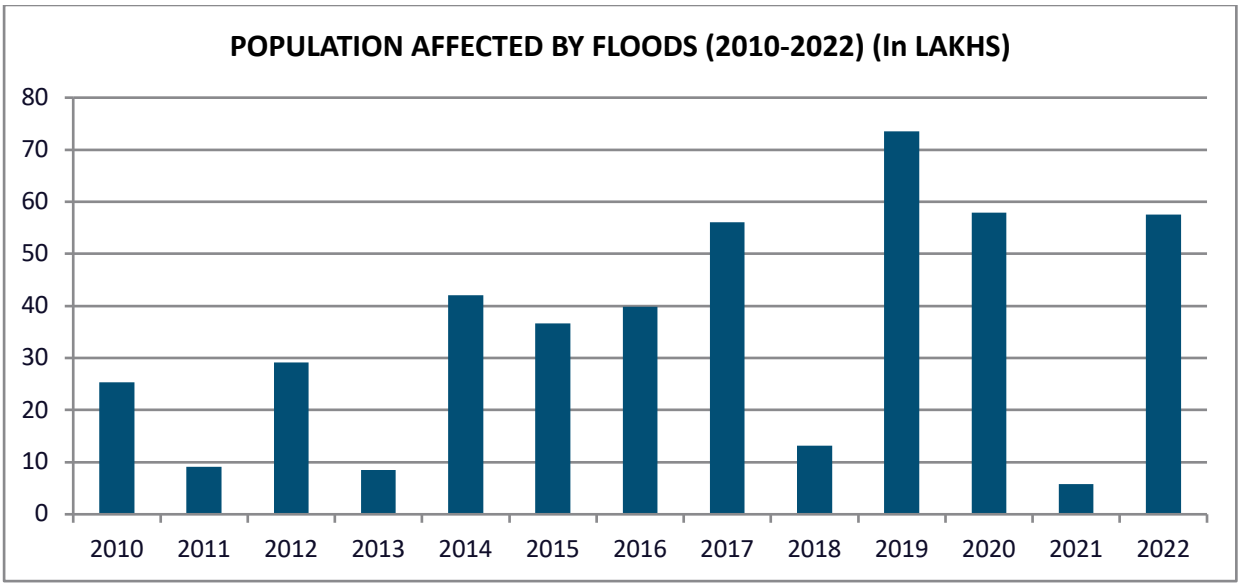
Assam also witnesses flash floods caused by the release of water from dams upstream in Bhutan and neighbouring States in the northeast. Release of water from Doyang (Nagaland), Ranganadi (Arunachal Pradesh) and dams in Bhutan causes large scale inundation in Assam. The Ranganadi dam has been

the main cause of flash flooding in and around Lakhimpur district, adversely affecting the environment and socio-economic conditions of its people. In July 2017, water was released from the Ranganadi dam without notice, catching the districts' administrations and 300,000 people off-guard. Flood waters damaged drainage channels under National Highway 15 between Lakhimpur and Dhemaji and washed away a 50-metre stretch of embankment at Bogalijan in Lakhimpur. Dam induced flooding is caused mainly because of human error. Timely communication by dam officials, early warning and emergency evacuation could save precious lives, property, prevent loss of lives and assets of people living in the downstream.

- **Flood Damage and Losses**

The State of Assam faces regular flood year after year causing loss of lives, property, infrastructure and livelihoods of people. In the Figure I below the affected population of Assam has been presented highlighting gravity of the flood hazard in the state over the years. Similarly, Table 5 below presents the damages caused by flood from 2012 till 2022.

Figure H: Population affected by floods (2010-2022) (In Lakhs)



Source: Flood Memorandum, Assam, 2022

Table 5: Damage caused by Flood in Assam during 2012 to 2022					
Year	**Crop Area Affected (Lakh Hectares)**	**Population Affected (in Lakh)**	**Human Lives lost**	**Cattle Lost**	Total Damages Value (in Crore)
2012	3.28	29.14	144	11408	3591.81
2013	0.71	8.48	NA	NA	NA
2014	3.67	42.03	90	28	2534.88
2015	3.38	36.67	66	212	1523.79
2016	2.35	39.81	64	5580	10,339.66
2017	3.98	56.02	160	449	4358.81
2018	0.31	13.22	53	556	2491.59
2019	2.15	73.05	101	250	3237.75
2020	1.88	57.89	150	702	2642.99
2021	0.65	5.74	3	13	NA
2022	1.08	57.5	179	2700	10,000
(Source: Flood Memorandum, Revenue & Disaster Management Department, 2022)					

Besides loss of lives, property and livelihood, floods in Assam have affected the world-famous Kaziranga wildlife sanctuary, the main home of the critically endangered one-horned rhinoceros. The floods force the rhinos to congregate in the few areas that are still above the water, making them easier prey for poachers.

Floods are a regular in Assam. But something peculiar has cropped up about them in recent years: They not only came early, but they stay longer as well. And worryingly, they have not been proportionated to the rainfall. What is frightening is the fact that such unusual rains will become more common with climate change. According to State Action Plan on Climate Change (SAPCC), extreme rainfall events in Assam may increase by 5-38 pesr cent and incidences of floods by 25 per cent during 2021-2050.[7] The massive floods of June-July 2022 have highlighted the changing nature and impact of floods in Assam.

D. Landslides

Landslides are sudden, short-lived geomorphic events that involve a rapid-to-slow descent of soil or rock in sloping terrains. It can also be caused by excessive precipitation or human activities, such as deforestation or development that disturb natural slope stability. Landslides are caused when the stability of a slope changes from a stable to an unstable condition. A change in the stability of a slope can be caused by a number of factors, acting together or alone.

[7] State Action Plan on Climate Change

In the recent past, Guwahati and other towns of Assam have witnessed a number of devastating landslides in its hilly belt. Fragile eco-system of the hilly areas due to poor communication, bad road, indiscriminate, gross misuse of land and forest, economic conditions of the inhabitants create serious administrative problems. The resultant loss of life and property has become a matter of concern. The hill slope failure and soil erosion associated with siltation flash floods and water logging in the low-lying areas also creates immense problems in the city drainage and sewerage system. Heavy and continuous rainfall during monsoon aggravates the process of slope failure.

Even though much of the minor landslides go unnoticed, some of the major events which have occurred in the region from over the past several years are presented in the table below:

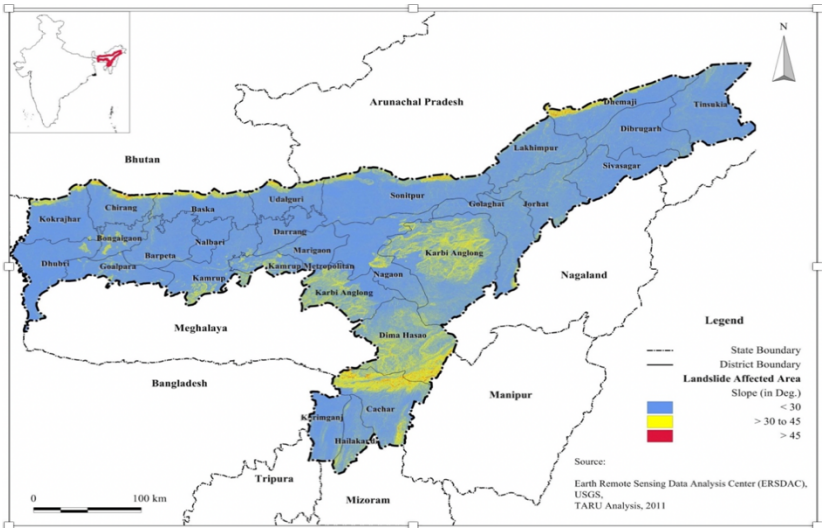
Table 6: List of Key Landslide Events

Date	Type	District	Name of the Place	Cause of Landslide
5- 8 Oct 2004	Landslide	Kamrup	Guwahati Urban	Heavy concentrated rainfall
28 Aug 2009	Rock-slips and landslide	North Cachar Hills	Mahur	Torrential rains
2 April 2010	Rock-slips and landslide	Cachar	Dholai	Torrential downpour
3 June 2010	Mud-slide	Karimganj	Rongpur	-
16 June 2010	Landslide	North Cachar Hills	Jatinga, Longrangjao, Mahur and Wadringdisa Village BlockPhaiding	Heavy rains
12 Sep 2010	Rock-slips and land-slide	Lakhimpur, Dhemaji, Golaghat, and Bongaigaon	-	Heavy rains
23 March 2011	Rock-slips and landslide	Kamrup	Kharguli Area of Guwahati	Heavy rains
20 February 2015	Rock-slips and landslide	Hilakandi	Monachhera area	Land cutting of a hillock
18 May 2016	Rock-slips and landslide	Hailakandi	-	Incessant and concentrated pre-monsoon precipitation
10 July 2019	Landslide and house collapse	Baksa	Katahbari, Garchuk,Near Bethany High School	Incessant rain
10 July 2019	Rock-slips and landslide	Golpara	Natun Basti, Matia	Incessant rain
22 June 2020	Rock-slips and landslide	Karimganj, Cachar, Hailakandi	Kaliganj, Joypur,	Incessant rain

			Kolapur village	
26 June 2020	Landslide and house collapse	Guwahati	Guwahati	Incessant rain
Source: Geological Survey of India (GSI), 2020				

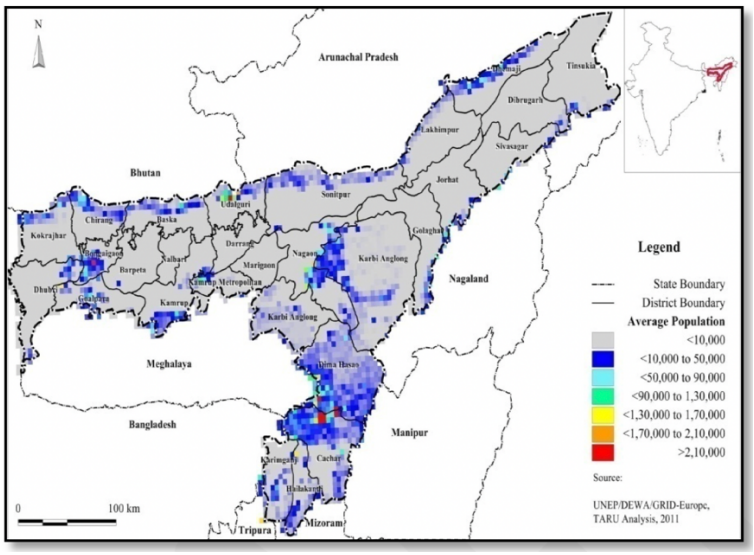
Figure I and J illustrate the landslide affected areas and estimated population exposed to the event in Assam.

Figure I: Landslide Affected Area in Assam



Source: Geological Survey of India, 2020

Figure J: Landslide Affected Area in Assam

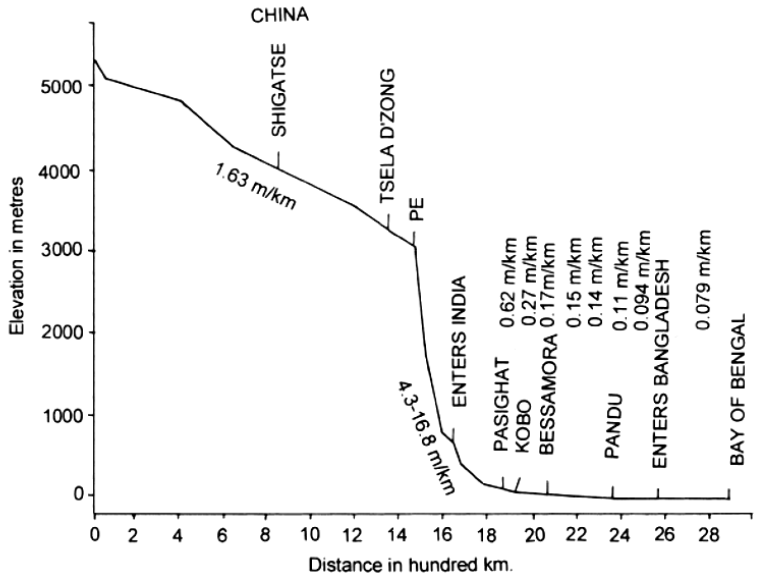


Source: Geologiccal Survey of India, 2020

E. Erosion

Erosion history of Assam indicates that between 1912 and 1996 around 868 sq. km. of land was lost to bank erosion; averaging to about 10.3 sq. km. of area lost per year. Further, the research conducted by Sharma, (2010) also made evident that significant erosion occurred in Assam due to Brahmaputra River during 1914 to 1975. According to Kotoky (2004), the bank line of the Brahmaputra is extremely unstable consisting mostly of fine sands and silts. Large scale slumping of river banks does take place when the level falls after a flood. Further, the braided nature of the Brahmaputra adds unpredictability to erosion problem making it more serious.

Figure K: Elevation Profile of the Brahmaputra River



Source: Sarma (2005)

The average bank-line shift of the north bank towards the north is estimated to be 227.5 m/year on average, 331.6 m/year from the north bank towards the south, 137.2 m/year from the south bank towards the south and 225 m/year from the south bank towards the north (Sarma, 2005). Over bank flood due to breaches in the embankment render the fertile cultivable land unsuitable for crop production due to deposition of coarse sand on the surface to a variable depth. The erosion statistics of Assam is presented in the Table 7.

Table 7: Soil Erosion Statistics of Assam (2002)	
a) Total cultivable area in Assam	34,60,082 Ha
b) Area affected by Soil Erosion	1,93,000 Ha
c) Area under Wasteland & Degraded Land	2,71,556 Ha

d) Area affected by shifting cultivation	1,70,000 Ha
e) Average area being eroded due to flood and soil erosion problems	6,500 Ha
f) Average area affected by Flood annually	4,50,000 Ha
g) Average annual rainfall in Assam	2,4000 mm
h) Total Annual Silt Load of Brahmaputra (1990)	
At Bhurbandha	3,59,241 Cu.M
At Pandu	4,94,357 Cu.M
i) Annual Soil Erosion rate (1990)	
Jia Bharali River	4,721 Tonnes per Sq.Km
Puthimari River	2,887 Tonnes per Sq.Km
Source: Assam Science Technology and Environment Council ***Available Online At: http://www.envisassam.nic.in/soilerosion.asp last accessed on 13th Jan, 2012***	

To assess the extent of erosion from 1988 to 2015, a bank line study of the river was carried out from satellite imagery by Brahmaputra Board in 2016. The study revealed that there has been an erosion of 739 sq. km against the deposition of only 209 sq. km during this period. Even this deposited land has no immediate value. Such land can be utilized for agricultural purposes only after the formation of the topsoil, which generally takes decades.[8]

Year	**Table 8: Erosion & Deposition (Filling) (Sq. km.) in North and South Bank of Brahmaputra River**		**Total (Sq km)**
	Erosion	**Deposition**	
1970-1990[9]	744.06	543.72	*1287.78*
1988-2016[10]	739	209	*948.00*
Source: IIT Guwahati and Brahmaputra Board, 2016			

This implies a trend of an increased riverine area and decreased habitable land in the valley. It also indicates an increased instability and higher erosion rate in the river with time which is a worrisome situation.

[8] Bank Line Study, 2016, Brahmaputra Board
[9] IIT Guwahati
[10] Study of Satellite Imagery by Brahmaputra Board

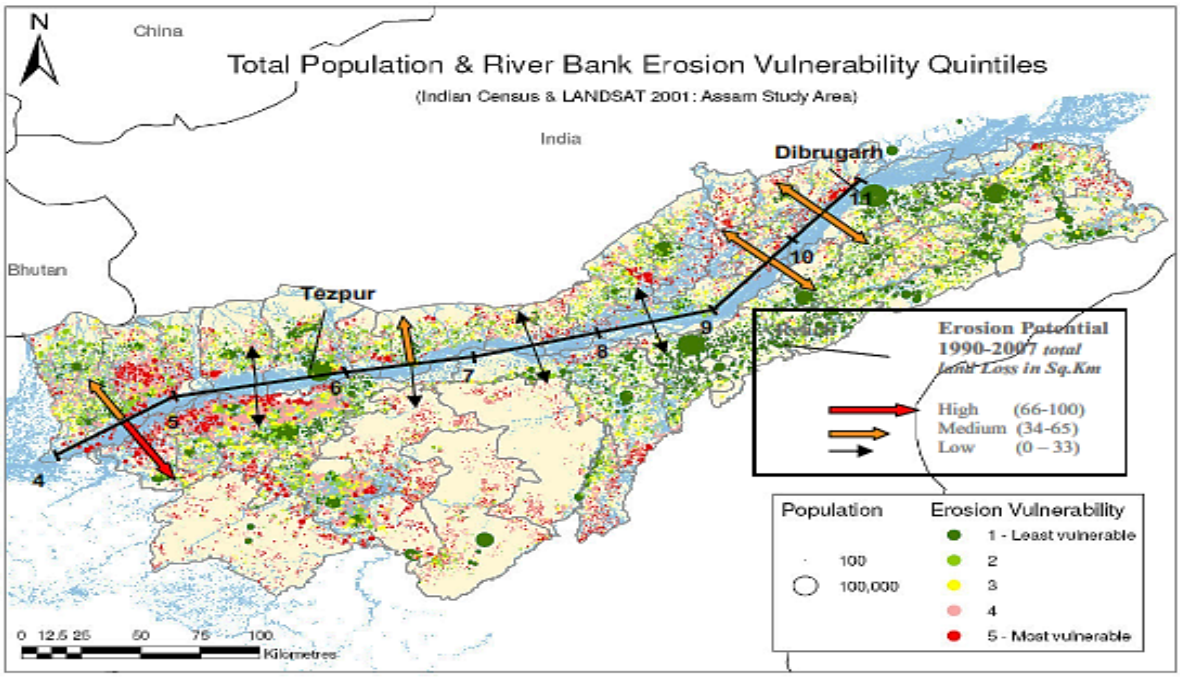
The main causes which seem to erode the banks of Brahmaputra River are:

i. Steep slopes
ii. Abundant sediment and bed load
iii. Erodible banks
iv. A highly variable discharge (flow per unit time)

(Source: Bank Line Study, Brahmaputra Board, 2016)

A total of 2,534 villages were obliterated and 90,726 families rendered homeless during 1970 to 2016 period. Severe erosions still continue in a number of locations along the banks of Brahmaputra and many of its tributaries. Large damages to private and public properties including roads, bridges, embankments, buildings, power transportation infrastructures, homesteads, and cultivated land happen every year. In addition, intangible losses in the form of loss of forest areas, loss of daily wages/wasted time due to communication breaches are a common feature in the valley.

Figure L: River Bank Erosion Vulnerability



Source: Assam land-use board study (2003)

According to Assam land-use board study (2003), high rainfall *(more specifically high intensity rainfall)* has been found to be another important factor causing erosion in almost all the districts mainly due to higher gradient/slope. Loss of topsoil through surface run-off under heavy precipitation and humid climatic condition is the most common type of soil erosion (gully) in the entire state. The problem of topsoil erosion is severe in the plain which further has an impact on the agriculture. The problem of erosion has been observed in districts like Nalbari, Hailakandi and Kokrajhar. These pockets are mostly located in the fringe areas of Indo-Bhutan border (Bhavar Belt) marked by sudden gush of runoff after a rain in the form of flash floods.

Table 9 represents the crop area affected by Gully erosion in Assam with its extent in number of districts.

Table 9: Crop Area Affected by Gully Erosion in Assam

Sr. No.	Crop Area Affected (%)	No. of District
1	0-10%	9
2	10-20%	13
3	30-40%	2
4	40-50%	2
5	> 50%	1

Source: State Land-use Board, 2003

According to the State Revenue and Disaster Management Department, as on July 2019, the area of land eroded till date has been the highest in Majuli (40,500 bigha) followed by Barpeta district (1,20,493 bigha), Kamrup (92,734 bigha, 5 katha, 71 lessa), Dhubri (87,036 bigha,9 katha, 43 lessa) and Dibrugarh (56186 bigha, 4 katha and 19 lessa). While in Morigaon district the number of displaced has been officially recorded at 18,425, in Majuli Island, as many as 10,500 people were noted as being displaced due to soil erosion. As per records, 9,337 have been mentioned as landless in Kamrup district. The lowest number of landless persons – two – has been stated to be in Charaideo district.

(*Source: State Revenue and Disaster Management Department*)

F. Wind and Cyclone

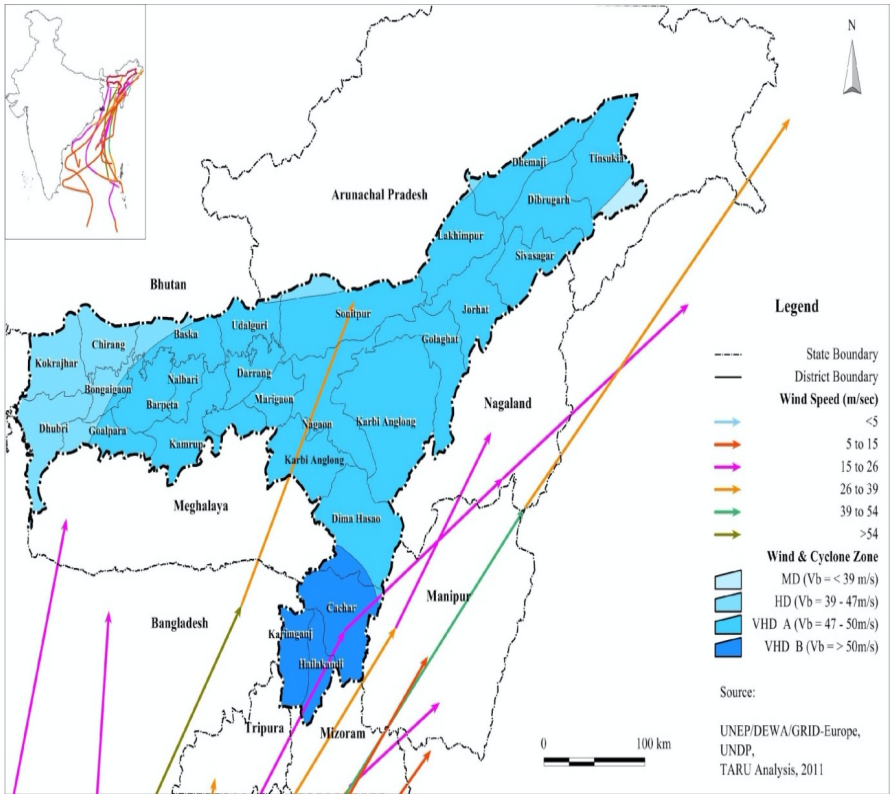
Assam is situated in the north eastern direction of Bangladesh which is highly prone to cyclone/winds. Every year about 60% of the area is affected by cyclones occurring in Bangladesh. Due to their specific locations, districts like Dhubri, Gaolpara, Hailakandi, Chachar and Karbi Anglong are more prone to cyclone/winds. Districts namely Kokrajhar, Bongaigaon, Kamrup, Barpeta, Nalbari, Darrang, Sonitpur, Nagaon, Marigaon, Lakhimpur, Dhemaji, Sibsagar, Jorhat, Golaghat, Dibrugarh, Tinsukia and Karbi Anglong are likely to experience wind speed of 50 m/s whereas districts like Hailakandi, Karimganj and Cachar have wind speed of more than 55m/s and are more vulnerable to cyclonic storms. Occasional cyclones do occur in western Assam and their severity is more during monsoon.

According to BMTPC cyclone zonation, north-west districts of Assam are lying in zone of high damage where wind speed can reach up-to 47 m/s an hour. Districts close to Bangladesh are in very high damage zone due to proximity of Bay of Bengal (which is a cyclone basin). In this zone wind speed can reach up-to 55 m/s an hour and can result into large scale damage. Fig. M indicates the wind speed zonation of Assam along with the tracks of the recent events of cyclones recorded within the state.

According to IMD Cyclone e-Atlas track records for the period 1968-2008 shows two cyclone events passing through the State. According to the Lutheran World Federation/Department for World Service India Program 2003, a short but devastating storm with torrential rains did occur in areas of Dhubri, Dhemaji, and Sointpur districts of Assam on 22nd April 2003, Mancachar Sub division of Dhubri district situated in the western corner of Assam was affected by this event. Almost 48 people were killed and 1,500 persons were injured in this event. There was also a record of similar event on December 23rd, 2010. During this event, Karbi Anglong, Cachar and Hailakandi were affected by severe winds.

Recently, on 15-16 April 2022, during Rongali Bihu (Assamese New Year) a severe cyclonic storm hit the state causing 12 reported deaths in Dibrugarh, Goalpara, Barpeta, Baska and Tinsukia districts. As per the report of ASDMA, a total of 21,000 people was affected and 7,344 houses were damaged (partially and fully) in the affected districts. **(Source ASDMA)**

Figure M: Cyclone Affected Area and Zonation of Assam



Source: BMTPC cyclone zonation, north-west districts of Assam

G. Drought

Assam suffers periodic droughts due to variability in rainfall pattern over the years. Since 2010, Assam has witnessed drought like situation twice, affecting large number of districts. 14 districts of Assam witnessed drought like situation in 2014, and again in 2019, 20 districts experienced less rain and drought like situation. Warming of the temperature is expected to reduce production of staple crops such as rice, horticulture produce, economically important tea produce, milk yields and fish catch affecting the agriculture productivity and livelihood of people of Assam. According to a study in 2020 by the North Eastern Tea Association (NETA), an organisation of tea producers, there was an estimated crop deficit of around 60 million kilograms, or about 40 per cent, in comparison to that of the same period in 2019. Climate change projections for Assam indicate that mean average temperature is likely to rise by +1.7-2.2 C by mid-century with respect to 1971-2000.[11] All across the State, except in the southern districts, drought weeks are going to rise as well, by more than 75% with respect to the base line (1971- 2000), which means reduced productivity in the primary sector i.e., agriculture and allied activity thereby impacting life and livelihood of people in Assam.

Coupled with increasing intensity of rain fall in some areas and intensive droughts in others, emergence of new pests and diseases, the yield realization in a business-as-usual agriculture practice scenario are likely to become lower.

[11] State Action Plan for Climate Change (SAPCC), Assam

4.3 Human Induced Hazards

A. Fire

Fire, as a hazard and risk factor, is complex since predicting or modeling its occurrence at a macro level (state level) is difficult. In this report an indicative fire hazard risk of the state is highlighted based on the historical database (2011-2019) of fire events as procured from fire service department. Table 10 highlights the occurrence of small, medium and large-scale fire calls received by the fire service department within the last decade. The data indicates that there has been a noticeable increase in the number of major fires over last 10 years or so in general and since 2017 in particular. This may be due to the increasing density of settlements/development within the cities, coupled with hazardous industrial activities.

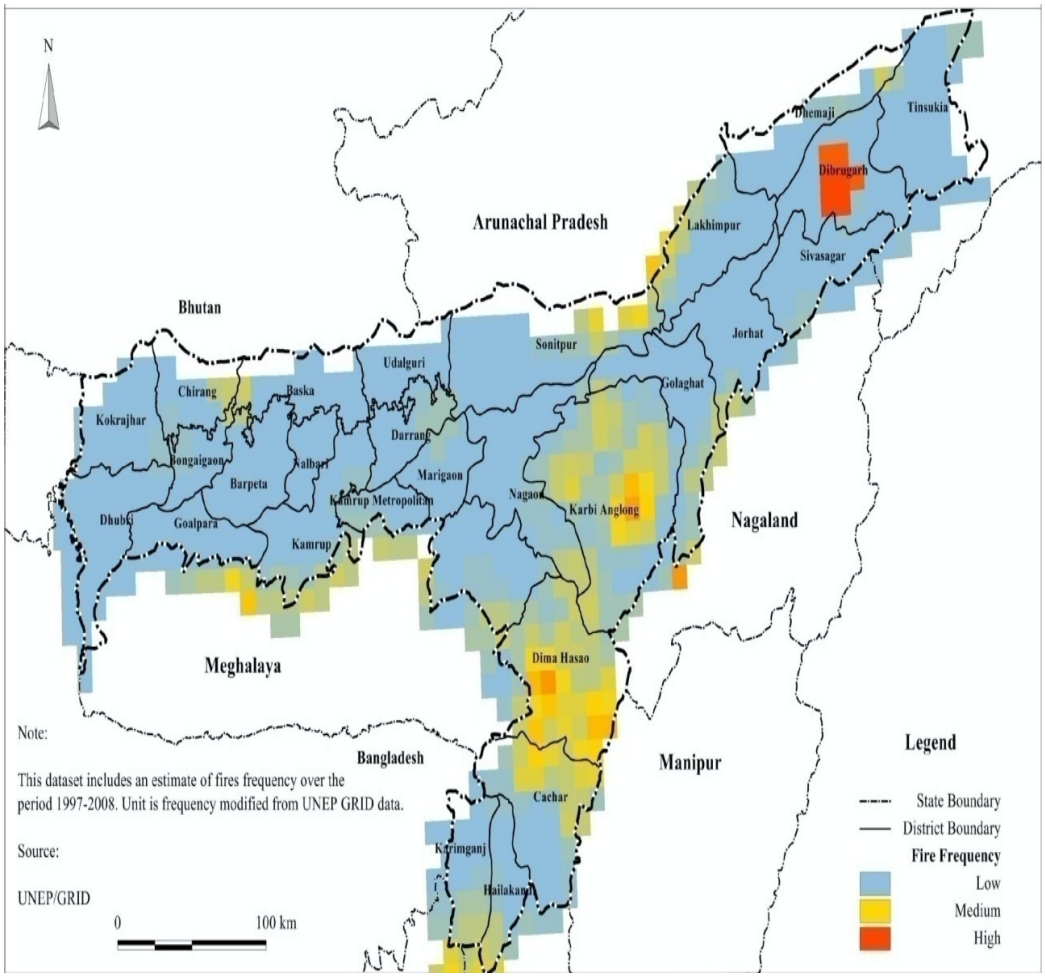
Table 10: Annual Fire Statistics of Assam (Year 2011 to 2020)

Year	Major Fire Call	Serious Fire Call	Medium Fire Call	Small Fire Call	Total No. Of Fire Call
2011	486	2	284	1749	2521
2012	606	16	292	2563	2477
2013	691	24	373	2518	2406
2014	728	14	358	3147	4247
2015	675	7	315	2822	3819
2016	644	11	250	2515	3420
2017	777	15	216	2368	3426
2018	844	8	255	2692	3799
2019	962	7	254	2803	4026
2020	**758**	**5**	**183**	**1476**	**2999**

Source: Fire and Emergency Services Department, Assam, 2020

Fig N represents frequency of fires (mostly forest fire or other large-scale fire incidences) in Assam between 1997 and 2008. It is a modified product of World Fire Atlas (WFA, ESA-ESRIN) dataset which shows low, medium and high frequency. Based on the map it is evident that North Chachar hills, Karbi Alglong and Dibrugarh are more prone to fire incidences.

Figure N: Fire Frequency



Source: Fire and Emergency Services Department, Assam, 2020

B. Industrial Disasters

Industrial units, more particularly in the Micro Sector, are getting severely affected during the summer season (i.e., Flood) every year in the districts like Dhemaji, Lakhimpur, Nagaon, Morgaon, Goalpara and Dhubri. These districts are recognized as flood prone districts of Assam.

As per the available data, 687 industrial units set up are under Chemical/ Rubber/ Plastic categories of Industries. Large set ups are of central Public Sectors units including OIL, ONGCL, Refinery of IOC, NRL, GAIL, HPC, CCI etc., all of which are of sensitive nature and are potential sources of hazard. In private sectors there are 36 Cement Factories and 24 Steel Factories, which also are potential hazard sources.

There are about 27 MAH (Major Accident Hazard) industries in Assam, which are more vulnerable to fire, explosion and accidents. The list of MAH industrial unit's district wise in Table 11 below:

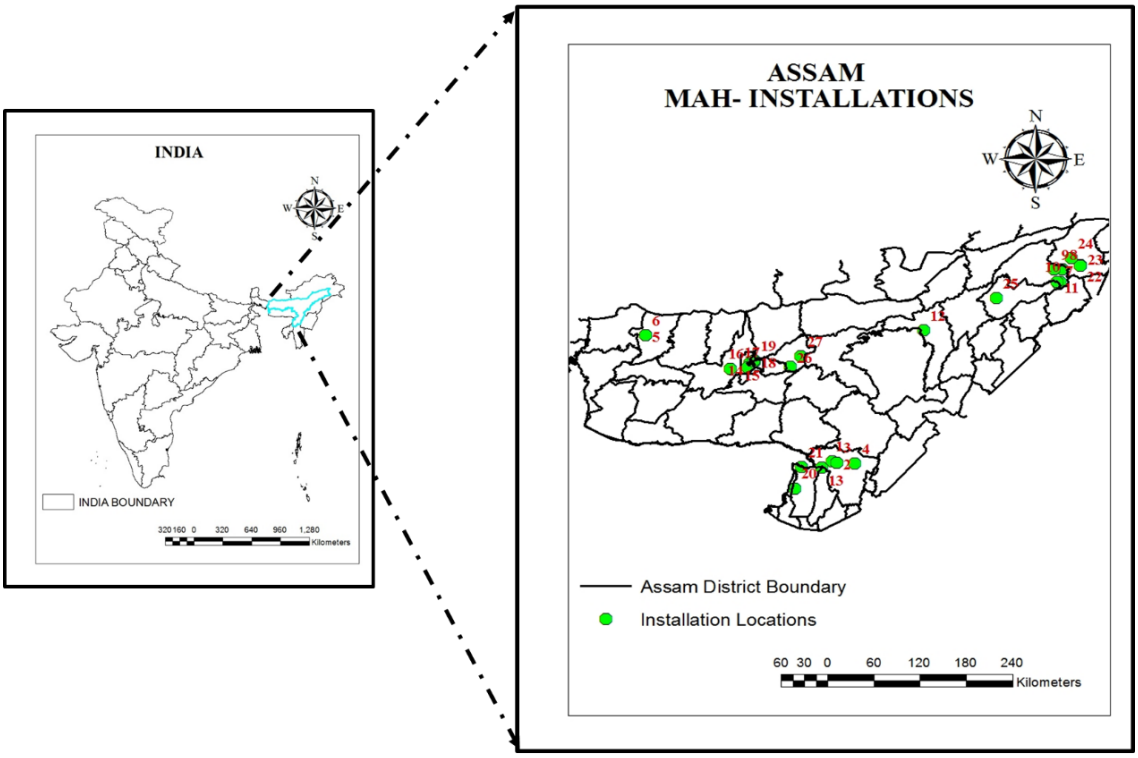
Table 11 MAH- Installations

S.N.	**Name and Address**	**HAZCHEM**
District	**Cachar**	
1.	Indian Oil Corporation Limited, (Indane Bottling Plant), Jaraitola, Cachar	LPG
2	Indian Oil Corporation Limited, Depot Ramnagar, Cachar	Kerosene, MS, HSD
3	Indian Oil Corporation Limited, (Depot) Annapumaghat, Cachar	Kerosene, MS, HSD
4	Aviation Fuel Storage Depot, Cachar	Aviation Fuel
	Chirang District	
5	Bongaingaon Refinery & Petrochemicals Ltd., Chirang	Cobalt Metal Oxide, Sulphur Dioxide, Petroleum Products, Class-4 LPG
6	Indian Oil Corporation Limited, (LPG Bottling Plant), New Bongaigaon	LPG
	Dibrugarh District	
7	Brahmputra Valley Fertilizer Co-op. Ltd., Namrup Unit, Parbatpur, Dibrugarh	Arsenic Trioxide, Ammonia, Arsenic Pentoxide
8	Kathalguri Thermal power Plant (NEEPCO), Dibrugarh	Natural Gas
9	Assam Gas Company, Duliajan	Natural Gas
10	ASEB Thermal Power Plant, Dibrugarh	Natural Gas
11	Assam Petrochemicals Ltd., Namrup, Dibrugarh	Methanol
District	**Golaghat District**	
12	Numaligarh Refinery Ltd., Golaghat	LPG, Methanol, MS, Aviation Fuel, Kerosene, Diesel, Fuel Oil, Ethylene
	Hailakandi District	
13	Hindustan Paper Corporation Ltd., (Cachar Paper Mill), Panchgram, Hailakanndi	Chlorine

District	**Kamrup District**	
14	Indian Oil Corporation Limited, (Indane Bottling Plant), North Guwahati, Kamrup	LPG
15	Indian Oil Corporation Ltd., (Guwahati Refinery), Noonmati, Kamrup	Sulphur Dioxide
16	LPG Plant Sarpara Mirza, Kamrup	LPG
17	Indian Oil Corporation Ltd., Tape off Point, Betkuchi, Guwahati, Kamrup	MS, HSD
18	Indian Oil Corporation Ltd., (Aviation Fuel Storage Depot), Guwahati, Kamrup	Aviation Fuel
19	Indian Oil Corporation Ltd., (MarketingDivion), Guwahati Storage, Noonmati, Kamrup	MS.HSD, Kerosene
	Karimganj District	
20	DLF Power Plant, Banskandi, Karimganj	N A
21	DLF Power Ltd., Adantila, Karimganj	N A
	Marigaon District	
22	Hindustan Paper Corporation Ltd., Nagaon Papermill, Jagiroad, Morigaon	Chlorine
23	Indian Oil Corporation Ltd., Thekaraguri, Marigaon	MS, HSD, Kerosene
	Sibsanag District	
24	GAIL, (LPG Recover Plant), Lakwa, Sibsang	LPG
	Tinsukia District	
25	Digboi, Tinsukia	Ammonia, Sulphur Dioxide, Hydrochloris Acid, LPG, Flammable Liquid
26	Indian Oil Corporation Ltd., Tinsukia	MS, HSD, Kerosene
27	Indian Oil Corporation Ltd., LPG Bottling Plant, Gopanari, Tinsukia	LPG

(Source: Department of Commerce and Industries), 2020

Figure O: MAH Locations in Assam



(Source: KAS, 2021)

- **Recent Disaster**

Gas Leakage of OIL (Oil India Limited) at Baghjan, Tinsukia: An oil well, which first burst on May 27th 2020 at Baghjan in Tinsukia district of Assam, and continued to leak oil and gas, caught fire on June 9th 2020 and it took several weeks till authorities could control the fire. Experts from Singapore and various other engineers were at work when the well operated by state-owned Oil India Limited (OIL) exploded into flames. Many workers got injured, couple of them died at site. While the clearing operations were on at the well site, the well caught fire. At least 200 workers including the foreign experts were working at site, however most of them luckily escaped unhurt.

C. Vector Borne Disease

Mosquito-borne diseases, including malaria, Japanese encephalitis (JE), lymphatic filariasis and dengue, are major public health concerns in the north-eastern state of Assam, deterring equitable socio-economic and industrial development. Dengue has recently invaded the state, with a large concentration of cases in Guwahati city that are spreading to suburban areas. Control of these diseases requires robust disease surveillance and integrated vector management on a sustained basis, ensuring universal coverage of evidence-based key interventions based on sound epidemiological data.

The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. Assam reported 5, 85,134 confirmed cases of which 5, 71,552 recovered and 5,587 deceased as on 24th August, 2021. (Source: Directorate of Health Services, Government of Assam).

Assam in its fight against COVID-19 adopted and executed the, "Assam Community Surveillance Plan (ACSP)" to look for SARI (Severe Acute Respiratory Infections) and ILI (Influenza like Illness) and fever cases covering all the 28000 villages / wards of Assam from 7th May, 2020.12 By making door to door visits, the potential cases of different diseases are listed out to test them (wherever necessary) and to take follow up actions, as per the test report. This opportunity of door-to-door visit is being used to look for any other diseases, like malaria, dengue, diarrhea etc. (Source: Directorate of Health Services, Government of Assam).

D. Livestock Disease

ASF is a severe viral disease that affects wild and domestic pigs typically resulting in an acute hemorrhagic fever. The disease has a case fatality rate (CFR) of almost 100 per cent. Its routes of transmission include direct contact with an infected or wild pig (alive or dead), indirect contact through ingestion of contaminated material such as food waste, feed or garbage, or through biological vectors such as ticks. In April 2020, more than 17,000 pigs have died across five districts i.e. Sivasagar, Jorhat, Lakhimpur, Dhemaji and Nagaon districts of eastern Assam of classical swine fever. Assam has the most farmed pigs in the country according to the 20th Livestock Census from 2012-2019. Data show that the eight north-eastern States with Assam at its core consume more than 65% of the 4.26 lakh metric tons of pork produced in the country. Timely control of this disease through vaccination could prevent loss of livestock population and save the livelihood thousands of livestock farmers engaged in piggery. The vaccination of pigs though got affected due to COVID related lock downs, the Animal Husbandry and Veterinary department could manage to prevent the spread of the disease. (Source: Animal Husbandry and Veterinary Department).

E. Pest Attacks

Prevalent across South Asia, army worms usually emerge after monsoonal floodwaters recede. Locally known as "shur puk" the species of caterpillar is also known as army worms. Rice-swarming caterpillars are considered one of the most dangerous pests who wipe out about thousands of acres of paddy fields affecting the livelihood of poor and marginal farmers across the state of Assam.

Changes in climate would normally shift the host pattern and life cycles of various insects, pests and pathogens. Unseasonal rains and heavy dew during flowering and fruiting period are likely to aggravate the incidence of pests and diseases. Many non-pest insects of cultivars might turn to be normal pests while many existing ones might perish forever. These would lead to exploring of new resistant varieties

[12]Department of Health and Family Welfare, Govt. of Assam

and pest controlling chemicals resulting in an increase in production costs and posing a potential risk to human health. (Source: Department of Agriculture, Horticulture, Government of Assam).

F. Accidents – Rail and Road

The fast pace of development brings with it increasing frequency of various types of accidents as more and more people are involved in diverse economic activities. The number of air accidents, cases of boat capsizing, building collapses, fires in built environments – residential, commercial and industrial, festival related incidents involving large number of people, forest fires, emergencies in mines (flooding, collapse, etc.), oil spills, rail accidents, road accidents, stampedes, transportation of hazardous material (HAZMAT) related accidents etc. are increasing. While all these are matters of utmost concern, not all of them fall within the purview of the SDMP.

While the cases of fires in the built environment and forests are included in the plan, local authorities address them in accordance with the relevant emergency management systems. The primary way to reduce risks is through mainstreaming risk reduction in development and governance. As part of the overall DRR plan, systems for disaster preparedness and response are being strengthened at all levels, which in turn will help in reducing the number of accidents and improve the capacity to respond. Assam has recorded 3,843 deaths in different types of accidents in 2019, the highest in the entire north-eastern region. The latest report released by the National Crime Records Bureau (NCRB) has revealed that over 41 percent deaths in road accidents in Assam take place with two-wheelers due to over speeding, reckless driving and overtaking. The traffic accidents in the State in 2019 comprise 8,055 road accidents. (Source: Public Works (Roads) Department, Government of Assam).

4.4 Vulnerability and Risk Analysis

HRVA study in Assam indicates that with around 31 million in population (as per Census of India 2011), the state's population is growing at an average rate of 18.67% with much of the growth rate being concentrated within the rural regions. Due to very low life expectancy, less than 5% of the people in Assam are beyond the age of 65, whereas, the number of children below 6 years is around 12% placing the combined vulnerable population to be around 17%. While there are other vulnerable groups such as expectant and nursing mothers, socially and economically marginalized, disabled etc., reliable data on them have yet to be generated, accessed and analyzed, which needs to be done on a regular basis. As per the available data, in general, one in every five persons living in Assam is highly vulnerable to hazard risks and related emergencies. The percentage literacy is low in the state compared to the national average therefore increasing the complexity of the state administration in communicating hazard risk information to the general public.

Over 50% of the population constitutes non-workers. Within the workers, only around 22% of the females are involved in some kind of an employment. This indicates that much of the households are dependent on single bread winners (male). The above aspect combined with skewed land holding (around 1 ha land held by individual farmers) increases the risk exposure of individual households. Sustainability of livelihoods in this existing scenario is highly vulnerable especially during or after any disaster events. This issue combined with the presence of less than adequate hospitals and public health

centers makes the state vulnerable to health hazards or epidemics which usually follow disasters such as flooding.

The state is frequently affected by the flood hazard i.e., on an average 34% of the land area is affected on decadal basis; followed by erosion, earthquake, landslide, fire and cyclonic storms. The state does receive relatively high average annual rainfall (2,425 mm) in India. The soil types within the states are predominantly of sand, clay or loam. Much of the area in the state is mountainous and exhibits slope which ranges from 1 to 8% with rivers in plains and gully erosion in the hilly areas. On an average 10-25% of the agricultural area is affected by this phenomenon.

Since much of the buildings within the state have roof and wall types of categories I and II, these buildings are at high risk to floods, erosion and cyclonic wind storms. The state is also situated in highly earthquake risk prone area (IX and above within MMI scale) placing much of the lifeline infrastructures such as dams, bridges, hydro power projects vulnerable to the hazard. With many hydro-power projects taking shape in the state, a detailed assessment of earthquake vulnerability of these infrastructures must be carried out for developing realistic disaster management action plans.

Rapid and unplanned urbanization, population growth, high migration rates and change in land use pattern of the city due to uncontrolled development activities are said to have done a lot of harm to the ecology and environment of the cities across the state. Illegal construction on hills has been one of the major causes for landslides. Uncontrolled urban development, particularly construction activities in and around the city and the city being in high seismic activity zone are the major risk drivers in the city and urban centres of Assam.

Better urban services and employment opportunities as compared to other rural areas such as education and medical facilities also are factors affecting immigration in Assam. As in most cases these people are poor or from economically backward background and thus, they tend to settle in illegal settlements and encroachments on hills or fragile lands, making themselves exposed to landslides and fire hazards.

The State of Assam is one the most vulnerable states against climate change and vulnerability according to the scientific assessment study - Climate Vulnerability Assessment for the Indian Himalayan Region Using a Common Framework 2018-19.[13]

a) Climate Variability and Climate Change

Assam is expected to be highly prone to the impact of climate variability and change. The main characteristics of climate change include rising temperatures, changes in rainfall pattern, melting of glaciers and sea ice, sea level rise and an increased intensity and/or frequency of extreme events. These changes in physical processes have impacts on biological and socio-economic factors such as: shifts in crop growing seasons; changes in disease vectors; increased rates of extinction of many species; severe water shortages; and heavy deluges and flooding.

[15]Source: Climate Vulnerability Assessment for the Indian Himalayan Region Using a Common Framework 2018-19.

b) Climate Projections

Climate projections for Assam show the projected changes in various climate parameters till mid-century. Temperatures continue to rise and may increase by 1.7-2.0 C with reference to base line (BL). Only the western part of the State will experience slight decrease in rainfall but the rest of Assam is projected to have increase in rainfall. There is likely to be increase in extreme rain fall event by 5% to 38% w.r.t.to base line. Droughts weeks are going to rise, with Southern districts showing marginal reduction in drought weeks but rest of the district show an increase by more than 75% with reference to BL. As regards floods, they are going to rise by more than 25% in the southern parts of Assam. Table12 below presents projections on the temperature and rainfall projections till 2050.

Table 12: Climate Projections for Assam and North East States

Temperature and Rainfall	**2021 to 2050 with reference to BL**	**Remarks**
Mean Temperature	1.7-2.0 C	Across Assam
Annual Rain fall	5 to 38%	North western districts
	5-10%	North Eastern districts
	10-25%	Central, South Eastern District
Extreme rainfall days	5-38%	Rainfall >25 to 150 mm
Drought weeks	25% to >75%	Southern districts show marginal reduction in drought weeks but rest of the districts show an increase by more than 75% wrt BL
Floods	Stream flow <10 % to > 25%	Min in North East and Max in Southern part of the State

Source: Climate Vulnerability Assessment for the Indian Himalayan Region Using a Common Framework 2018-19

c) Vulnerability of the State to Climate Change:

Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. Therefore, the inability to cope with changing climate conditions is generally contextual and is a characteristic of the existing developmental paradigm, and that of the social and ecological systems amongst others.

Physical Vulnerability:

- 31.98% of the State's population lived below the poverty line (2011-2012), with majority of the population, especially the people living in interior rural areas, in areas inhabited by Scheduled Caste & Scheduled Tribe population, tea garden areas and far flung "char" (riverine) lack facilities of safe drinking water, sanitation etc. These developmental gaps contribute to the communities' vulnerability to climate change.

- Small islands in the Brahmaputra and Barak River basin are isolated from the rest of Assam and have no permanent health care facilities and are prone to frequent flooding as climate change continues, these islands will become increasingly vulnerable.
- Primary sector comprising of agriculture, fisheries and forests, which together contribute 34% of the GSDP, and combining mining and quarrying the primary sector has a share of 42% in the total GSDP of the State. Climate change will impact agriculture, fisheries, forest and affecting food security, income and livelihood of people.
- Practices such as over exploitation of ground water, Jhum cultivation in hilly areas, mono cropping etc. and recurrent floods and droughts have been putting pressure on the agriculture system. Exacerbations of climate change induced hazards are likely to further make the agriculture production system of the State uncertain.
- The predicted increase in average temperature and decrease in the number of rainy days due to climate change will further stress water resources.
- Dependency on fuel wood, mining, logging, urbanization, encroachment, higher frequency Jhum cultivation etc. are some of the developmental factors leading to degradation of forests. As floods and droughts are likely to intensify, it is very likely that a further reduction in forest cover may occur in these areas and may amplify the impacts on agriculture, water resources and the composition of the remaining forestland.

Economic Vulnerability:

The anticipated economic impact of climate change in Assam will be as follows[14]:

- Agriculture and horticulture contribution to State GDP (SGDP) will be reduced by about 2%, partly as a result of temperature trends and partly because of more variable and unpredictable rainfall.
- Climate change will result in more frequent and severe floods which will increase the costs of reconstruction and maintenance on State infrastructure, including roads, irrigation, water and sanitation. The economic cost of climate change on infrastructure would grow to between 0.3% and 0.9% of GDP by 2050.
- The increase in flooding will also increase loss and damage to domestic and industrial property and will affect labour productivity and result in increased health burden and loss of life and injury.
- Loss and damage in the forestry sector is likely to be higher than average in Assam, because of the large forest area.
- World Health Organization (WHO) suggests that climate change in tropical areas is likely to increase the incidence of climate sensitive diseases by about 10%.

Environment and Eco-System Vulnerability:

[14] Assam State Action Plan for Climate Change

With glacial contribution decreasing over the years, future lean season flow (low flow) may decrease in the Brahmaputra basin leading to increased water stress and changed hydrological regimes of the rivers as well as altered eco-hydrological characteristics of the riparian ecosystems. As a result, agriculture on which large populations depend for livelihoods and diverse ecosystems that sustain a rich biodiversity and food security in the state may be jeopardized.

Important forest ecosystems (especially grassland and wetland environs) on river banks such as those in Kaziranga, Manas, Pobitora, Burhachapori, Panidihing and Dibru Saikhowa may see changes in the normal mode of land water interactions which may have significant detrimental effect on the micro-environment characterized by temperature, soil moisture, humidity on which the sustenance of many wild flora and fauna depends.

4.5 Scale and Diversity of Assets

Needing Disaster Risk Management Arrangements

Given the State's geographical location, population size, natural resources, richest biodiversity zones, and complexity of hazard risks, there can be no single approach directed towards protecting the people and elements at risk (physical, social and economic resources). A wide range of government institutions operate to govern the state and manage the assets. The state is among nation's largest producer of crude oil, significant share in India's agricultural production (tea and rice), and has built up infrastructure system (lifeline buildings / highways/road / rail / airport / heliport / power / communication) that serves as a critical link within the state and as a vital link to northeastern part of India.

Considering the geographical location, access issues, population exposure, scale and diversity of resources, there exists an urgent need for implementing and expanding State wide comprehensive disaster management strategies. Resilience building encompassing preparedness, prevention, mitigation, emergency response and rehabilitation initiatives, if taken by all departments of the state, will result in minimizing the loss of life, property and livestock; reduce disruption time of basic services vital for society to function and protect assets/infrastructure which are vital for the state economy. It is necessary to devise and implement strategies so that the affected community is able to bounce back to pre-disaster stage well before the next occurrence of such recurrent disasters.

4.6 Environment and Wildlife Conservation

Environment and ecosystems in Assam provide goods and provisions such as food-plants and animals, water, raw materials for production and many types of medicines on the one hand, and on the other it protects the state from natural events such as cyclone and flood. Besides, it also offers the most general ecosystem services necessary for all living things to survive (e.g. production of atmospheric oxygen, soil formation, nutrient cycling and water cycling).

Natural disasters in Assam cause extensive environmental degradation thereby exposing the ecosystem's capacity to provide critical productive services such as arable land and portable water and protective service (soil stabilization). Further, disasters grossly impact the ecology and environment posing threat to the populations of endangered species; disrupt wildlife conservation or ecologically important habitats.

A resilient ecology plays an important role in supporting recovery and reconstruction after a disaster, but in reducing future disaster risk. Our National DM Framework states that strengthening of environmental resilience is one of the strategies required for preventing the creation of risks and notes the importance of preserving ecosystem functions that help to reduce risks while promoting the mainstreaming of DRR. Protected areas, ecosystems restoration and natural resource management would, therefore, be the key for Assam to achieve DRR objectives.

4.6.1 Key areas of Environmental Management for Disaster Risk Reduction

i. Environmental Monitoring and Assessment

Environmental monitoring and assessment play an important role in generating relevant information that assists environmental and disaster managers in identifying risks, vulnerabilities and opportunities to promote community resilience. Monitoring and observing environmental factors that signal the onset of a hazard are fundamental to early warning systems. Environmental monitoring systems also track trends in environmental degradation, such as deforestation, that underlie a local area's exposure to risk.

Mapping hazard risk and exposure is another function of environmental monitoring. In addition to identifying hazard risk (flood, landslide, seismic activity, etc.), some environmental authorities also map environmentally sensitive areas. Environmental assessments produce targeted environmental analyses by reporting on current and anticipated future environmental conditions and identifying drivers of environmental change. These include post-disaster assessments that identify environmental damages and needs, as well as strategic environmental assessments (SEAs) that determine potential environmental consequences of development plans and policies.

ii. Protected Area Management and Ecosystem Rehabilitation

While the environmental conditions modify the frequency of hazard events, ecosystems serve as natural barriers that can moderate the effects of a hazard and protect communities. According to the Millennium Ecosystem Assessment (MEA 2005), an ecosystem is a dynamic complex of plant, animal, and micro-organism communities and the non-living environment interacting as a functional unit, which could range from relatively undisturbed areas such as natural forests, landscapes with mixed land-use patterns, to an intensively managed system by humans, such as agricultural land and urban areas. Ecosystems are socio-ecological systems and managing ecosystem services is highly relevant for the purposes of disaster risk reduction. Biodiversity including rare wildlife and their habitats are included in these.

Global climate change awareness has spurred a new drive to better manage protected areas and reduce deforestation. Protecting and preserving the natural position and trajectory of wetlands and other water resources has received increasing support, given the risks from their alteration, elimination or loss for developmental purposes[15].

Ecosystem rehabilitation or restoration entails a wide array of activities, including post-disaster clean-up, e.g. after an oil spill, as well as replanting of forests or mangroves. Restoring ecosystems following

[15] NDMP 2019

natural and human-made disasters can work to reduce the underlying risk factors and mitigate future disaster impacts. Decisions at the field level require detailed knowledge of local environmental conditions (e.g., planting regimes, species choices) and competing community needs. There are several examples of protected areas management, ecosystem restoration and natural resource management showing how decisions need to balance livelihood priorities with environmental sustainability concerns.

Pro-actively managing natural areas can ensure protection of the environment and reduce underlying risk factors for disaster by maintaining the resilience inherent in ecosystems. Community participation in forest and fire management has also played an important role in reducing risk of devastating wildfires. Fuel reduction employing both the use of mechanical means as well as controlled (prescribed) fire contributes to a reduction of wildfire hazards and the risk of high-severity wildfires.

4.7 State and Bio-Diversity Conservation

Biodiversity refers to the variety of life forms at all levels of organization, from gene through species to higher taxonomic forms and also includes the variety of ecosystems and habitats as well the processes occurring therein. Biodiversity is fundamental to the fulfillment of human needs - a biodiversity rich region offers wide options and opportunities for sustaining human welfare including adoption to changes.

The State of Assam is a constituent unit of the Eastern Himalayan Biodiversity Region; one of the two biodiversity “Hot Spots” in the country. The climatic condition and variety of physical features in Assam have resulted in a diversity of ecological habitats such as forests, grasslands, wetlands, which harbor and sustain a range of floral and faunal species. A state with an abundance of wilderness, Assam has five national parks, eighteen wildlife sanctuaries and is home to two-thirds of the population of the unique one-horned rhino. Assam has 37.3% of its geographic area under forests and tree cover. The Forest and Protected Area Network in Assam is presented below in Table 13.

S.N.	Table 13: Forest and Protected Areas of Assam
1	National Park: 5 Kaziranga, Manas, Nameri, Dibru-Saikhowa and Orang Rajiv Gandhi
2	Tiger Reserve: 3 Kaziranga, Manas and Nameri Elephant Reserve: 5 Sonitpur, Chirang-Ripu, DihingPatkai, Kaziranga-KarbiAnglong and Dhansiri-Lumding
3	Biosphere Reserve: 2 Manas and Dibru-Saikhowa
4	World Natural Heritage Sites: 2 Kaziranga and Manas
5	Wildlife Sanctuaries: 20 Garampani, Laokhowa, Bornadi, Chakrasila, Burachapori, PanidihingHollongapar Gibbon, Pobitora, Sonai-Rupai, Bherjan-Borajan-Padumoni, East Karbi-Anglong, Nambor, Marat-Longri, Nambor-Doigurung, Amchang, Dihing-Patkai, Borail, Deepar-Beel, Bordoibum (Proposed) and North Karbi-Anglong (Proposed)
Source: (Assam State Bio-Diversity Board, 2020)	

i. Flora and Fauna Diversity

Table 14: Flora and Fauna Diversity	
FLORAL DIVERSITY	**FAUNAL DIVERSITY**
Angiosperms: 3017 species	Aquatic Plants: 100+ species
Gymnosperms: 23 species	Mammals: 164+ species
Medicinal Plants: 952 species	Primates: 10 species
Orchids: 193+ species	Birds: 800+ species (280 migratory)
Bamboos: 42 species	Reptiles: 116 species (approx)
Cane: 14 species	Amphibians: 60+ species
Ferns: 315 species	Fishes: 197 species
	Molluscs: 39 species
	Butterflies: 1500 species (approx.)
	Moths: 387 species

Source: Assam State Bio-Diversity Board, 2020.

- **Horticulture:** Assam is traditionally rich in horticultural production due to its diverse and unique agro-climatic condition, conducive for growing a range of horticultural crops like fruits, vegetables, flowers, spices, nuts, medicinal and aromatic plants. Major horticultural crops of Assam include banana, mango, lemon, orange, litchi, pineapple, papaya, guava, jack-fruit, chilli, turmeric, ginger, black pepper, coriander, areca nut, coconut etc.

- **Tea Plantations:** Assam is the biggest producer of quality tea in India, contributing about 55 per cent to country's total tea production. Tea industry has contributed substantially to the economy of the state. About 17 percent of the workers of Assam are engaged in the tea industry. Tea plants used to grow naturally in the Upper Brahmaputra Valley. Presently it grows both in the Brahmaputra and Barak plains. Tinsukia, Dibrugarh, Sibsagar, Jorhat, Golaghat, Nagaon and Sonitpur districts are rich in tea gardens.

- **Sericulture:** Assam is well known for its Sericulture industry and bulk of the country's Eri and Muga silk are produced in Assam. Rearing of Eri, Muga and Mulberry silk worm are playing an important role in the livelihoods of a large section of rural population of the State. It is practiced in more than 9000 villages and provides employment to around 1.91 lakh families.

- **Bamboos:** Bamboo has played an important part in the lives of the people of Assam. It has tremendous economic value besides being an integral part of the social and cultural traditions of the state. It grows in natural forests, and is cultivated in homesteads, groves and on private plantations. It is utilised for housing, fencing, agricultural implements, handicrafts, fuel and food. More than 42 naturally growing species of bamboo under 15 genera are recorded from Assam.

ii. Wetlands and Aquatic Plant Diversity

Assam has more fresh water wetlands than any other state in the North Eastern Region. The two major drainage systems of Assam-the Brahmaputra and the Barak and in the flood plains of these river systems exist patches of marshy depressions and swamps as well as perennial water bodies of varying shape, size and depth called locally as beels, haors, jalah, doloni, hola, pitoni etc. Man-made tanks like Joysagar, Sibsagar, Dighalipukhuri, Jorpukhuri, Hazarapukhuri, Rajhuwa Borpukhuri etc. were also dug by ancient Rulers of Assam. There are an estimated 3513 beels and hoars, 1,85,623 ponds and tanks and one reservoir in Assam. Deeporbeel near Guwahati is a Ramsar site. Besides Deeporbeel and some others mentioned above wetlands of importance are Chandubi, Rata, Sohola, Taralipather, Phokolai, Mer, Sonbeel, Jamjing, Sagunpara, Motapung, Sarlane, Sareswar, Roumari, Khalihamari, Goranga, Sapekhati, Koladuar etc.

In Assam, 6 national parks, 3 tiger reserves, 5 elephant reserves, 2 bio-sphere reserves, 2 World Natural Heritage sites (Manas and Dibru-Saikhowa), 20 wild-life sanctuaries and thousands of freshwater wetlands are vulnerable to annual recurring floods in the Brahmaputra and its tributaries, changing river courses and erosions, forest fire, increase and organized group encroachment in the reserved forests and grazing and poaching in the protected areas.[16]These natural habitats would be at higher risk

[16] Assam Forest Policy, 2004

of degradation with advent of climate change. Increasing hydro-meteorological events such as floods, erosion, and forest fire are major threats to the bio-diversity of the state.

4.8 DRM and Climate Change in Wildlife Action Plan

The Third National Wildlife Action Plan (2017-2031)[17] is based on the premise that essential ecological processes that are governed, supported or strongly moderated by ecosystems are essential for food production, health and other aspects of human survival and sustainable development. And maintenance of these ecosystems which can be termed as 'Life Support Systems' is vital for all societies regardless of their stage of development. It also emphasizes on other two aspects of resource conservation viz. preservation of genetic diversity and sustainable utilization of species and ecosystems which has direct bearing on our scientific advancements and support to millions of rural communities.

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

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

The following measures have been suggested in the WAP-3:

- The Environmental Impact Assessment (EIA) process needs to integrate the issues concerning CCA and DRR
- Improving collection and collation of data on hazards

[17] Third National Wildlife Action Plan (2017-2031)

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

Against this larger backdrop of the hazard, risks and vulnerabilities in the state of Assam, there is a need to have a more informed understanding of the risks and their underlying factors as the first step to build disaster and climate resilience in the state. The next Chapter 5 deals with the institutional arrangement for disaster management in the State of Assam.

CHAPTER 5: DISASTER MANAGEMENT: INSTITUTIONAL ARRANGEMENT

5.1 Overall Structure

An elaborate institutional arrangement across national, state and district levels for disaster management in India is conceived and mandated by Disaster Management Act 2005. However, it must be underlined here that a set of institutional mechanisms was already in place before the national DM Act was enacted. Thus, the DM Act supplements and does not supplant the institutional mechanisms in place before the enactment of DM Act.

The Disaster Management Act, 2005 puts in place new institutional arrangements at national, state and district level, in addition to the arrangements already in place. This is apparently done in view of the felt need post tsunami disaster in December, 2004, that while the response of the Government and other relevant agencies had been adequate, it could have been considerably improved, if appropriate preparedness and capacity building measures were put in place together with an effective coordination mechanism, and the necessary legislative mandate at national, state and district levels.

The Disaster Management Act, 2005 was enacted on 23rd December 2005 in the above-mentioned context. The legislation was made under Entry 23 (Social Security and Social Insurance) in the Concurrent List of the Constitution of India. This provides the advantage of permitting the States to have their own legislation on disaster management since it is not feasible for a national Act to take care of all micro level considerations which need to have legislative back up.

Besides, in a federal system where state governments draw their mandate directly under the Constitution of India like the national government, it would be appropriate to allow them to legislate to address their own concerns; more so when in the federal set up of India, the basic responsibility for undertaking rescue, relief and rehabilitation measures in the event of natural disasters is that of the State Government concerned. The role of the Central Government is supportive, in terms of physical and financial resources and complementary measures in sectors such as transport, warning and inter-state movement of food grains and other relief materials/ resources and other logistic support measures.

The Disaster Management Act, 2005 therefore puts in place an institutional mechanism in the country by establishment of-

- A National Disaster Management Authority (NDMA) at central level;
- National Executive Committee at central level;
- State Disaster Management Authorities at state level;
- State Executive Committees at state level;
- District Disaster management Authorities at district level;
- National Disaster Response Force; and
- National Institute of Disaster Management

At a macro level, the institutional arrangement across all States including Assam is fairly uniform. The State Authority has the responsibility for laying down policies and plans for disaster management in the State. The Chief Secretary, who is the Chairperson of the State Executive Committee which assists the State Authority, is also the ex-officio Member of the State Authority. Besides, the State Government has also established a District Disaster Management Authority (DDMA) for every district in the State.

The District Authority is headed by the Collector or District Magistrate or Deputy Commissioner, as the case may be, and has an elected representative of the local authority as Co-chairperson. However, in any district where a Zilla Parishad exists, the Chairperson thereof shall be the co-Chairperson of the District Authority, provided that in the tribal areas, the Chief Executive Member of the district council of autonomous district shall be the Co-Chairperson.

It is also statutorily provided under the Act that the State Authority has the responsibility for laying down policies and plans for disaster management in Assam. Specifically, the State Authority may—

(a) Lay down the State Disaster Management Policy;

(b) Approve the State Plan in accordance with the guidelines laid down by the National Authority;

(c) Approve the disaster management plans prepared by the departments of the Government of the State;

(d) Lay down guidelines to be followed by the departments of the Government of the State for the purpose of the integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therein;

(e) Coordinate the implementation of the State Plan;

(f) Recommend provision of funds for mitigation and preparedness measures;

(g) Review the developmental plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein; review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary;

(h) Lay down detailed guidelines for providing standards of relief to persons affected by disaster in the State; provided that such standards shall in no case be less than the minimum standards in the guidelines laid down by the National Authority in this regard.

As per the Disaster Management Act, 2005 and the Assam Disaster Management Rules, 2010, DM arrangements in the state are based on partnerships between National, State, District and Local Authority. This partnership recognizes each level of DM arrangements. Although the Disaster Management Act, 2005 does not categorize disasters as national, state or district level disasters, the levels of disasters have generally been recognized internationally and disseminated, based on the ability of various authorities to deal with them.

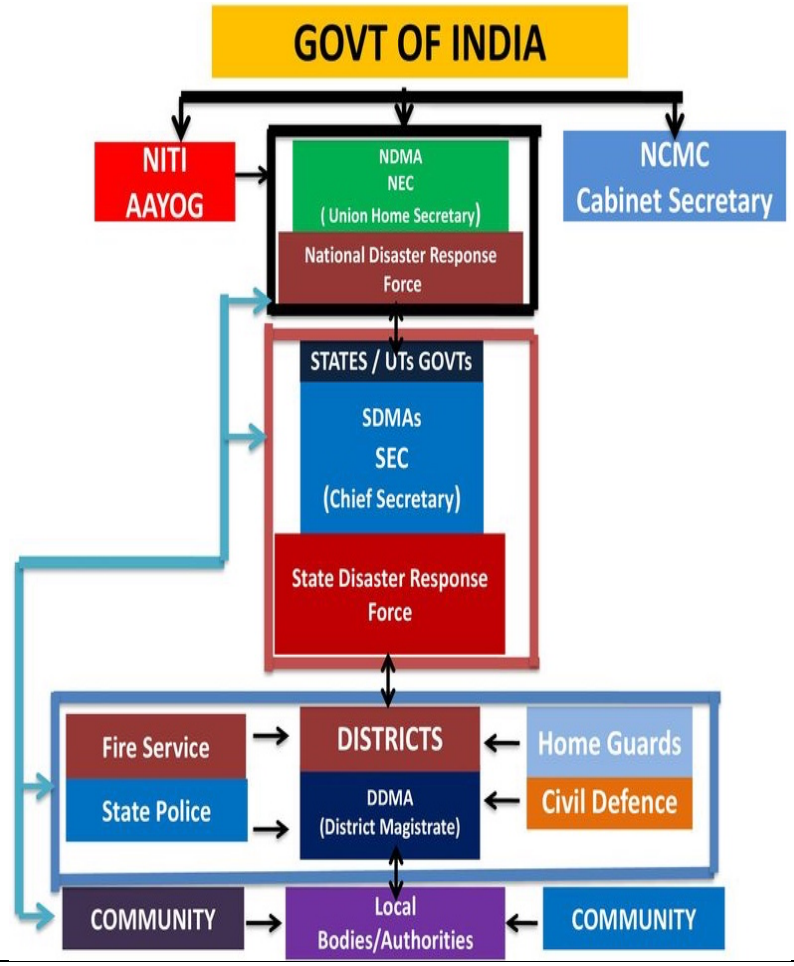
L0	L0 denotes normal times which are expected to be utilized for close monitoring, documentation, prevention, mitigation and preparatory activities. This is the planning stage where plans at all levels from community to the State shall be put in place. Training on search and rescue, rehearsals, evaluation and inventory updating for response activities will be carried out during this time.
L1	L1 specifies disasters that can be managed at the district level; however, the state and centre will remain in operational readiness to provide assistance, if needed.
L2	L2 specifies disaster situations that may require assistance and active participation of the state, and the mobilization of resources at the state level. In this case also, the central government and agencies will remain in operational readiness to provide assistance, if needed.
L3	L3 disaster situations arise from large scale disasters where districts and the state may not have the capacity to respond adequately and require assistance from the central government for assisting the state and district machinery.

There may be disasters which affect a local area only but the expertise required may be so specialized that it may not be available with the district or state authority such as nuclear, biological and chemical disasters and therefore such disasters qualify as L3 disasters since intervention of national government becomes necessary.

The partnership across authorities is to work collaboratively and ensure coordination and planning at all times, information sharing and resource mobilization that are necessary for DM. In any response situation, initial efforts would always be made by the District Administration. However, when District is overwhelmed in any situation, the support necessarily has to come from the State and National Level. Responsible Officer (RO) within the jurisdiction control will trigger the activation for various levels of disaster.

DM arrangement in Assam is based on a four tired structure and recognizes all four levels, including the support mechanism from the National Level.

Figure P: Overall Structure

Statutory Authority	Arrangement	Level of Operation[18]
National		L3
State		L2
District		L1

Source: KL Team, 2021

Overall institutional disaster management structure is already established across the state of Assam (Local/District/State) along with creation of support structures such as Disaster Response Information Centre, State Disaster Response Force (SDRF) among others, so as to conduct operations for each level of DM arrangements.

[18] Reference has been made to High Powered Committee (HPC) Report, 2001

Institutional Framework and their roles and responsibilities at State and below-State Level

a) Roles and Responsibilities of State level arrangements

Assam State Disaster Management Authority

The Assam State Disaster Management Authority constituted under the chairmanship of the Chief Minister and other members will ensure inter-departmental coordination covering all aspects of DM. Its functions are enumerated above.

State Executive Committee

The State Executive Committee (SEC) constituted under the chairmanship of the Chief Secretary to the Government of Assam will assist the State Authority in the performance of its function and coordinate action in accordance with the guidelines laid down by the State Authority and ensure the compliance of directions issued by the State Government under the Act.

b) Roles and Responsibilities of District level arrangements--District Disaster Management Authority

The District Disaster Management Authority is constituted for every district in the State under the chairmanship of the Deputy Commissioner. The District Authority shall act as the district planning; coordinating and implementing body for DM and take all measures for the purposes of DM in the district as per the guidelines laid down by the National and State Authority.

The District Authority will prepare the District Disaster Management Plans, review capabilities and preparedness measures, give directions to the concerned departments at the district level, organize and coordinate specialized training programmes for different level of officers, employees, voluntary rescue workers and take all such measures as may be appropriate for a holistic and pro-active approach to DM.

c) Roles and Responsibilities of Local level arrangements

Local Authorities

In Assam the local authorities include the PRIs, Municipalities, Urban Local bodies, Autonomous Councils, Development Councils and Territorial Councils etc. The local authority will ensure that its officers and employees are trained for disaster management, resources relating to DM are so maintained as to be readily available for use in the event of any disaster situation; construction practices under it or within its jurisdiction conform to the standards and specifications laid down for prevention of disaster and mitigation; and carrying out relief, rehabilitation and reconstruction activities in the affected areas in accordance with the State Plan and the District Plan.

i. National Institute of Disaster Management

The National Institute of Disaster Management functions within the broad policies and guidelines laid down by the National Authority and is responsible for planning and promoting training and research in the area of disaster management, documentation and development of national level information base relating to disaster management policies, prevention mechanisms and mitigation measures.

ii. National Disaster Response Force

The National Disaster Response Force has been constituted for the purpose of specialized response to a threatening disaster situation or disaster. The general superintendence, direction and control of the Force shall be vested and exercised by the National Authority and the command and supervision of the Force shall vest in an officer to be appointed by the Central Government as the Director General of the National Disaster Response Force.

Disaster Management Plan

As per the DM Act 2005, Disaster Management means a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for-

- Prevention of danger or threat of any disaster
- Mitigation or reduction of risk of any disaster or its severity or consequences;
- Capacity-building;
- Preparedness to deal with any disaster;
- Prompt response to any threatening disaster situation or disaster;
- Assessing the severity or magnitude of effects of any disaster;
- Evacuation, rescue and relief;
- Rehabilitation and reconstruction;

Disaster Management plan at all levels will be drawn upon at the Local, District and State levels as well as by relevant departments with a mandate for DM functions to ensure coordination and holistic response to disaster. The plans will incorporate the inputs of all stakeholders for integration into the planning process.

iii. Supporting Plan

State level Supporting Plan (Department and Sector) for each of the functional area, developed in relation to specific hazards and related intensity of emergency are to be produced as directed by SEC. Supporting Plans are to be reviewed and endorsed by ASDMA.

In preparing the Supporting Plan the sector department (designated as an agency for a hazard/emergency or involved in sector development activities) is required to communicate/consult with all other departments/agencies/organizations that have a role in mitigation/prevention, preparedness, emergency response, rehabilitation. The roles and responsibilities of primary and support

organizations will be detailed in the Supporting Plan. The Supporting Plan will identify resources available for their own agency for undertaking DM activities taking into consideration of covering the local function requirements, as well as make provisions from external sources (support organizations), if need arises.

This methodical approach of DM plan development process is applied at State, District & Local level and Supporting/Sub-Plan current status compiled as Annex to State DM Plan and District DM Plan, City DM Plan. Their development must be approved by respective institutional arrangements in Assam.

iv. State Guidelines for Disaster Management

The DM Act 2005 mandates the NDMA to lay down policies and guidelines (National Disaster Management Guidelines, NDMG) to be followed by the State Authorities in drawing up the State Plan. NDMA guidelines inter alia cover different aspects of prevention, mitigation, preparedness, rehabilitation and reconstruction. NDMA has also formulated appropriate policies and guidelines for effective and synergized national disaster response and relief. The State Plan must be in conformity with the guidelines laid down by NDMA. This has been ensured in the preparation of ASDMP 2022 as well.

Given the unique characteristics of the State, prevalent hazards and associated socio-economic risks, the State Disaster Management Authority shall have the responsibility for laying down policies and plans for disaster management in the State and lay down guidelines to be followed by the departments of the State for the purposes of integration of measures for prevention of disasters and mitigation in their plans and projects and provide necessary technical assistance for the same. SDMA therefore must initiate steps towards preparation of State Disaster Management Guidelines (SDMG). SDMG shall be prepared by ASDMA in consultation with local/district/state authorities and subject matter expert.

National DM Guidelines on Preparation of State Disaster Management Plan (NDMA, 2007) envisage the key roles of the departments in planning and coordinated execution of State and Departmental DM plans to promote sharing of resources, perspectives, information and expertise through support of training centres, academic and applied research, education and awareness generation programme, etc. Further, the 'all sectoral' approach mandated by NDMP 2019 requires states to have updated departmental DM plans and call for state departments' enhanced synergy and engagement for holistic DRR and resilience building in the state to meet the emerging challenges of disasters and climate change.

Assam has already made institutional arrangements and allocated specific responsibilities to the state departments against different phases of disaster management cycle. ASDMA, as per the given mandate, is coordinating with the departments and guiding the departments to develop the departmental DM Plans. Further, departments are updating the departmental plans as directed by ASDMA from time to time as per the DM Act 2005. As of now, 16 Departments have already prepared their Departmental Disaster Management Plans, as prescribed by Assam State Disaster Management Authority (ASDMA).

Since the departmental plans have a direct bearing on the State DM Plan, the inputs of the relevant departments were critical. Hence, 20 consultative meetings were scheduled during 21st November, 2020 to 14th February, 2021, and were aimed at eliciting their views, inputs and suggestions on key

issues and challenges related to overall DM planning, implementation and coordination, both at the state and departmental levels. This has been really helpful in improving and updating the SDMP and departmental planning process.

The summary of suggestions and recommendations that emerged from these consultative meetings is listed as follows:

1. Adequate coordination is an area of concern in the Departments, both horizontally and vertically. The coordination needs to be improved at the level of these Departments.
2. Every Department has the problem of finance/ adequate budgeting. As they do not have adequate budgetary allocations and funds, they are struggling to access the mitigation fund at the State level.
3. Focused specialized trainings, customized to the learning needs of various functionaries at different levels are strongly felt needs across most of the departments. However, at present, only the generalized disaster management trainings are being organized in the Departments, which are not adequate. It's high time for more specialized need-based training and capacity building interventions.
4. Lack of a clear-cut action plan is another grey area pointed out at the departmental level. There are many Departments, which have yet to come out with time bound action plans or departmental roadmaps with short term, medium term and long-term perspective.

The suggestions made by the departments and agencies of the Government of Assam have been taken into consideration, while revising the ASDMP.

v. Partnership arrangement - Involvement of Civil Society Organizations, Private Sector and Voluntary agencies.

Within the larger framework of a multi-stakeholder partnership arrangement, DM activities entail support across variety of institutions including the Civil Society Organizations and Private Sector Organizations. Business and industry organizations are expected to be aware of the hazard risks in the state. Risks posed by geological and hydro-meteorological hazards are high and therefore executive staff of these organizations will require assessing threats and putting in place adequate prevention and mitigation strategies. Onsite and offsite plans are a mandatory requirement for all hazardous units. The existing emergency plan could expand to include employee injury prevention programmes, community outreach programmes (educate people about potential threats), business continuity plan and to allocate resources towards hazard specific mitigation measures. A critical need for coordination and partnership support in DM has been recognized by ASDMA.

Voluntary organizations are involved in providing disaster relief to individuals and families during emergency situation / mass care, in coordination with the State/District administration. Traditional relief and response agencies, community first responders (trained in basic first-aid, search and rescue) and DM Volunteers provide extensive support (knowledge assistance, human resource requirement) to local administration and community during emergency situations.

vi. Disaster research, documentation and scaling-up

The existing institutional arrangement will also be suitably re-oriented to promote required disaster research, its documentation and dissemination. Specific learning from the disaster research undertaken is envisaged to feed into the planning process and implementation strategies for disaster managements across different districts and departments in the state.

Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue. "Disaster research" deals with conducting field and survey research on group, organizational and community preparation for response to, and recovery from, natural and technological disasters and other community-wide crises. The purpose behind this field of research is to attempt to advance and communicate knowledge on mitigation techniques and procedures and disaster preparedness, response, and recovery. Research allows continuous improvement through enhancement of arrangements, policies and planning with the aim of minimizing the effects of disasters and enhancing community resilience to disasters.

Engineering institutions are traditionally involved in research towards improvising the safety and design of structural elements to withstand severe forces. Post-disaster needs assessments (PDNA) also provide valuable information from the field and can be directly linked to developing prevention and mitigation instruments/tools. The lessons identified/best practices (what worked and what did not work effectively) can be documented and circulated for policy considerations, based on which appropriate guidelines may be developed, to be followed by all concerned departments and agencies.

DM stakeholders across departments and agencies will have their own independent responsibility to identify, support and resource research priorities within their sector. It is important to establish links with research/policy/academic organizations at the state and national level involved in the realm of disaster research and documentation of best practices.

vii. List of good practices/innovations

There are several good practices/ case studies/ innovations, both national and international, available which can be accessed for disaster response and risk reduction that would inform and guide the policy makers and practitioners of Assam in taking appropriate actions to mitigate disasters and climate change. The list of good practices and their links are given below:

1. Volunteer Network Management system, OXFAM India, https://d1ns4ht6ytuzzo.cloudfront.net/oxfamdata/oxfamdatapublic/2018-10/DRR_AnimeshAprilbooklet_Web_0.pdf
2. Strengthening Community Based Early warning system, OXFAM India, https://d1ns4ht6ytuzzo.cloudfront.net/oxfamdata/oxfamdatapublic/2018-10/DRR_AnimeshAprilbooklet_Web_0.pdf
3. Application of Technology for Reduction of Disaster Risks. This booklet includes 14 best practices on the application of technology for reducing disaster risks from China, Japan and the Republic of Korea in which the experience, impacts and results, lessons and relevant challenges are introduced. https://www.undrr.org/publication/trilateral-best-practices-application-technology-reducing-disaster-risks-china-japan

4. Adaptive Social Protection and Disaster Risk Management: A Case Study of Japan, https://www.preventionweb.net/publication/adaptive-social-protection-and-disaster-risk-management-case-study-japan-english
5. WhatsApp messages from Bhutan save lives in Assam (Good Practice), https://www.thethirdpole.net/en/regional-cooperation/community-communications-save-lives-in-assam/
6. Friendly social media warnings from Bhutan help Assam villagers tackle floods, (Good Practice), https://www.hindustantimes.com/india-news/friendly-social-media-warnings-from-bhutan-help-assam-villagers-tackle-floods/story-6vf9Hak0weAkoNdVIr59EN.html
7. Collective Action Integral to Transboundary Risk Governance, Transboundary Early warning System in Asia; (available at https://reliefweb.int/report/india/trans-boundary-early-warningsystems-asiasouthasiadisastersnet-issue-no180-january)
8. Transformative Women Leadership for Inclusive and Participatory Water Management; (Available at https://www.unescap.org/sites/default/files/Environmental%20Change%20Through%20Participation.pdf)
9. Mainstreaming DRR in Local Development Plans to reduce aid dependency;(available at https://www.oxfamindia.org/blog/mainstreaming-drr-localdevelopment-plans-reduce-aiddependency)
10. 'Feasibility study of application of life towers in flood prone settlement of Odisha,' available at https://docs.unocha.org/sites/dms/Documents/Prakash_Lifetower.pdf
11. Prayas – Innovation and Learnings from CSOs in DRR, IAG Odisha and Odisha State Disaster Management Authority 2016 (Available at https://www.oxfamindia.org/knowledgehub/workingpaper/water-wisdom-times-climate-crisis
12. Defying Climate Change –Putting Women and Children First" a compendium on best practices in climate change adaptation; (Available at https://cansouthasia.net/wp-content/uploads/Defying-Climate-Change.pdf
13. Integration of CCA and DRR for Flood Resilience: A review of good practices in the United Kingdom; (Available at https://www.preventionweb.net/files/66296_f337finalcleggintegrationofccaanddr.pdf
14. 30 innovations for Disaster Risk Reduction, https://collections.unu.edu/eserv/UNU:7274/n30_Innovations_for_Disaster_Risk_Reduction_final.pdf

CHAPTER 6: SOCIAL INCLUSION IN DISASTER RISK REDUCTION

6.Introduction

Inclusion means that all people, regardless of their abilities, disabilities, or health care needs, have the right to be respected and appreciated as equal members of their communities. Inclusion is seen as a universal human right. The aim of inclusion is to embrace all people irrespective of race, gender, disability, medical or other needs. It is about giving equal access and opportunities and getting rid of discrimination and intolerance. It affects all aspects of public life.

Article 15 (1) of the Constitution of India, enshrined as a pivotal article under Fundamental Rights states that "The State shall not discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them" It is not just a negative barrier on prevention of discrimination. It entails the State to take positive action to ensure equity and inclusion for all segments of population.

The Disaster Management Act, 2005 further reiterates this constitutional prohibition against discrimination by stating specifically that "While providing compensation and relief to the victims of disaster, there shall be no discrimination on the ground of sex, caste, community, descent or religion". (Section 61).

The preamble of the National Policy on Disaster Management (NPDM) 2009 notes that the economically weaker and socially marginalized sections, women, Scheduled Castes and Scheduled Tribes tend to suffer more during disasters. The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015 – 2030 calls for an 'all-of-society approach' that is people-centric and inclusive.

Disaster Risk Management (DRM) needs 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 marginalized social status. Addressing the enormous challenges of social marginalization, social exclusion and other inequities may be generally considered as beyond the domain of DRM. However, DRM must take cognizance of social realities to ensure that every possible effort is made to make DRM as socially inclusive as possible.

Inclusive Disaster Risk Management is about equality of rights and opportunities, the dignity of the individual, acknowledging diversity, and contributing to resilience for everyone, not leaving aside members of any community based on age, gender, disability or other.

The added emphasis on social inclusion in the ASDMP for DRM will be on the following:

- Gender-based vulnerabilities
- Scheduled Castes and Scheduled Tribes (SC&ST)
- Elderly people
- Women
- Children
- Persons with Disabilities (PwDs)
- Transgender people

The Department/ Directorate of Women and Child Development and Department/ Directorate of Social Justice and Empowerment and Department/Directorate of Tribal Affairs (Plain) Government of Assam aim at welfare of the Children, Women, Physically Challenged persons and Elderly Persons and marginalized sections addressing their special needs. The plan of the Department / Directorate has budget provision for such activities on annual basis.

6.2 Gender Perspective in Disaster Risk Management (DRM)

Gender inequality is a fundamental challenge for development in general and disaster risk management in particular. Gender roles directly influence who has access to and control over which resources and opportunities, and who makes decisions. This may render women more vulnerable than men to the impacts of disasters. Understanding how gender relations including power based on sex shape the lives of women and men, vulnerabilities, capacities and what threats they are exposed to, is therefore critical for inclusive DRM.

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

Government of Assam under the GoI-UNDP Disaster Risk Management programme, sought to build the capacities of volunteers to act as trainers to impart disaster preparedness skills in the community. The volunteers drawn from the community with the help of civil society organizations underwent a Training of Trainers course at the block level. It was felt that women master trainers would provide an enabling environment for other women to learn. In addition, these trainers would act as facilitators in the process of developing a contingency plan at the village level and assist in the formation of Disaster Management Teams (DMTs).

6.3 Scheduled Castes and Scheduled Tribes

The Scheduled Castes (SCs) have been the most socially and economically backward and discriminated communities for several centuries in India including Assam. Although measures such as reservation have been undertaken to address the issue of discrimination primarily in education and employment after Independence in the form of constitutional protection and enactment of laws, the fact remains that discrimination still persists in many ways, especially in rural areas, but to some extent in urban areas as well. It is therefore necessary to extend protection and support to the members of the scheduled caste, particularly in disaster situations. The fact that most of the scheduled caste communities, besides being socially marginalized, are also economically poor and disadvantaged, warrants the need for special protection for them. Similar is the case for the members of the Scheduled Tribes (STs)

The total population of Assam according to 2011 Census is 3.12 crore. Of them, 22.31 lakh persons are Scheduled Castes (SCs) and 33.08 lakh persons are Scheduled Tribes (STs), constituting 7.15 and 10.60 per cent of the total population of the state. It is therefore necessary to pay more intensive attention to scheduled tribes and scheduled caste communities since it has generally been observed that there is an element of discrimination against such communities in distribution of relief materials and re-construction of dwelling units, due to inherent bias primarily at the community level. It is therefore essential for the State Government to ensure that such disparities are aggressively discouraged and exemplary punishment is awarded to persons engaged in promoting such disparities.

6.4 Provision for Women

To increase the coping capacity of vulnerable sections of the community, viz., women, adolescent girl and girl child, the Department/Directorate of Women and Child Development is implementing various schemes such as Ujjawala, Women Helpline, Working Women Hostel etc. These initiatives envisage encouraging women empowerment, gender equality, promoting their participation and leadership among others. In the event of pre and/or post-disaster scenario, schemes that focus on women may be activated by the Department/Directorate of Women and Child Development/ Department/Directorate of Social Justice and Empowerment of Assam in association with ASDMA and respective line departments at the district level. The respective Departments should prioritize the schemes that help in building resilience among the vulnerable sections of women.

6.5 Child Risk and Impact Assessment

Children of both the gender from different age groups are mostly at-risk from the impact of natural disasters and conflicts. Many aspects of children's lives are affected adversely including, but not limited to, dropping out of school, missing immunization due to disruption of health services and the non-availability of nutritious food, clean water and sanitation facilities leading to malnourishment and diseases. In addition, during disasters there is also increased incidence of violence, exploitation and abuse as well as child trafficking and child labour.

The United Nations Convention on the Rights of the Child adopted in 1989 (UN 1989) became the first legally binding international convention to affirm human rights for all children. It stipulates that children have the right to adequate food, water, shelter and education. In disaster situations they ought to be free from abuse, neglect, sexual exploitation or trafficking, and should be able to grow up in a safe and supportive environment. Children are vulnerable due to their age and immature psycho-social understanding of the surrounding.19

The emphasis on strengthening the capacities of state disaster risk management governance systems and institutions at all levels, and supporting them to implement child-centered risk

[19] National Disaster Management Plan 2019 (Page 78)

informed programming plans and strategies is needed. Risk reduction strategies should focus on strengthening public health systems, improving water security and overall flood and drought preparedness, expanding child friendly spaces, improving readiness to support social sector recovery, comprehensive school safety and security, and supply chain management for relief operations. Community based disaster risk management programmes involving children and adolescents that support resilience initiatives in urban and rural settings could be well opted to empower children.

Children in age group 0-6 years are most vulnerable in disaster situations. The distress of parents gets communicated to them symbolically. In the event of death of either or both parents, particularly mother, their safety, security, food and nutrition and other basic needs at this tender age are vastly adversely affected. Besides, children in this age group run the risk of being kidnapped and trafficked. The risk is even graver in case of female children. Children mostly demonstrate sleeping problems, poor concentration, attention-seeking behaviour, dependency, temper, tantrums and increased fear. These factors eventually affect their personality even after growing up.

Common symptoms for children in age group 6-11 years include disturbing thoughts and images, nightmares, eating and sleeping disorders, non-compliance, irritability, extreme withdrawal, outbursts of anger and fighting, disruptive behaviour, inability to pay attention, irrational fears, regressive behaviour, depression and anxiety, feeling of guilt and emotional numbing, excessive clinging, headaches, nausea and visual or hearing problems.

Traumatic events experienced before the age of 11 are three times more likely to result in serious emotional and behavioural difficulties than those experienced later in life. Above all, they are at grave risk of being kidnapped and trafficked, particularly the female children. Besides, in the event of death of either or both the parents, their safety, security, food and nutrition, playing activities are adversely affected, as in case of children in 0-6 age group. In case of damage to the structures, temporary/ emergency provision needs to be created allowing children to access the services.

The state government may increase the food supplies so that the nutrition support can be doubled in the Anganwadis and primary schools. It is also necessary that schools and anganwadis become operational as early as possible in the aftermath of a disaster.

For youth in the age group of 11-18 years, it is important to note that they may experience a wide range of outcomes following disasters of all types, including natural disasters, and only a small percentage of children and youth will develop mental and/or substance use disorders after disasters. They become victims of depression, substance abuse, anxiety disorder, behavioral problems, including aggression and inability to control anger, while others may struggle with lack of control or hopelessness.[20]

Schemes launched by Assam Government like Poshan Abhiyan, Scheme for Adolescent Girls (SAG) and Integrated Child Protection Scheme (ICPS) may be used as important instruments for protecting children. It will be mandatory to keep a regular check and evaluation of these schemes at the different phases of disaster especially in the aftermath of any disasters.

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

[20] Behavioral Health Conditions in Children and Youth Exposed to Natural Disasters, 2018--SAMHSA

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 Department of Women and Child Development and Department of Social Justice and Empowerment 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[21].

On the same lines, ASDMA and the Government of Assam through Department/Directorate of Women and Child Development and Department/ Directorate of Social Justice and Empowerment, Home and other concerned departments may establish similar units at village and block level for protection of children in the State and ensure identification of relief camps with provisions for Child Friendly Spaces (CFS) adhering to the comprehensive and multi-hazard safety standards. Child Friendly Spaces (CFS) are the designated places within the relief camps, where children are provided a safe environment and integrated programs including play, re-creation, education, health and psycho-social support may be delivered by the related line department/agencies. The purpose of CFS is to support the resilience and well-being of children and young people through, structured activities conducted by community/ line departments in a safe, friendly and stimulating environment. It may be ensured that Child Friendly Spaces are operational in all camps where children are being taken care of (as included in the Annexure-II in SOP for Relief Camp Management).

4.2.1 Integration of orphan children in the society in the aftermath of a disaster

Orphan children fall within the category of "Children in need of care and protection (CNCP) as described in the Juvenile Justice (Care and Protection of Children) Act, 2015. The primary responsibility of execution of the Act lies with the State Governments.

Orphan children face grave problems in Assam. They are forced to become street children, rag pickers, drug addicts and dealers, beggars and are also kidnapped and trafficked for sexual abuse, made disabled for begging and sold as bonded labour. The position is equally worse for children becoming orphans due to any disaster. In particular, the on-going COVID-19 pandemic has brought this issue in sharp focus in general and in Assam in particular. However, reliable data on COVID orphans in the state has yet to be collected and analyzed for finding out ways and means to help them with appropriate policies and programs at the state level. Health Department is assigned with the task of mapping each COVID orphan and ensuring access to government welfare schemes for the fullest human development. COVID orphans belong to a larger group of children rendered orphans due to a variety of reasons including disasters which also cover COVID 19 pandemic.

[21]National Disaster Management Plan, 2019 (Page 78)

Based on a Central scheme for COVID orphans, the Government of Assam has recently launched a slew of schemes for COVID orphans under which a payment of Rs 3,500/- is made for each COVID 19 orphan, till they become self-reliant, besides other protective measures. ASDMA, in conjunction with the Department/Directorate of Women and Child Development and Department/Directorate of Social Justice and Empowerment will explore the possibility of extending this scheme to all other category of orphans including children rendered orphans due to any disaster, which may include, besides monetary assistance, other protective measures such as safety measures, food and nutrition, education and skill development.

Health Department has stated that it will map out each COVID orphan for accessing government welfare schemes for the fullest human development. In that case, the Department/Directorate of Women and Child Development and Department//Directorate of Social Justice and Empowerment would do a similar exercise in respect of all other orphans to access benefits under government's welfare schemes. The state government may associate one or more NGOs already working for children at the State/ District level for implementation, monitoring and evaluation of the schemes.

6.6 Elderly people

According to 2011 census, 7.5 per cent of the population of Assam is of elderly people comprising 7.1 per cent elderly male and 7.8 per cent elderly female. The elderly in the state are particularly vulnerable to disasters. The greater vulnerability of the elderly compared to others during disasters needs to get more attention in all phases of disaster risk management. The elderly need to be treated as priority group by proper design in the disaster management plans. 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. 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.

It is therefore necessary that State Government of Assam and ASDMA take pro-active action to ensure well-being of elderly. It is preferable to have community-based senior-citizen support mechanisms so that the senior citizens are not uprooted from their immediate surroundings. This should include efforts to educate local communities about how they can help senior citizens and raise their awareness about supporting the elderly. The elderly people may be included in the decision-making process while drafting the agenda for DRR. The Village Disaster Management Plan may include a list of senior citizens living without any family support and who may need special care and attention in a disaster situation including medical care. Constitution of community groups of elderly persons for facilitating elderly centric health care services may be ensured. Special consideration may be applied particularly to older women who are more vulnerable to any kind of disaster scenario. Special arrangements may be made during pre-disaster phase to protect the property and assets of senior citizens during and in the aftermath of a disaster, if required. This list may be updated from time to time.

6.7 Persons with Disabilities (PwDs)

According to Census, 2011, there are 4.80 lakh Persons with Disabilities (PwDs) in Assam. A standard operating procedure has been formulated to organise screening camps in all blocks of the districts for identification of Persons with Disabilities along with issuance of Disability Certificates so that every eligible person with disability gets the opportunity in getting beneficial schemes implemented by the Department//Directorate of Social Justice and Empowerment and other Departments. With proper database the population can be traced and given necessary assistance during the aftermath of any disaster.

DRR efforts must specifically address the vulnerabilities of PwDs 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 (Apada Mitra) system whereby each PwD have one or more persons in the neighbourhood who are responsible to act as a buddy (Aapda Mitra) 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 PwDs 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 PwDs 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 PwDs in need of 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 PwDs. The administration can provide special arrangements to protect the property and assets of PwDs, if required[22].

6.8 Transgender People

Transgender people are people whose gender identity is different from the gender they were thought to be at birth. Transgender refers to gender identity and gender expression, and has nothing to do with sexual orientation. Transgender community is one segment of population who are totally excluded from society. Though they are generally clubbed together with LGBTQ+ communities, they are actually segregated from others in these communities also. One section of the transgender community, popularly known as 'hinjras' usually live together as a group and their livelihood ranges from dancing and singing at weddings and births to sheer begging. With dwindling sources of income, they are often found begging at streets and traffic lights in urban areas. They are socially excluded and are at best tolerated as "unfortunate people".

As citizens and members of our society, transgender people also have constitutional rights to enjoy all the facilities and privileges equally along with other people in our society as envisaged in the Constitution for all the citizens of the country. However, they are often marginalized and face massive

[22]National Disaster Management Plan, 2019 (Page 81)

social and cultural barriers in their effective participation in society. Their plight in a disaster situation is particularly grim, as they are often neglected because of their apparent invisibility. As a result, they often do not get their fair share during relief distribution. At present, no reliable data base is available for transgender community at state, district and sub-district level in Assam.

The Government of Assam had initiated a scheme in 2018-19. The scheme proposes to include preparation of data-base for transgender community, skill development training, entrepreneurships etc. so as to bring about a transformative change in their lifestyle and livelihood activities with proper rehabilitation.

ASDMA, in conjunction with Department//Directorate of Social Justice and Empowerment will develop a data base for rehabilitation and equity in relief distribution for this community. Members of this community will be associated with several skill development programmes so that they can sustain their source of livelihood. Above all, the scheme may generate awareness amongst people to live together with transgender community in a cohesive manner.

In order to ensure inclusion, the health department the Department//Directorate of Social Justice and Empowerment may be sensitized for eradication of stigma and discrimination against transgender people or persons from sexual minorities in availing barrier free health care services.

6.9 Making Disaster Risk Management Inclusive

Inclusion is a condition for community resilience. A community can only be safe when all its members can cope better to avert disasters. Inclusive DRM recognises that people face different risks and barriers based on their capacities and capabilities. For this reason, responses should be tailored and empowering. Building equal opportunities and scope of action on risks will make a difference for excluded people, and the whole community will be more resilient because everybody will be safer. DRM processes often ignore the needs of the excluded, and they may inadvertently end up generating more risks for them. By supporting excluded people along with others, the State Government may achieve the equity needed to allow everybody to enjoy the right to be safe.

6.10 Importance of Psycho-Social Care including Mental Health

In the contemporary world, disasters are inevitable truth of our life, preventable but unavoidable and they are part of our living in this complex globalised, industrialized and civilized world. There is a need to understand the effects of disaster on health so that precautionary measures can be adopted to mitigate the suffering. Mental health professionals are required to understand their role in a disaster response team. They have a very important role to play in pre-existing or post- disaster response phase. They must play a multi-dimensional role from educating, training, negotiating, administrative, fund raising, collaborative, skill transferring, treating, advocating and rehabilitating roles.

6.10.1 Role of mental health professionals in disaster response

Mental health issues have been found to be common in post-disaster scenario, particularly among women and children; more so when they lose either their family members or close friends. The problem came to light prominently post Bhuj earthquake disaster when young school-going children participating in Republic Day Parade saw before their own eyes their classmates and friends dying or gravely injured. The same scenario was observed in Tamil Nadu post tsunami-disaster.

The problem is more compounded due to grossly inadequate availability of mental health professionals/ councilors, particularly in rural areas. In addition, the attitude of family members and others in the community is unfortunately negative towards mental health issues where depression, a perfectly normal and fully curable disease, is perceived as some kind of symptom for madness.

It is necessary that these pre-conceived notions are dispelled and mental health issues are accepted as any other normal medical condition which is fully curable, given medical help, counselling and sympathy and understanding of family and community members. Therefore, following actions may be taken during different phases of disasters to take care of mental health issues.

i. During pre- disaster period (preparedness)

- Public Education Activities- Life skills education, educating about the disaster mental health
- Disaster Response Network- To develop collaboration with various existing agencies like governmental agencies, NGO's and community health workers.
- Disaster response training of trainers in-

  Disaster mental health, first aid training (both medical and psychological), counselling skills, stress management, identifying common mental disorders and referral, life skills training, Psycho education regarding mental health in trauma/ disaster for the general population, community level support and community resilience training, strengthening information, education and communication (IEC) activities.

ii. Immediately after the Disaster

- Being part of the multi-disciplinary relief team
- Rapid assessment (mental health surveillance)-

  Magnitude of the psychological impact, available mental health resources in the affected community needs assessment, social, cultural and religious perspective of the community.

- Providing health care-

  Medical and psychological first aid, the pre-existing mentally ill patients, substance intoxication and withdrawal in survivors, crisis intervention, establish the referral system.

- Providing targeted disaster mental health interventions to the needy
- Disaster psychiatry outreach teams to provide care
- Promoting resilience and coping mechanism
- Dealing with the victims and volunteers stress (stress management)

- Fostering the mass grieving/mourning
- Collaborating with administrative and funding agencies
- Mental health education- do's and don'ts-
- Educating the administrative personnel, local leaders, and public
- Utilizing mass media to reach the survivors
- Initiating collaboration with the local agencies for capacity building and outside agencies for support
- Planning research

iii. During disillusionment phase

- Providing care for the mentally ill patients
- Attending to the referrals
- Continuing and expanding the capacity building activities
- Training of resourceful community members like private physicians/doctors, primary health care staff members, school teachers, Anganwadi workers, alternative complementary medicine personnel's, religious leaders, spiritual leaders and faith healers.
- Community outreach camps
- Hand holding of the community health workers
- Assessment of the intervention and feedback mechanism

It must be underlined here that it is not easy to organize professional help, particularly in rural areas, to provide above-mentioned relief through medical practitioners on mental health issues. However, a brief training may be imparted to village public health workers, elderly persons, particularly women. If partly educated group of young women is trained in these issues, they can be of immense help. NGOs active at district/ village level can voluntarily extend assistance and train elderly women, young educated community members and members of self-help groups in these issues for counseling. Besides, doctors at primary Health Centres also need to be sensitized and familiarized with medicines to be prescribed for patients suffering from mental health issues.

6.11 Responsibility Framework

Social Inclusion: Applicable to State Government Departments and District

Social inclusion is a cross-cutting Thematic Area for Action (TAA) relevant to all types of hazards and disasters. Therefore, the responsibilities for social inclusion rest with every agency

However, for clarity the lead agencies relevant to each Sub-TAA have been mentioned in the Responsibility Framework Table 15 given below:

Table 15: Social Inclusion Responsibility Framework

S. N.	Sub-Thematic Area for Action	State Agencies, District Administration and their Responsibilities			
		State Departments/ Agencies	Responsibility - State	Districts Departments/ Agencies	Responsibility- District
1	Gender equity/ women	The Department//Directorate of Women and Child Development SDMA; All Agencies Associated with DRM directly or indirectly	Promote gender inclusive DRM ensuring active participation of women. No discriminatory practices that marginalize women, girls. Review and make changes in existing regulations, norms and directives to make them gender sensitive. Recognize additional vulnerabilities of women with the assistance of the State Women's Commission. Use of Information and Data Management to support gender sensitive approach. Convergence of concerned departments to ensure gender sensitive DRR. Shelters/ Relief Camps – provision for specific needs for women and transgender people	The Department//Directorate of Women and Child Development DDMA; All Agencies associated with DRM directly or indirectly	**Extension and implementation of state level responsibilities at district level** **HRVA to take care of women.** **Training, Awareness, Mock drills, Vocational Training/Skill development** **Promoting insurance** **Gender audit of DRM measures. Ensure joint ownership in the name of husband and wife of houses reconstructed and assets provided.**

			Inclusion of gender concerns of DRR in curriculum development. Guidance on preventing, and investigating discriminatory practices, violence and abuse. Inter-agency support to prevent trafficking Gender-sensitive psycho-social support, post-disaster rehabilitation (economic, social)		
2	Scheduled Castes (SC) & Tribes (ST)	Department//Directorate of Social Justice and Empowerment; Department/Directorate of Tribal Affairs (Plain); SDMA; Directorate of Town and Country Planning All Agencies associated with	Guidance and support; Promote studies and research on DRM challenges for SC communities Promote studies and research on disaster response and mitigation strategies appropriate and acceptable to the tribal communities, Review and amendment of existing regulations, norms and directives to make them consistent with needs of DRM Promote insurance/ risk transfer, Guidelines IEC, mass media campaigns Capacity development guidelines, Inclusion of the concerns of SC/ST about DRR in curriculum development and amendment of existing regulations;	Department//Directorate of Social Justice and Empowerment; Department/Directorate of Tribal Affairs (Plain); DDMA, Department /Directorate of Tribal Affairs (Plain) at District level. All Agencies associated with	**Extension and implementation of state level responsibilities at district level, HRVA Assessment to specifically include SC/ST vulnerabilities** **Protecting the tribal identity, traditions and customs in post-disaster situations in different phases of DRM** **Ensure steps taken for DRM do not cause irreversible damage to the community's culture, tradition, habitat and ecosystem** **Use of Information and Data Management to support relevant issues -DDMA and District level departments** **Convergence between concerned departments in schemes meant for SC/ST for DRR**

		DRM directly or indirectly.	Review norms and directives to address requirements of implementing DRR in SC/ST settlements	DRM directly or indirectly at district level	**Shelters/ Temp Shelters/ Relief Camps– non-discriminatory, Ensuring enabling environment for participation,** **Training, Awareness, Mock drills, Vocational Training/ Skill development, Empowering, especially leadership in DRR** **Curriculum development with focus on issues of SC/ST communities.** **Promoting insurance products/ campaigns,** **Include non-discriminatory implementation of DRM In Social audit.**
3	Children, particularly Disaster/COVID 19 Orphans	Department/ Directorate of Women and Child Development, SDMA; All Agencies associated with DRM directly or indirectly	Guidance and support for various DRM initiatives for children Review regulatory and institutional needs for the protection and safety of children Supervision and monitoring of DRM initiatives for children– Pre-school, school-going and children not in school. Support for implementing measures for proper protection and care of disaster affected children Mobilizing support to disaster-affected children from national and	Department/Directorate of Women and Child Development, DDMA All Agencies associated with DRM.	**Extension and implementation of state level responsibilities at district level** **Make special arrangements for disaster preparedness and safety of various children's institutions,** **Regulatory measures for ensuring school safety and disaster preparedness in schools, Regular mock drills and other preparedness measures in all schools and children's institutions.** **Pay special attention to children's institutions**

			international agencies working for children's welfare. Support from International agencies may be taken through the Central Government		**after early warning and post-disaster.** **Ensure that in post disaster situations children do not face isolation, anxiety, trauma, due to being 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 labor in post disaster situation.** **Sensitize all agencies and key personnel.**
4	Elderly	Department/Directorate of Social Justice and Empowerment; SDMA; Health And Family Welfare Department	Guidance and support to address DRM needs of the elderly Promoting awareness of the challenges faced by the elderly in disasters, Promoting agencies and organizations working for the welfare of the elderly to develop expertise for supporting DRM efforts for the elderly. Mobilizing support to the elderly in disaster-affected areas from national and international agencies working for the well-being of the elderly.	Department/Directorate of Social Justice and Empowerment at district level; DDMA; Health And Family Welfare Dept.	**Extension and implementation of state level responsibilities at district level** **Sensitizing local communities about additional vulnerabilities of the elderly persons in the communities and neighborhood groups or responsible individuals to assist the elderly.** **Make special arrangements for disaster preparedness and safety of various institutions for the elderly such as old age homes, retirement homes and shelter homes for the elderly.**

					Linking organizations working for the welfare of elderly with community initiatives for DRM. **In case of imminent risk or after early warnings, take measures to ensure that the elderly people are informed and prepared.** **Involve elderly people 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)	Department/Directorate of Social Justice and Empowerment; SDMA; Health And Family Welfare Dept.	Guidance and support to address DRM needs of PWDs as per global best practices Promoting awareness of the DRM challenges for PWDs Promoting agencies and organizations working for the welfare of PWDs to develop expertise in DRM Mobilizing support to the PWDs during disasters	Department/Directorate of Social Justice and Empowerment; DDMA; Health And Family Welfare Department	**Extension and implementation of state level responsibilities at district level** **Sensitizing local communities about the PWD living in the community and their special needs, particularly during disasters.** **Promote neighborhood groups to 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 PWDs such as school for the blind, hostels for PWD and any facilities dedicated to PWD** **Linking organizations working for the welfare of PWDs with community initiatives for DRM** **Preparing lists of all PWDs, periodically reviewing their situation and check the status of social network (neighbours, relatives, and 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.**
6	Transgender people	Department/Directorate of Social Justice	Promote gender inclusive DRM ensuring active participation of transgender people.	Department/Directorate of Social Justice	**Extension and implementation of state level responsibilities at district level**

		and Empowerment; SDMA; All Agencies Associated with DRM directly or indirectly	No discriminatory practices that marginalize transgender. Review and make changes in existing regulations, norms and directives to make them gender sensitive Recognize additional vulnerabilities of transgender people with the assistance of the State Department of Women and Child Development / Department of Social Justice and Empowerment. Use of Information and Data Management to support gender sensitive approach. Convergence of concerned departments to ensure gender sensitive DRR. Shelters / Relief Camps – provision for specific needs for transgender people. Inclusion of gender concerns of DRR in curriculum development. Guidance on preventing, and investigating discriminatory practices, violence and abuse. Inter-agency support to prevent trafficking. Gender-sensitive psycho-social support, post-disaster rehabilitation (economic, social)	and Empowerment; DDMA; All Agencies associated with DRM directly or indirectly	**HRVA to take care of transgender people.** **Training, Awareness, Mock drills, Vocational Training/Skill development** **Promoting insurance** **Gender audit of DRM measures** **Ensure joint ownership in the houses reconstructed and assets provided.**

CHAPTER 7: MAINSTREAMING DRR IN DISASTER MANAGEMENT

7.1 Background

Disasters result in colossal loss of lives and property and seriously affect community's capacity to fight disasters or sustain their economy from deteriorating further. These losses and adverse impact on economy and standard of living of community can be arrested significantly if disaster risk reduction measures are mainstreamed into development. Based on the magnitude of a disaster, the losses to different sectors of the affected region disturb adversely almost every sector of the economy and the quality of life of the people. It makes it very difficult to achieve pre-disaster development goals due to need for substantial expenditure on relief, rehabilitation and different aspects of recovery. This adverse impact can be reduced if disaster risk reduction measures are integrated or mainstreamed in the development.

According to a UNDP study published in 2012, every dollar invested in disaster risk reduction measures results in saving of seven dollars in the expenditure necessitated in the aftermath of a disaster. Unfortunately, the expenditure incurred in the aftermath of a disaster is mostly needed for subsistence of affected community and, though necessary, it does not result in development gains. It is therefore necessary that disaster risk reduction measures are mainstreamed into development process to derive optimum economic benefits and to reduce risk of the community to future disasters.

7.1.1 What is mainstreaming

Mainstreaming disaster management into the development planning process essentially means "*looking critically at each programme, activity and project that is being planned, not only from the perspective of reducing the existing risks of disasters, but also from the perspective of minimizing its potential contribution to creation of new risks of disasters."* [UNISDR].

7.1.2 Why Mainstreaming

Development plans and projects can either reduce or enhance the disaster risks. A conscious effort has to be made to reduce disaster risk. If development activities are undertaken without any regard to disaster risk reduction, such activities may be counter-productive in the long run since such development would not be sustainable. The purpose of mainstreaming risk reduction is therefore to ensure that risks from natural hazards are factored into development policies and plans and are considered as a matter of course in the design of all development projects, particularly in hazard prone areas.

A conscious effort must be made to develop and implement the projects in a manner that ensures that these projects and plans do not add to existing vulnerabilities or create new vulnerabilities, if these do not contribute to reducing the existing vulnerabilities. Examples of bottlenecks in mainstreaming DRR into development process include, but are not limited to; poor design and construction of buildings,

inadequate protection of assets, lack of public information and awareness, high levels of poverty and education, limited official recognition of risks and preparedness measures, disregard for wise or weak environmental management or weak management.

7.1.3 Which Agencies should mainstream

All stakeholders engaged in different aspects and levels of disaster management have the responsibility to integrate disaster risk reduction in the developmental projects and plans. At the State Level, it is the responsibility of the State Government including its departments for projects developed by them or projects and plans taken up for implementation; District Government; Local Government; Civil Society; Development Agencies; Humanitarian Agencies; and above all the community.

It is desirable for each agency and stakeholder to introspect; in respect of any project being taken up for implementation; to the extent they are associated with any aspect of development or implementation, whether their activities would enhance the vulnerability or, even if it does not enhance the vulnerability, whether it is possible to reduce existing vulnerability through the project, and if so, bring it to the notice of project implementing agencies. The cost of undertaking mitigation activities to prevent enhancement of vulnerabilities, or to reduce the existing vulnerabilities should be treated as a component of the total cost of the project since if this aspect is ignored, the projects and plans would not be sustainable, particularly in disaster prone areas.

Therefore, mainstreaming disaster risk reduction in development is a dynamic process to ensure that it is protected through DRR strategies and it does not increase people's vulnerabilities or create new vulnerabilities to disasters. This objective can be achieved through inclusive development.

7.2 Sectors for Mainstreaming

7.2.1 Mainstreaming DRR in Development

There has been considerable national concern on mainstreaming disaster risk reduction into development process for sustainable development for over last three decades. It was articulated first during the International Decade for Natural Disaster Reduction (1990-1999); and Yokohama Strategy for a Safer World (1994); followed by Hyogo Framework of Action (2005-2015) when a detailed strategy for it was worked out. It mentioned seven principles and twelve sectors of mainstreaming. While Hyogo Framework of Action (HFA) got replaced by Sendai Framework for Disaster Risk Reduction (SFDRR) in 2015, the following is still relevant in the context of mainstreaming.

Hyogo Framework of Action 2005-2015—12 Sectors for Mainstreaming

- **Food security**- Promote food security as an important factor in ensuring the resilience of communities to hazards, particularly in areas prone to drought, flood, cyclones and other hazards;

- **Livelihood**- Promote diversified income options for populations in high-risk areas to reduce their vulnerability to hazards, and ensure that their income and assets are not undermined by development policy and processes that increase their vulnerability to disasters;

- **Health**-Integrate disaster risk reduction planning into the health sector; promote the goal of "hospitals safe from disaster" by ensuring that all new hospitals are built with a level of resilience that strengthens their capacity to remain functional in disaster situations;

- **Infrastructure**-Protect and strengthen critical public facilities and physical infrastructure, particularly schools, clinics, hospitals, water and power plants, communications and transport lifelines, disaster warning and management centers, and culturally important lands and structures through proper design, retrofitting and re-building, in order to render them adequately resilient to hazards;

- **Urban Planning**-Incorporate disaster risk assessment into the urban planning and management of disaster-prone human settlements, in particular highly populated areas and quickly urbanizing settlements. The issues of informal or non-permanent housing and the location of housing in high-risk areas should be addressed as priorities, including in the framework of urban poverty reduction and slum-upgrading programmes;

- **Building codes**- Encourage the revision of existing or the development of new building codes, standards, rehabilitation and reconstruction practices at the national or local levels, as appropriate, with the aim of making them more applicable in the local context, particularly in informal and marginal human settlements, and reinforce the capacity to implement, monitor and enforce such codes, through a consensus-based approach, with a view to fostering disaster-resistant structures;

- **Land use planning**-Develop, upgrade and encourage the use of guidelines and monitoring tools for the reduction of disaster risk in the context of land-use policy and planning;

- **Rural development**- Incorporate disaster risk assessment into rural development planning and management, in particular with regard to mountain and coastal flood plain areas, including through the identification of land zones that are available and safe for human settlement;

- **Social Protection**- Strengthen the implementation of social safety-net mechanisms to assist the poor, the elderly and the disabled, and other populations affected by disasters;

- **Post-disaster recovery**- Incorporate disaster risk reduction measures into post-disaster recovery and rehabilitation processes and use opportunities during the recovery phase to develop capacities that reduce disaster risk in the long term;

- **Risk Insurance**- Promote the development of financial risk-sharing mechanisms, particularly insurance and reinsurance against disasters;

- **Private sector**-Promote the establishment of public–private partnerships to better engage the private sector in disaster risk reduction activities; encourage the private sector to foster a culture of disaster prevention, putting greater emphasis on, and allocating resource to, pre-disaster activities such as risk assessments and early warning systems.

Although the Hyogo Framework of Action concluded in 2015, the above principles and the sectors where disaster risk reduction must be mainstreamed are still valid and need to be pursued vigorously.

7.2.2 Key Thematic Areas

The key thematic areas of mainstreaming disaster risk reduction in developmental plans and projects are:

- Generating awareness and understanding of disaster risk among all stakeholders;
- Adequate legal mandate and better disaster governance strategies
- Efficient disaster risk management strategy;
- Social inclusiveness in disaster risk management;
- Institutional arrangements and capacity development for disaster risk management;
- Inter and intra government coordination;
- Budget allocation for mainstreaming DRR concerns into developmental projects/plans within the overall cost of the project in disaster prone areas;
- Comprehensive project appraisal and scrutiny of development projects and plans to stress on multi-hazard resilient infrastructure; and
- Set up realistic targets, time frame and monitoring mechanisms to achieve the objective of integrating disaster risk reduction in development.

These themes will be integrated in the process of devising and implementing the developmental projects and plans and monitored closely.

7.3 Legal, Institutional and Administrative Arrangements and Framework

7.3.1 Legal Arrangements and Framework

The Disaster Management Act, 2005 extends legal support for mainstreaming of disaster risk reduction in development plans, policies and projects at different levels from national to local level through National, State and District Disaster Management Plans. The Preamble of the Act states that the Government have decided to enact this law on disaster management to provide for requisite institutional mechanisms for drawing up and monitoring the implementation of the disaster management plans, ensuring measures by various wings of Government for prevention and mitigating effects of disasters and undertaking a holistic, coordinated and prompt response to any disaster situation.

The related specific provisions in the Act are as follows:

- The National Plan shall inter alia include measures to be taken for prevention of disasters or mitigation of their effects and integration *of mitigation measures in development plans [Section 11(3)]*

- The State Plan inter alia provides for inclusion of vulnerability assessment, measures for prevention and mitigation of disasters and *the manner in which mitigation measures shall be integrated with development plans and projects [Section 23(3)]*

- The District Plan shall inter alia include areas in the district vulnerable to different forms of disasters, *measures for prevention and mitigation of disasters*, capacity building and preparedness measures to be taken by departments at district level and local authorities in the district *[Section 31(3)]*

- State Government to take measures for prevention and mitigation of disasters in accordance with guidelines of NDMA, *ensure appropriate preparedness measures for integrating DM into development plans and projects* and allocate funds for disaster prevention, mitigation, preparedness and capacity building *[Section 38 (a), (b), (c)]*.

- Every department of state is responsible, to take measures necessary for prevention of disasters, mitigation, preparedness and capacity building and *integrate these measures into its development plans and projects* and allocate funds to discharge above-mentioned responsibilities; *[Section 39].*

- Review its enactments, policies, rules and regulations to incorporate therein provisions necessary for disaster prevention, mitigation and preparedness. *[Section 39(d)].*

It is therefore very clear that the Disaster Management Act, 2005 uniformly mandates mainstreaming of disaster risk management into development process at all levels. Besides, the National Policy on Disaster Management also stresses the need for disaster management to be built in Development Plans. It states *"NDMA will ensure mainstreaming of DRR in the developmental agenda of all new & existing development programs & projects which shall incorporate disaster resilient specifications in design & construction". Further "The Planning Commission (now Niti Ayog) will give due weightage to these factors while allocating resources"*

7.3.2 Institutional Arrangements and Framework

Disaster Risk Reduction is a multi-sector activity, cutting across different departments of the State. Besides, it also encompasses private sector and Civil Society Organizations, involved in developing and implementing development plans and projects, irrespective of the fact whether these are being implemented by government, public or private sector. That requires the institutions to explicitly recognize the DRR requirements and pay attention to implementing adequate institutional

arrangements required for addressing relevant accountability and responsibility. The following ARAC Framework for disaster risk management is relevant in this regard.

Figure Q: ARAC Framework

Source: MPS,2013

The different components mentioned above may be elaborated further as follows: Ministry of Finance, at the instance of NDMA, have issued instructions revising formats for EFC/ DPRs to address disaster management concerns dated 19.06.09, 12.04.10 and 26.05.10, which may be accessed (available as circulars) on NDMA website. It would be seen that various components given above, authority, responsibility, accountability and capacity development cut across different sectors and therefore an integrated and cohesive approach is needed for institutional arrangements and capacity development. The nodal agencies at state and district level as also in private sector and civil society organizations must provide leadership, determine broad disaster risk management policies, oversee implementation and take up advocacy for the inclusion of disaster risk reduction concerns in development.

7.3.3 Inter and Intra-Government and Multi-Stakeholder Coordination

Disaster Risk Management is a multi-sector, multi-stakeholder and multi-institutional activity involving multiple line agencies, and levels of administration. It is therefore necessary to ensure prompt and effective coordination among all departments at different levels, various stakeholders in government, private sector and civil society organizations. The coordination must be horizontal as well as vertical. Horizontal coordination is needed between different departments of the State having their distinct responsibilities. Similarly, horizontal coordination is required among different departments of

district administration. Vertical coordination is needed among different departments and agencies at national, state, district and local level.

The powers and functions of the State Disaster Management Authority inter alia mentions for State Authority to coordinate the implementation of the State Plan. This coordination would be necessary among different departments of the state including their departmental disaster management plans, as also the functions being discharged by other stakeholders including Civil Society. Further, under section 21 of the Act, the State Executive Committee has also been assigned the function of a *coordinating* and monitoring body for management of disaster in the State; to *coordinate* and monitor the implementation of the National Policy, the National Plan and the State Plan; and *coordinate* response in the event of any threatening disaster situation or disaster*; coordinate* the activities of the Departments of the State, District Authorities, statutory bodies and other governmental and non-governmental organizations engaged in disaster management.

Section 30 of the Act states that the District Authority shall act as the district planning, *coordinating* and implementing body for disaster management. The District Authority may *coordinate* and monitor the implementation of the National Policy, State Policy, National Plan, State Plan and District Plan; *coordinate* the specialized training programmes for different levels of officers, employees and voluntary rescue workers in the district; and *coordinate* response to any threatening disaster situation or disaster. Therefore, coordination is an essential aspect of mainstreaming disaster management in the disaster risk reduction process.

Since there are several line agencies, sectors and levels of administration involved in the development actions at the national, state and district level, mechanism of inter-agency coordination and integration must be strengthened to ensure that locally identified needs are reflected in the planning process and strategies. Both horizontal and vertical coordination are equally important, given the cross-cutting nature of disaster risk reduction.

7.4 Implementation Plan and its Principles

The State Disaster Management Plan only lays down the broad principles of mainstreaming DRR initiatives in the development process. It is for each department of the State and District Administration, as also other implementing agencies to review the current ongoing programmes and the projects and plans to be implemented in future to generate risk awareness; take up risk assessment with particular emphasis on reducing existing vulnerabilities or to avoid creation of new vulnerabilities; work out and add the cost of taking up DRR initiatives as a component of the total project cost; determine the DRR related targets, time frames and indicators; monitor the progress as per the pre-determined targets, timeframes and indicators from time to time; and ensure comprehensive appraisals and monitoring of the implementation of such DRR initiatives at regular intervals.

In conclusion, the success of meaningfully mainstreaming the DRR initiatives in the development projects and plans would depend on project designers and implementers and the State Government and its departments, which frame the policies and plans for mainstreaming disaster risk reduction into development process to achieve sustainable and inclusive development.

7.4.1 Mainstreaming DRR- Gaps to be addressed

During consultation meetings held with different departments of the Government of Assam for updation of ASDMP, mainstreaming of disaster risk reduction in the development plans and projects emerged as one of the major areas of concern. It was generally observed that integration of DRR with the development plans and projects, though initiated, has yet to gain momentum and has yet to be fully integrated in the development process in most of the departments. While this was found to be the case across most of the departments, the Departments of Agriculture, Urban Development and Public Health Engineering, in particular, have clearly underlined a felt need to mainstream disaster risk reduction into the development plans and projects through a well-designed development process from state to local level. It is also noted that due to this gap, adequate funds for disaster risk reduction initiatives have yet to be provided as an inseparable component of the total project cost.

The other reasons which have reportedly contributed to lack of adequate efforts to mainstream DRR into development process include the following: inadequate staff at district and local level; inadequate training of officers and staff from state to local level. It is agreed that mainstreaming DRR can be ensured only through focused training programmes and inclusion of this component as an integral part of the designing and implementation of development plans and projects. Moreover, the level and extent of coordination, both horizontal and vertical, would need to be improved significantly, particularly among the concerned departments at state level and their counterparts at district level and below so that intensive supervision and monitoring of development projects and plans could be undertaken and, where necessary, mid-course corrections could be carried out to ensure that DRR is fully integrated with the development process.

7.4.2 Challenges of mainstreaming DRR in development

Besides the above constraints brought out specifically by the State Government departments in the Government of Assam, some challenges common to all mainstreaming efforts generally are as follows.

- Mainstreaming is difficult and complex and requires a coordinated approach by different departments and agencies.
- Adequate support for mainstreaming at all levels is hard to get.
- Various departments of Central and State Governments are more focused on disaster management rather than on disaster risk management, although a change in this approach is gradually apparent after constitution of the National and State Disaster Management Authorities. However, it has yet to travel down to District Disaster Management Authorities at the desired pace.

These challenges can be addressed through aggressive, prompt and comprehensive coordination among various stakeholders including different departments of the Government of Assam and intensive training programmes from State to Local level on mainstreaming DRR into the development process for State and District Departments, project implementing and supervisory agencies and other stakeholders.

7.5 Implementation Strategy

7.5.1 For Mainstreaming DRR in Development

In order to ensure effective mainstreaming of DRR in development, a comprehensive disaster risk management strategy will be developed through multi-stakeholder engagement and participation. Consultations will be held with all the concerned stakeholders at all levels of government as well as the private sector, local communities and civil society. The process will be facilitated by Assam State Disaster Management Authority (ASDMA) in collaboration with the concerned government departments and district administration. This will be done in terms of convening and providing required coordination and putting in place appropriate monitoring mechanisms and arrangements.

The disaster risk reduction initiatives, actions and programmes would form components of this strategy. Besides, the strategy will also include innovative and effective mechanisms for mainstreaming disaster risk reduction concerns into design and implementation of individual development initiatives. The risk management processes are continuous and embedded within the broader development framework.

7.5.2 Awareness Generation and Understanding Risk

Awareness of disaster risk among all stakeholders and, above all, the community, particularly in high-risk disaster-prone areas is crucial, since it is a key element of mainstreaming disaster risk reduction in development. The Sendai Framework emphasizes the role of improving the understanding and awareness of risk. The DRM policies and practices must be based on an improved understanding of disaster risk in all its dimensions and communities must be made aware of various aspects of disaster risk so that they are able to proactively take preventive measures at the local level. Risks overlap different sectors; hence decisions relevant for one sector may still change disaster risks in other sectors. Therefore, decision-makers across diverse sectors and levels of government as well as the private sector and civil society also must recognize the importance of considering disaster risk as an intrinsic part of all projects, programmes and initiatives[23].

The cost of integrating such initiatives for mainstreaming disaster risk reduction in development plans and projects should constitute a component of total project cost, to be financed from the source from which the total project cost is being financed. The Ministry of Finance, at the instance of NDMA, had issued instructions in 2009-2010, as already underlined above, revising formats for Expenditure Finance Committee (EFC) and Detailed Project Reports (DPRs) to address disaster management concerns and to mainstream such concerns in the development projects/plans. Similar instructions need to be issued by the State Government, if not issued already. These would function as a self-audit, a system of self –certification, to ensure that disaster management concerns are mainstreamed in state development plans and projects.

7.5.3 Budget allocation for mainstreaming DRR concerns in development

[23] National Disaster Management Plan, 2019, a publication of National Disaster Management Authority

A major constraint mentioned by almost all departments of the Government of Assam has been about the non-availability of adequate funds for undertaking disaster risk reduction initiatives. There is a consensus across most of the departments that lack of funds adversely impacts integration of DRR features in the development process in general and various development plans and projects in particular.

The objective of mainstreaming is primarily to ensure that DRR initiatives are not perceived as stand-alone features. These are essential for sustainable development. While designing and taking up any project or programme, the concerned departments should introspect whether it tends to enhance vulnerabilities or create new vulnerabilities. It may also be examined whether the project can contribute to reduce the existing vulnerabilities.

The measures required to be taken to reduce vulnerabilities or prevent creation of new vulnerabilities may be added to the project as an integral component of the project and the component of the cost on account of introduction of such measures may be included in the total cost of the project. Unless such measures are undertaken as a part of the project, it would not be sustainable and would therefore be against the very concept of a development project or programme. This has been reiterated by the Ministry of Finance, at the instance of NDMA in 2009-2010 and the instructions in this regard have been shared with all state governments including Assam. These need to be followed scrupulously while taking up development and implementation of all projects.

Besides this, it also needs to be ensured that levels of public expenditure on risk reduction are enough and there are adequate financial arrangements to manage residual risk. The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socio-economic policies such as safety nets and risk transfer mechanisms as part of a holistic approach. Therefore, the mainstreaming of disaster risk reduction requires each department of the state to make adequate provision for DRR as an essential part of the budget by ensuring that all the major activities have incorporated DRR, in addition to all development projects having an essential component of the project cost to reduce existing vulnerabilities or to ensure that no new vulnerabilities are created.

7.5.4 Comprehensive project appraisal and scrutiny of development projects

In order to ensure that disaster risk reduction components become an integral part of the development projects *ab initio,* it will be ensured that they first become a part of the appraisal process of various projects, and then of the supportive supervision plan of development projects. Mainstreaming DRR elements is essential to making the development gains of such projects sustainable over an extended period. It is important to ensure that both DRR and development components of projects are complementary to each other in a manner that they enhance each other's effectiveness. As part of this, the project appraisal and environment impact assessment (EIA) will specifically address DRR and climate change concerns in a systematic manner from the initial stage itself before the budget is approved and financial sanctions accorded for implementation of the project by the project approving agencies.

7.5.5 Setting Targets, Timeframes and Indicators

The State Governments, District and Local Administration, though gradually are becoming aware of different aspects of disaster risk reduction, actions for combating disaster risks are still in their infancy. Though DRR initiatives are generally identified at the level of the state and various government departments, the capacity to monitor and evaluate has to be further enhanced. As passive resistance to accepting the need for adopting DRR initiatives as an essential component of inclusive development is still not uncommon in many contexts, setting clear targets, time frames and indicators are likely to be very helpful in ensuring that DRR actions are mainstreamed into development process at a systemic level.

It will be important to determine in advance the targets to achieve DRR actions and link it to a pre-determined time frame and develop indicators to measure the progress of such actions from time to time. Besides, it applies to all sectors of development and governance since mainstreaming must be treated as an ongoing and continuous process, to be fully integrated into all development initiatives.

As there is a felt need to accelerate the pace of DRR initiatives into all development process, as underlined above, DRR actions will be identified in the first instance for each development project/ programme; set targets, timeframe and indicators; monitor the progress of implementation of such initiatives from time to time and particularly as per the pre-determined time frame and pre-recognised indicators; set up short, medium and long term goals for achieving the targets within the overall plans and projects. The periodic meetings to monitor the progress of implementation of such development plans and projects will have to invariably focus on implementation and progress achieved in respect of DRR components.

7.5.6 Ensuring Social Inclusiveness in Disaster Risk Management

Though the importance of social inclusion for DRR has been discussed in the previous chapter, it is important to underline here that inclusive DRR is essentially 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 at all levels.

Section 61 of the Disaster Management Act, 2005 states that while providing compensation and relief to the victims of disaster, there shall be no discrimination on the ground of sex, caste, community, descent or religion. This section reiterates the provision already existing in the Constitution of India; Article 15 of the Constitution of India states that the State shall not discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them.

In pursuit of the same goal, the Preamble to the National Policy on Disaster Management, 2009 recognizes that in the context of human vulnerability to disasters, the economically and socially weaker segments of the population are the ones that are most seriously affected. Within the vulnerable groups, elderly persons, women, children, especially expectant women and nursing mothers, women rendered destitute and children orphaned on account of disasters and the differently abled persons are exposed to higher risks. Therefore, the specific provision made in section 61 of the Disaster Management Act, 2005 assumes added importance for non-discrimination.

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. While there is no single definition of social inclusion acceptable to all, The World Summit for Social Development, Copenhagen held in 1995 defines an inclusive society as a society for all, in which every individual, each with rights and responsibilities, has an active role to play.

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 SDMP and DDMPs for DRR shall be on the following categories:

- Gender-based Vulnerabilities: particularly of women and transgender people
- Scheduled Castes and Scheduled Tribes (SC&ST)
- Elderly people
- Expectant women and nursing mothers and women rendered destitute
- Children and
- Persons with Disabilities (PWD)

7.6 Review of Progress

7.6.1 Mainstreaming DRR into the development

In conclusion, ASDMA will monitor periodically, at least before the updating of the State Disaster Management Plan every year, the progress of mainstreaming primarily on the following parameters:

- Level of desired awareness and orientation has been created from state to local level within existing institutional arrangements and departmental structures therein.
- Based on re-defined functional goals, re-designing of the related processes and mechanisms in order to make sure that DRR concerns and elements are mainstreamed in program/project planning and implementation on the ground, including two areas of critical importance namely institutional strengthening and project/program planning, implementation and monitoring.
- Mainstreaming risk reduction by ensuring that risks from natural hazards are factored into development policies and plans and are considered as a matter of course in the design of all development projects, particularly in hazard prone areas.
- Efforts made by each state department in developing and implementing the projects in a manner to ensure that these projects and plans do not add to existing vulnerabilities or create new vulnerabilities, if these do not contribute to reducing the existing vulnerabilities.
- Each department of the state has ensured that authority, responsibility, accountability and capacity development in different sectors balance each other through an integrated and cohesive approach.

- There is an intense, prompt and comprehensive coordination among various stakeholders including different departments of the State Government of Assam for mainstreaming DRR in the development process.
- Intensive training programmes are organized from State to Local level on mainstreaming DRR into the development process for State and District Departments, project implementing and supervisory agencies and other stakeholders.

It is envisaged that a carefully implemented review process will go a long way in ensuring effective mainstreaming of DRR in development in the state of Assam.

CHAPTER 8: BUILDING DISASTER RESILIENCE AND GOVERNANCE

8.1 Introduction

An informed understanding of existing and emerging risks is the crucial first step of resilient development. As disaster is both a development and governance issue, assessing and understanding risks have significant implications for both these domains. In view of this, a state-wide risk assessment has been carried out by the Government of Assam considering all relevant hazards and vulnerabilities, both in terms of their direct and indirect impacts. However, embedding disaster risk assessment and integrating it into the very culture of governance and daily work ethics, which include policy, planning, implementation and budget mechanisms of the state government, are work still in progress in Assam. Moreover, major gaps still exist in risk information quality and availability of data for various applications. And more importantly, the challenge remains for decision makers to use the available data and information in policy design, planning and investment.

8.2 Thematic Areas of Disaster Risk Management

The original SDMP prepared in 2014 incorporated key principles enunciated in the DM Act 2005 and the National Policy on Disaster Management, 2009. But as the National Disaster Management Plan was prepared in 2016 followed by its revision in 2019, ASDMP 2022 seeks to align itself with the national plan with specific reference to the local context as obtaining in the state of Assam.

In view of the three major post- 2015 global frameworks such as SFDRR, SDGs, COP21 Paris Agreement and the PM's Ten Point Agenda, special focus on social inclusion and an added emphasis on mainstreaming constitute the key features of ASDMP 2022. They seek to strengthen the resilience of the institutions, society and communities against disasters and steer the state towards achieving the SDGs at the state level.

The NDMP 2019 is right in its observation that disaster risk reduction and resilience building are not just one agency's responsibility. Divisions/Departments across different levels of Government are required to share these responsibilities for sustainable reduction of disaster risks and protecting the gains of development in the long run. As indicated by the NDMP 2019, the State Disaster Management Plan incorporates following six thematic areas into its resilience framework.

- Understanding Disaster Risk
- Inter-Agency Coordination
- Investing in DRR – Structural measures
- Investing in DRR – Non-Structural measures
- Capacity Development
- Climate Change Risk Management

8.2.1 Understanding Disaster Risks

Risk is often described as a function of the combined effects of hazards, assets and capacities of people exposed to hazards and the vulnerability of those exposed elements. Understanding the basis, the composition and what can be done to change risk is Priority 1 of the Sendai Framework for Disaster Risk Reduction. Risk is ultimately the result of decisions that we make in face of hazards. Hazards are often given; the nature of our exposure to them and what we do about them convert them into disasters. For instance, if most of the state of Assam is in seismic zone IV and V, this hazard cannot be changed; but what can certainly be done is to plan development or other actions in a way that this hazard does not get converted into a disaster. Like we make decisions about where to build schools, factories, dams and dykes and how much to invest in disease surveillance and we make decisions about how our societies organize and care for vulnerable people and assets. All such decisions can potentially contain elements of disaster risk reduction and resilience building.

Understanding and assessment of disaster risk are in fact the first step for building disaster resilience of institutions and stakeholders. A detailed risk assessment helps in identifying risk reduction measures, prioritizing response functions, updating preparedness plan and informing strategic and policy decision making at all administration levels (Local/District/State). A detailed Multi-Hazard Risk & Vulnerability Assessment (MHRVA) study can direct strategic investment plan for risk reduction.

ASDMA has commissioned several scientific studies to determine hazard risk and vulnerability across the State. The information collated through these assessments is used to guide the planning exercise including mitigation/response aspects of disaster management. The major themes for action are: a) Observation Networks, Information Systems, b) Research, Forecasting, Zoning/ Mapping, c) Monitoring and Warning Systems, d) Hazard Risk and Vulnerability Assessment (HRVA), and e) Dissemination of Warnings, Data, and Information. Having adequate systems to provide warnings, disseminate information, and carry out meaningful monitoring of hazards are crucial to disaster risk reduction, and improving resilience. They are also an integral part of improving the understanding of risk.

8.2.1.1 Disaster Risk Assessment

Assam State Disaster Management Authority, with support from the North East Space Application Centre, conducted the HRVA for Dhemaji district and Guwahati city, Dibrugarh and Silchar towns on a pilot basis. The objective was to develop data-base of disasters and to identify and assess the structural and physical vulnerabilities and to develop social and economic vulnerability indicators for the state for undertaking multi-hazard risk and vulnerability assessments of the entire state. The outputs generated from HRVA were supposed to be used for taking necessary mitigation measures for reducing risk of the society at large.

Broadly, the work was carried out in 3 major phases: assessment of frequency-magnitude- damages related to past hazardous events for each study area; preparation of hazard zonation maps for probable hazards; assessment of physical and social vulnerability and risk for each hazard. Hazard zonation maps are prepared considering available historical records, frequency of each hazard, various

resource/thematic maps in spatial domain, and sophisticated models for assessing nature, their probable impact to the study areas. Cartosat-I stereo data, World View (WV) I and WV II Multispectral data of 2009-2011 were used for generation of various resource/thematic maps on 1:10,000 scale using UTM projection and WGS84 datum. In addition, data from various ground surveys carried out during 2011-2012 are integrated for deriving hazard zonation, vulnerability and risk maps.

Vulnerability and risk were assessed for infrastructure and population through socio-economic survey using the samples of buildings derived from high resolution data along with physical survey of population characteristics and their pattern and temporal distribution. The use of space technology, especially the high-resolution satellite data of Worldview coupled with Cartosat 1, have made it possible to identify buildings types in the study area. Though the collection of data on economic status of population from the field was not possible, but this was inferred indirectly from the building types extracted from the satellite data. However, educational qualification as a parameter was not used in the calculation of vulnerability in the study. During the survey, temporal data on population occupying the buildings was collected on two-hourly basis and stratified method was used in the study. Temporal data was represented in four intervals of a day, i.e., morning, day, evening and night. This was done by averaging out the presence of persons residing in the buildings. By integrating all these in GIS platform, final risk map for each of the hazard under study was generated.

8.2.1.2 Urban Risk and Vulnerability Assessment – Guwahati city and Districts[24]

The study identified 4 key hazards of the Guwahati city i.e., Urban Flash Flood, Landslide, Industrial and Seismic Hazard. With respect to Urban Flash Flood, Ulubari, Bamunimaidam, Jatia, Japorigog, Fatashil, Madghoria fall under high vulnerability zone. Areas like Hengrabari, Noonmati, Khanapara are categorized in medium vulnerability zone while Bagharbari, Paltan Bazar, Dispur, Kahilipara fall under low vulnerable category. Local storm water congestion in the event of sudden storm events is identified as the primary reason behind the recurrent flooding of Guwahati city.

Kamakhya, Kahilipara, Dakhin Gaon, Kharghuli Town, Non-Cadastral Madghoria, Tetelia are some of the places falling in high vulnerability zone against landslide hazard. Total 53 locations are categorized in medium vulnerability zone while total 22 locations are categorized in low vulnerability zone. Approximately, 116, 33778, 12777 and 21311 number of people are residing in very high risk, high risk, medium risk and low risk zones respectively. Alarming unplanned human activities combined with long duration precipitation/rainfall are the direct cause in triggering landslides especially debris and earth slides in Guwahati.

However, in few instances, the slope failure problem in the Guwahati city has resulted from interactions of different geo-environmental causative factors too, e g., incidences of rock slides. The buildings on the hills are mostly at high risk because of their weak structure. Immediate attention needs to be given towards alteration of hill slope due to unscientific anthropogenic activities to near vertical to vertical beyond angle of repose. Further, both surface and sub-surface drainage systems need to be improved in existing settlement areas on hills.

[24] Technical Report and Atlas on Remote Sensing and GIS based inputs for Hazard Risk Vulnerability Assessment of Guwahati City, Silchar, Dibrugarh Towns and Dhemaji District, Assam.

Guwahati city is also vulnerable to four different industrial hazards - Pool Fire, Vapour Cloud Explosion (VCE), Boiling Liquid Expanding Vapour Explosion (BLEVE) and Toxic Release. For pool fire hazard almost, whole city comes under medium vulnerable zone. Paltan Bazar, Japorigog, Dispur, Ulubari, Maligaon, Kahilipara, Natbama, Basistha are some places which fall in the low vulnerable category. In case of Vapour Cloud Explosion (VCE) Hazard too, almost whole city falls under medium category of vulnerable zones. Paltan Bazar, parts of Maligaon, Dispur, Khanapara, Madghoria, Ulubari fall under low vulnerable category. In case of BLEVE hazard Dispur, Ulubari, Paltan Bazar Japorigog, Bagharbari, Kharghuli Town come under medium vulnerable category. Almost whole city is vulnerable to toxic release hazard. Dispur, Ulubari, Paltan Bazar, Bamunimaidam, Hatigaon, Maligaon, Rukminigaon are some places that fall under medium category of vulnerability.

In North Guwahati Silingaon, Abhoyapurgaon are some places which are highly industrial hazard risk zones. Gauripur, Rudreswar, North Guwahati, Madghoria, Noonmatigarden, Betkuchi are falling under medium risk zones. In case of VCE, North Guwahati, Shilagrant, Betkuchi, Silingaon, Madghoria fall under high-risk category. Medium category includes places like Amingaon, Gauripur, Rudreswar, Bamunimaidam. Japorigao, Ulubari, which fall under low-risk zones for VCE.

BLEVE Hazard is very risky in areas like North Guwahati, Tilingaon, Noonmatigarden, Betkuchi and Fatashil. Medium risk category zones include Shilagrant, Abhoyapurgaon, portions of North Guwahati, Noonatigarden, Bamunimaidam, Japorigog, Hengerabari, Sarania Town, Satgaon, which fall under low-risk zone. For toxic release, high risk zone includes places like North Guwahati, Silingaon, Shilagrant, Noonmati, and Betkuchi. Almost 99,11,048 people fall under different risk zones of VC followed by 1,03,954 people residing under different risk zones of BLEVE while 31,972 people residing under different risk zones of Pool fire.

Guwahati city is also prone to seismic hazard. The city is surrounded by the Himalayan thrusts (MCT and MBT, HFT) zones to the north, the long Kopili fault and the Assam syntax is zone to the east and northeast, the Dhubri fault to the west and the Shillong plateau source zone to the south. Out of these source zones, the Kopili fault is most active recently and is nearer to the study area. Some recent earthquakes occurred in the Kapilifault make it prominent that the fault may be vulnerable for an impending large earthquake.

8.3 Inter-Agency Coordination

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

Nodal agencies/Scientific institutions in Assam document/catalogue disaster events and these databases are maintained and updated on regular basis. Every event feed into better understanding and building of the hazard profile. Information such as population vulnerability due to socio-economic

factors, physical vulnerability, accounts of damage and loss are maintained by a range of agencies mandated to deliver sector specific functions. By putting all this information together, the state can develop/undertake risk analysis or risk assessment exercise. The output/information will enable disaster management professionals and communities to undertake prevention/mitigation and preparedness actions.

8.4 Investing in DRR – Structural Measures

Undertaking necessary structural measures is one of the thematic areas for DRM and enhancing resilience. The National Disaster Management guidelines mandate integration of measures for prevention of disasters and mitigation into developmental plans and projects including mitigation projects and to facilitate provision of adequate funds for DM. Plans may be shown in three broad categories, viz. short, medium and long term. These consist of various physical infrastructure and facilities required to help communities cope with disasters. The NDMP further reemphasizes implementation of these measures so as 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 as indicated in NDMP 2019.

8.5 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. While the National DM Policy 2009 and Assam State DM Policy put lot of emphasis on this, the Priority-2 of the Sendai Framework and NDMP 2019 also underscore the significance of investing in non-structural DRR measures. These non-structural measures comprising of laws, norms, rules, guidelines, and techno- legal regime (e.g., building codes) provide the legal regime which empowers the authorities to mainstream disaster risk reduction and disaster resilience into development activities.

8.5.1 Techno Legal Regime

The earthquakes in Assam during the last century have clearly exposed the vulnerability of building stock, which caused wide spread damage resulting in loss of lives and property. This is mainly due to faulty design and construction practices which do not follow earthquake resistant features specified in Indian Standards and Building Codes. To create an appropriate Techno-legal regime in the country and effective enforcement mechanism, the Ministry of Home Affairs, Government of India constituted an Expert Committee to develop Model Building Bye-laws and review the existing Town and Country Planning Acts and Development Control Zoning Regulations/ Building Bye-laws.

The committee has given detailed recommendations for modifications in existing Town and Country Planning Act, putting Land use Zoning Regulation in place, and addition to Development Control Rules and Bye-laws[25]. The Ministry of Home Affairs, has recommended the same to the State Governments

[25]Building a new Techno Legal Regime for safer India, Ministry of Home Affairs and Building Materials & Technology Promotion Council, Ministry of Urban Employment & Poverty Alleviation, Government of India

and Union Territory Administrations for early adoption. ASDMA will constitute a committee of concerned State Departments and Experts to review the existing Building Bye Laws in the State to bring it in line with the National Building Code, 2016, Town and Country Planning Act and Land Use Zoning Regulations and put in place necessary institutional support for enforcement, monitoring, and compliance of the updated Techno Legal Regime in the State.

8.6 Capacity Development

Capacity development is a recurring theme in all DRM efforts. National Disaster management Policy, 2009 emphasizes on building DM capacities of the institutions and stakeholders. 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 process comprises awareness generation, education, training, Research and Development (R&D), etc. It further addresses putting in place appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters. 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.

8.7 Climate Risk Management

Assam is extremely vulnerable to climate change due to both its geographic proximity to the delta region and poor socio-economic conditions prevailing in the state. There are definite indications that climate change would increase the frequency and intensity of natural disasters like cyclones, floods and droughts in the coming years affecting lives and livelihood of people of Assam. In order to meet these challenges in a sustained and effective manner, synergies in approach and strategies for climate change adaptation and disaster risk reduction shall be encouraged and promoted.

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. The state government has recognized that climate change is a deterrent for the state's development aspirations, and recently proposed to set up a climate change management society headed by the chief minister.

The State Action Plan on Climate Change addresses the issues of sustainability of agricultural systems, energy sufficiency and efficiency, and enhanced impacts on health, among other issues. However, 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 DRM.

8.8 Disaster Risk Governance

It is recognised that governments alone cannot deal with DRR. All actors – from national to local governments, civil society organizations, academics, professional associations, the private sector, and communities – have a role to play in the decision-making, planning and implementation process of DRR. With varying capacities and degrees of responsibility, they all need to engage in reducing disaster risks and contribute to building disaster resilience in their local areas. However, in order to do so, the roles and responsibilities need to be clearly defined.

Governance implies that governments do not make decisions in isolation but rather adopt a consultative approach to arrive at policies and practices with those who are part of or affected by their decisions. Disaster risk governance affects the distribution of exposure and vulnerability, and therefore of disaster risk, among different groups of people.

It is well recorded that those who do not have a voice and whose rights are not recognized are at a higher risk of death, injury and loss of property. Good disaster risk governance needs to promote participation and recognition to address the underlying risk drivers that result in differentiated disaster impacts according to age, ethnicity, religion, gender, labour conditions, land ownership, economic status and disabilities (physical, psychological and cognitive).

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices in DM (UNDP 2015). Good governance also entails improving accountability, transparency and meaningful participation throughout all disaster management procedures, protocols and practices. Negotiating, building consensus and reaching agreements comprise both formal and explicit mechanisms (legislation, policies, standards and administrative procedures) and informal and implicit agreements that mediate social, economic and political relations. In places where there is a proactive, responsive and accountable local government that works with local actors, the possibilities of resilience are much higher.

8.9 Local Government Leading the Process

Ownership of the DRR and resilience strategy by the local government is essential for its effective implementation on the ground. Hence, special efforts will be made to build the capacities of the local governments (PRIs & ULBs) to help them lead the process from the local level.

8.10 Community Engagement

This plan is based on this implicit recognition that communities', being the first responders, their active engagement is critical to having robust DRR strategies and their effective implementation on the ground. It is well established that governments alone cannot address DRR effectively.

Larger ownership of the agenda with vulnerable communities being the primary stakeholders in the process of DRR planning and implementation is the key to the effectiveness of DRR efforts. Several DRR success stories involve planning and implementation that give central importance to community or civil society involvement. Alone or with the support of NGOs, academia and/or the private sector,

engaged communities enable priorities to be better defined and actions planned, responding to real (mostly local) needs and concerns and bringing about long-term change.

At the same time, it is important to acknowledge that there are inherent limitations to community-driven processes, which need to be overcome in collaboration with the local governments. As communities themselves do not have control over issues such as land tenure or the formulation of public policies, these would need to be taken up with the concerned local governments and government departments.

Hence, it is obvious that the institutionalization of community-driven processes at the local level needs the support of local governments. As communities are not homogenous groups, there is usually unequal distribution of exposure and vulnerability, and of related risks, across different social groups due to their specific location/s within the village space and their varying socio-economic vulnerabilities. Hence, internal DRR issues will have to be identified and addressed through representative community groups as required and their involvement in planning and implementation.

8.11 Involvement of other Actors

Universities and local NGOs can play a key role as intermediaries between local governments and communities. They can act as facilitators during negotiation and consensus-building processes between different local/urban actors. This is especially the case when there is mistrust between actors involved in the process. Universities and NGOs can monitor local government's actions and push for accountability. They can also play a crucial role in the construction and dissemination of knowledge around DRR and help build risk assessments and profiles, integrating themes and engaging a wider range of actors.

The private sector has a central role to play in guiding and financing the expansion and growth of urban areas. Developers, construction companies and real estate offices influence the location of investments, generate employment opportunities and expand services in these areas. Similarly, commercial, industrial and service companies represent an important share of those assets exposed to disaster risk. Directly or indirectly, they all affect where urban residents live and work, so it is essential that they understand DRR measures and the benefits of reducing present and future risks.

Different instruments, including regulations and control mechanisms, as well as incentives for risk-aware investments and risk sensitive development, are crucial for orienting the decisions and actions of these actors. The private sector is also engaged in developing tools for systematizing information and improving decision-making, and there are examples of partnerships between companies and local governments. Insurance and re-insurance companies and financial institutions play an active role by providing financial compensatory mechanisms and creating catastrophe bonds and funds to facilitate reconstruction. 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.

8.12 NDMP, Sendai Framework and Strengthening Disaster Risk Governance

The NDMP 2019 emphasizes the importance of governance at different levels for an effective and efficient management of disaster risk. Effective risk governance requires clear vision, plans, competence, guidance, and coordination within and across sectors, as well as participation of relevant stakeholders. Strengthening disaster risk governance is necessary to foster collaboration and partnerships for the implementation of disaster risk reduction and sustainable development at the state and local level.

ASDMP 2022 will strengthen disaster risk governance in the state of Assam through the following measures:

- Mainstream and integrate DRR within and across all sectors and promote the coherence and development of relevant laws, regulations, and public policies. It will guide both the public and private sectors through the legal framework that clearly spells out the roles and responsibilities to address disaster risk in publicly owned, managed, or regulated services and infrastructures. It must encourage actions by persons, households, communities, and businesses. It must enhance relevant mechanisms and initiatives for disaster risk transparency. It must put in place coordination and organizational structures.
- Adopt and implement DRR strategies and plans, across different levels (state, district to community) and time scales, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening resilience – economic, social, health and environmental.
- Decentralize and ensure devolution of functions both horizontally (line departments) and vertically (Districts/blocks/PRIs/ULBs/Tribal Autonomous Councils).
- Promote engagement and participation of community in planning, implementation and monitoring of DRR initiatives to foster community ownership.
- Carry out assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at different levels.
- Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions of laws and regulations, including those addressing land use, urban planning, building codes, environment, resource management, health and safety standards, and update them, where needed, for better disaster risk management.
- Develop and strengthen mechanisms to periodically review and assess the progress on various DM plans as well as encourage institutional debates, including by Policy Makers and relevant officials, on DRR plans. Assign clear roles and tasks to community representatives within disaster risk.

The Department of Revenue and Disaster Management and ASDMA has already developed the Disaster Management Manual which clearly delineates the departmental responsibility chart for managing different phases of disaster management covering preparedness, recovery and rehabilitation and mitigation. However, the inter-agency coordination still remains an issue, as per the feedback provided by different departments during the departmental consultation process. A Disaster Risk Governance Matrix for Assam is furnished below at Table: 16, as per the NDMP guidance, which would further synergize and streamline and bring role clarity with regard to thematic DRR interventions and key actions.

Table 16: Responsibility Framework for Strengthening Disaster Risk Governance

S.N.	Major Themes	*Strengthening Disaster Risk Governance*			
		State Agencies, District and their Responsibilities			
		State	Responsibility State	District	Responsibility District
1.	Mainstream and integrate DRR within and across all sectors/ Institutional Strengthening	ASDMA; Revenue Dept. (DM); Department/ Directorate of Women and Child Development and Department/ Directorate of Social Justice and Empowerment	**Short Term (T1)** Empower local authorities; Carry out assessment of the technical, financial and administrative capacity for disaster risk management at state, district, and local levels **Medium Term (T2)** Improve work culture; promote the coherence and development of relevant laws, regulations, and public policies. Adopt and implement DRR strategies and plans, across different levels and timescale. Make institutions efficient and responsive. Develop mechanisms, and processes to ensure transparency and accountability. Enhance relevant mechanisms and initiatives for transparency. Strengthen/ establish coordination and convergence	DDMA; PRIs; ULBs; Department/ Directorate of Women and Child Development and Department/ Directorate of Social Justice and Empowerment all dept. at district level	**Short Term (T1)** Local authorities including PRIs & ULBs to assess technical, financial and administrative capacities for DRM. All district level departments to assess technical, financial and administrative capacities for DRM. **Medium Term(T2)** Create DM teams having good work culture and commitment to effective response during all stages of disaster. Enhance relevant mechanisms and Initiatives for transparency such as IRS at taluk and district level. Establish and strengthen institutional coordination and convergence of all local authorities and organizations including NGOs at the district level.

			mechanisms at state, district, and local levels. **Long Term (T3)** Promote necessary mechanisms and initiatives to ensure high level of compliance with the safety-enhancing provisions. Make institutions efficient and responsive; Improve work culture Develop mechanisms and processes to ensure transparency and accountability.		**Long Term (T3)** Same as for state at district level as well
2.	Develop capacity; Empower local authorities, Strengthen coordination mechanisms	ASDMA. Revenue & Disaster Management Department, Assam Administrative Staff College, all relevant departments concerned with DM	Recurring Implementation in state, departments, and agencies **Short Term (T1)** Develop capabilities at state, district, block, and Panchayats to understand disaster risk, develop DM plans, implement relevant policies, laws, and ensure compliance with risk reduction safety standards. **Medium Term (T2)** Involve communities, panchayats, municipalities, urban local bodies, etc., elected representatives, civil society organizations, private sector, and educational	DDMA; ULBs; PRIs	Recurring Implementation in district, departments, and agencies. **Short Term (T1)** Same as for state at district level **Medium Term (T2)** Same as for state at district level

			institutions. Develop necessary capacity to understand and effectively enforce regulatory norms, standards for DRR.		
3.	Work with elected representatives	ASDMA, Revenue Dept. (DM), All dept. involved in DM, Panchayat & Rural Development (P&RD), Department of Housing and Urban Affairs	Sensitize 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.	Panchayats; ULBs; Department/ Directorate of Women and Child Development and Department/ Directorate of Social Justice and Empowerment	Create awareness of the role of ecosystems and appropriate land-use in DRR. **Long Term (T3)** Same as for state at district level as well

4.	Work with elected representatives	ASDMA, Revenue Dept. (DM), All dept. involved in DM, especially Panchayat & Rural Development and Department of Housing and Urban Affairs	Sensitize the political leadership and involve the political leadership at state, district, block, and local levels in discussions on DRR	DDMA; PRIs; ULBs	**Recurring** **Same as for state at district level as well.**
5.	Grievance Redress Mechanism (GRM)	ASDMA, Revenue & DM Dept., all depts. 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 within state Develop plans to strengthen GRM Medium Term (T2) Implement plans for strengthening GRM	DDMA; PRIs; ULBs; all district level departments	**Recurring** **Same as for state at district level as well** **Short Term (T1)** **Same as for state at district level as well** **Medium Term(T2)** **Same as for state at district level as well**
6.	Promote quality standards, such as certifications and awards for disaster risk management	ASDMA, Revenue Dept. (DM), all state level depts..	**Recurring** Ensure implementation of standards Monitor compliance **Short Term (T1)** Formulate state-level regulations along with wide public consultations **Medium Term**	DDMA ; PRIs; ULBs; all district level departments	**Recurring** **Ensure implementation of standards Monitor compliance** **Short Term (T1)** **Same as for state at district level as well**

			(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		**Medium Term (T2)** **Same as for state at district level as well** **Long Term(T3)** **Same as for state at district level as well**

CHAPTER 9: RECOVERY, RECONSTRUCTION AND REHABILITATION TO BUILD BACK BETTER

9.1 Recovery

In the aftermath of a disaster, time is a valuable, yet extremely limited resource. Recovery decision-makers, planners and implementers face the immense task of assisting individuals, communities, economies, and the natural environment to recover in a coordinated, efficient, and risk-reducing manner. A lot depends on the efforts that have already been made in the State, in the areas of preparedness, prevention/mitigation and capacity building in general and Pre-Disaster Recovery Planning (PDRP) in particular.

Building capacity in recovery improves the ability to withstand the event, respond with a plan and sequence activities (before-during-after), and recover faster with reduced damage and loss. However, one must keep in view that economic rebuilding after a disaster never completely recovers from what was lost and does not return communities to a "normal" state that existed before. There is often a "new normal", as societies and economies are forever altered. Therefore, recovery, rehabilitation and reconstruction process need to be handled with sympathy and sensitivity and not only rational analysis.

Strong evidence and commonsense indicate that much can be done before a disaster to alleviate recovery planning demands after the disaster. In order to address this, the critical information would be gathered; tools would be employed to assess needs and provide assistance to analyze and be prepared, and further, the roles and responsibilities would be defined. Additionally, the streamlined processes would be developed to expedite recovery efforts and further the partnerships would be established to leverage additional resources. These opportunities, and more, would help the State, to make more effective use of limited time allotted for post disaster recovery planning.

9.1.1 Approach to Recovery

The National Disaster Management Policy, 2009 mandates for a comprehensive recovery and reconstruction process approach that could convert adversity into opportunity. Incorporating disaster resilient features to 'build back better' will be the guiding principle. The administration, the stakeholders and the communities need to stay focused on the needs of this phase, as, with the passage of time, the sense of urgency gets diluted. Emphasis will be laid on plugging the gaps in the social and economic infrastructure and infirmities in the backward and forward linkages. Recovery efforts will be made to support and enhance the viability of livelihood systems, education, health care facilities, care of the elderly, women, children and disabled, etc. [26]

The overall lead role in recovery is played by the administration. It requires a united effort from all the concerned departments of the State. It also entails an inclusive planning approach by involving the

[26] National Disaster Management Policy, 2009

communities, sector/subject expertise and inputs to aid common recovery objectives across the affected region. Mission to recovery shall be built on Post-disaster Damage and Needs Assessment (PDNA) study.

Recovery focuses on timely restoration of basic services for the community including health care; shelter; renewal of infrastructure; service functions; securing livelihoods; maintain/strengthen social fabric of communities; restoration of environmental services; support social and physical well-being of the communities; restoration of economy; preserving the historical and cultural identity of the affected region. Linkages in recovery spread across the communities, local administration, district administration and the state administration.

9.1.2 Recovery to Build Back Better

The recovery programs coupled with sensitive public awareness and engagement after disaster, afford a valuable opportunity to develop and implement the disaster risk reduction measures and to apply the build back better principle. Building Back Better (BBB) is primarily a critical part of disaster recovery that must address the major structural improvements as well as underlying drivers that lead to the risk at the on-set. 'Building Back Better' (BBB) envisages, seizing the opportunity to rebuild and to reduce development deficits of the affected areas going beyond restoration to the pre disaster normal situation. Disaster recovery process is a set of orderly actions, which contributes to BBB. It will consist of several related activities such as:

- Developing recovery framework including institutional arrangements
- Thrust on damage and needs assessments/ damage and loss assessment (PDNA, DALA)
- Measures to ensure socially inclusive disaster recovery, including gender balancing
- Demolition of damaged structures, debris clearance, removal and its safe disposal
- Restoration and upgrading the utilities including communication networks
- Housing, reconstruction and detailed building inspections
- Redevelopment planning and environmental assessments
- Integrating DRR into the various development initiatives
- Involvement of the concerned local communities and NGOs
- Multi stakeholder partnership and synergy to build back better

To build back better in the state of Assam, the line departments will be involved extensively apart from the district/ local administration. The thrust will be on the structural and non-structural measures as well. All related provisions would be followed, including National Building Code (NBC) 2016 etc., for the purpose of safe construction and to build back better in all the affected areas in the state.

Women participation would be encouraged for registration of houses, in joint names of husband and wife, to avoid the gender discrimination. Further, the engagement of local communities and NGOs would help to cater to specific local needs. The climate adaptive and disaster resilient approach would be preferred in BBB. It will require integrated planning and actions on ground.

9.1.3 Principles of Recovery [27]

The State of Assam including the ASDMA and the concerned departments of the state as also other stakeholders shall adopt the following key principles for successful recovery from the disaster:

- Understand the geographical and socio-economic context
- Convene a team to assess the damage and identify the needs, unbundle the complexity before formulating the intervention strategies
- Convene a core planning team to oversee the entire effort and remain accountable
- Address interim needs
- Prioritize restoration of functional services
- Mainstreaming disaster risk reduction in the recovery/development process – build back better approach
- Always ensure high and inclusive level of coordination
- Promote participatory approach and keep community as the central theme for programming recovery
- Build an initial recovery plan covering all aspects and conduct stakeholder consultation meetings with stakeholders and communities
- Finalize the recovery plan
- Ensure a common thread in explaining the recovery plan to the communities, employ effective communication mechanism while dealing with disaster affected people.
- Design public information outreach to inform the community about actions taken by all levels of administration and the assistance being made available to them
- Create space for owner driven construction process and build their capacity through training and hands on activities
- Enforce safety standards in all activities, demonstrate to gain public confidence
- Improve the living condition of the affected communities
- Increase resilience and promote sustainable development
- Document key processes, measure progress, evaluate the efforts and monitor the change

9.1.4 Recovery Process

The effective post disaster recovery process has primarily the following three broad aspects:

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

[27] National Disaster Management Plan 2019

The key interventions under recovery programs have been classified under four broad heads:

- Physical
- Economic
- Social
- Cross Cutting Sectors

After a disaster in the State, a Post-Disaster Needs Assessment (PDNA) will 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 government, including district and local authorities. The PDNA will also provide a platform for the international community to technically 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 major steps of the recovery and the processes involved are summarized in Table 17 below:

Table17: Major Steps of the Recovery Process and the Key Processes Involved

S.N.	Major steps	Process
1	Post-Disaster Needs Assessment and Credible Damage Assessment	• Preliminary assessment reports. • Compilation and transmittal of damage and loss data. • Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment. • Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts. • Results monitoring and evaluation plan for recovery program. • Select the most appropriate and achievable processes and Methodology for conducting early and credible damage 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 regarding public expectations from recovery.
6	Prioritizing 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.

9.1.5 Early, Mid- Term and Long-Term Recovery

Three recovery stages, in which appropriate policies and programs tend will be planned and implemented, are: a) Early, b) Mid-Term, and c) Long-Term, which are described briefly in Table 10-2.

The salient provisions of the recovery framework include the following:

- **Institutional arrangements:** Ensuring institutional mechanisms at state, district, and local (urban and rural) levels that clearly define roles and responsibilities in recovery.
- **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.
- **Public-Private Partnerships (PPP):** Participation of the private sector would be leveraged for larger public good and the Public-Private Partnerships is one effective way to facilitate the private sector involvement in recovery.
- **Information and Communication Technology (ICT):** Effective use of ICT in recovery program, disseminating messages among all stakeholders, and providing information on all aspects of recovery program.
- **Decision Support System (DSS):** Setting up an adequate DSS that includes Management Information System (MIS), databases, deployment of spatial data management technologies.
- **Pool of Expertise:** Pooling of professional skills and expertise in diverse areas.
- **Community Participation:** Ensuring the pro-active involvement of communities, proper

community outreach, empowerment, and gender equity in program formulation and implementation.

- **Monitoring and Evaluation (M&E):** It is an important component required for promoting transparency in the recovery processes and it would include technical and social audits.
- **Documentation:** Documentation of recovery good practices would be done for replication in future post-disaster recovery process.

Table 18: Recovery Stages

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

9.1.6 Institutional Mechanism for Recovery[28]

In the aftermath of a major disaster (affecting one or several districts) the State Government will establish an efficient and transparent relief administration mechanism to handle long term recovery and reconstruction. If required, the SEC would decide to put up a mechanism such as establishment of a Recovery Committee with Secretaries of select Departments as Members. In order to provide a strong leadership and coordination, SEC may also appoint a Relief Coordinator. Table 19 below indicates the name of the State Department with the capability to take the role of primary responsibility in dealing with specific components of the recovery framework.

Table 19: Primary Responsibility of Departments in Recovery

Recovery component lead role	Department
Social Recovery	Department/ Directorate of Women and Child Development; Department/Directorate of Social Justice & Empowerment; Department/Directorate of Tribal Affairs (Plain)
Economic Recovery	Planning & Development Department
Infrastructure Recovery	Public Works Department
Environment Recovery *a*. Natural environment b. Natural and cultural heritage properties	**a. Environment and Forest Department** **b. Department of Cultural Affairs**

[28] Existing Assam State Disaster Management Plan 2014

In the event of an emergency affecting one or several local areas within the District, DDMA will convene a meeting to discuss recovery implications with support from line departments and ESF's already identified in the DDMP. The CEO of DDMA will be responsible for providing the leadership and coordination and laying out the recovery time line, execution plan, monitoring progress and further reporting to SDMA. Recovery at a city level will be managed by the Local City Government. In rural areas the District Authority will continue to coordinate heavily with the local authority on recovery efforts.

9.2 Reconstruction

The reconstruction phase requires a substantial commitment of time and resources by the Government and other agencies. It is important to note that much of this commitment would be beyond the scope of traditional emergency management programs. The reconstruction challenge involved would most often be the result of a catastrophic event that has caused substantial damage over a very large area and/or affected a very large population.

The key activities of post disaster reconstruction phase are detailed damage assessment, restore/ relocate houses accordingly, finalize reconstruction and rehabilitation after generating substantial funds from appropriate & reliable sources. The activities in the post disaster phase will be primarily carried out by the local bodies (such as Gaon Panchayats in Assam, Block, District, Sub Division, Municipal Corporations, and Municipalities etc.), various Government departments and Boards, under supervision and periodic guidance of Assam State Disaster Management Authority/ SEC. These Post Disaster Reconstruction (PDR) activities shall be carried out, in conjunction with the concerned implementing authorities.

Reconstruction efforts mainly include:

- Re-establishment of adequate housing through ODR etc. to replace the structures, which have been destroyed
- Reconstruction of public infrastructures, buildings and social services damaged by disaster.

1. Re-establishment of Housing through Owner Driven Reconstruction (ODR)

However, there are a number of approaches for the re-establishment/ reconstruction of housing, such as Donor Driven Approach (DDR), Contractor Driven Approach (CDR) etc., but the Owner Driven Reconstruction (ODR) is one of the simplest, most challenging and at the same time democratic and decentralized approach to the mass scale reconstruction; and yet it demands a controlled, strong and centralized policy framework in the effective post-disaster governance.

Here the Owners are the disaster affected victims and they take their own call on reconstruction. It encourages people to do what they normally do, build their own homes; and yet it has to construct a range of extraordinary support systems to ensure that they do it better and faster post disasters.

The key to a successful Owner Driven Reconstruction lies in providing an enabling environment, by regulating the price and subsidizing key construction materials, ensuring special support to most vulnerable people, access to good quality construction materials, technical support and training. This

requires adequate planning to develop good understanding and cooperation with government and civil society organizations. Awareness has to be generated among communities for constructing toilets and smokeless chulhas.

One of the most challenging tasks, in any post disaster stage is to institutionalize the Owner Driven Reconstruction. Prior to institutionalization, an in-depth planning plays a very crucial role. And as the first step of Owner Driven Reconstruction planning is defining the ingredients of ideal ODR, in Assam, the Ideal Owner Driven Reconstruction planning process will have the following key components:

- The existing vulnerabilities, applicable risks and local capacities of the area concerned would be clearly known.
- Following the disaster, a comprehensive damage and loss assessment will be carried out.
- The settlement planning, land titles and specific uses of the same should be known to the user/ implementer.
- The appropriate Owner driven housing technologies will be documented and shared widely.
- The house owner will be empowered to make an independent choice based on his/ her preferences, affordability and needs with the broad parameters outlined in the reconstruction policy.
- Decentralized governance would support and facilitate the Owner Driven Reconstruction process.
- A techno legal framework would support the Owner Driven Reconstruction with diversity of materials, codes and flexibility in designs.
- As a part of Ideal Owner Driven Reconstruction planning, adequate technical skills and required material will be easily available locally to work on the available technologies.

2. Reconstruction of damaged public infrastructure/ buildings/ houses/ social services

Reconstruction efforts in Assam, after the disaster, have witnessed a growing increase in State responses, as well as in the range of stakeholders supporting reconstruction. In most post disaster reconstruction programs with reference to damaged buildings and houses, the speed, cost and quality of construction as well as meeting population targets and deadlines for completion are the main priorities. Moreover, the designing and structuring a policy environment also plays a very crucial role, which allows for a genuine owner led role of the affected community, though it is not always achieved.

When a disaster affects public infrastructure, housing, buildings, social services etc., there are important choices to be made in the rebuilding effort, related to design and construction technology and whether to repair/retrofit the building or demolish it. These choices will take into account the environmental cost, social, institutional, and technical factors. The size and scale of ODR as well as the geographic concentration of the affected area also play a significant role in taking decision on appropriate technologies at the time of reconstruction of buildings, houses, infrastructure etc.

The following guidelines will be followed for a sound housing, building design and construction technology:

- Ensure that the reconstructed design of the damaged building/ infrastructure etc. is compatible with local traditions or with the local population’s willingness to change.

- Ensure reconstructed design is consistent with infrastructure plan so all necessary services are provided (either in the community or in the individual house) and are not redundant.
- Ensure intense community participation in the design and decision-making process (house size, morphology, spatial organization, functions, form, and position on the plot).
- Design the house or building and landscape to take advantage of the climate and reduce the demand for operating energy: sun/shadow exposure, solar shading, thermal insulation, passive solar energy, solar hot water, photovoltaic electricity, rain water collection, wind ventilation system, etc.
- Ensure incorporation of flexibility, modular design, and expandability in the building/ housing design and concept that will make those operations easier and cheaper to carry out when necessary.
- Design a house/ building that facilitates future expansion (or reduction); it will reduce modification costs. Limit the needs of operating energy through the design; heating and cooling costs may force inhabitants to forego comfort.
- Limit the vulnerability of houses/ buildings etc. to the hazards through its design elements, especially form, dimension, and morphology.
- Use traditional technologies and vernacular tradition and provide most appropriate solutions by integrating costs, climate, culture, and technical capacity. Improve and adapt traditional solutions by integrating modern technologies.
- Use indigenous materials, unless the scale of the disaster, its origin, and transportation availability hinders access to local materials.
- Mitigate risks by merging modern technology components with traditional construction practices and improving existing traditional practices.

i. Co-ordination

The reconstruction efforts require the coordination at several levels with the government and the stakeholder institutions, having specific responsibilities for central, state, private sector, voluntary organizations, and international aid agencies, if associated. An aggressive, prompt and effective coordination mechanism will be set up involving all concerned stakeholders to ensure that the relevant decisions are taken in consultation with all concerned and all stakeholders complete their assigned tasks within the given time frame. The coordination system will include both horizontal and vertical coordination; the former involving all concerned state departments and state level other stakeholders whereas the latter will include concerned state department, district and local administrations and district and sub district level other concerned stakeholders.

ii. State Government

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

- Lead and support the need and damage assessment operations.
- Provide relevant data on the severity of the disaster and individual needs.
- Participate and support public information and education programs regarding recovery efforts and available Government assistance.
- Coordinate with the Central Government and other stakeholders for reconstruction process.

iii. Private Sector

The private sector would be engaged in the disaster management and related interventions to mitigate the disaster risk impacts with the help of management practices through reconstruction, and rehabilitation. There is a need to involve 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.

iv. Voluntary Organizations and International Aid Agencies

They will participate in the following activities:

- Joint need and damage assessment
- Support government effort in reconstruction process especially in so far as the mandate requires them.
- Provide technical support to reconstruction and recovery efforts.
- Assist the government in disseminating public information regarding reconstruction and rehabilitation plan.
- Training and capacity development of local communities.
- The voluntary organizations working at grass roots level will also function as the bridge between the district/ local administration and the affected community for awareness generation, benefits of toilet facilities and smokeless kitchens, need for sanitation and cleanliness etc, since they are already familiar with the communities and enjoy their trust.

9.3 Rehabilitation[29]

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

[29] Karnataka State Disaster Management Plan 2019

psychological, infrastructure, as well as economic and social rehabilitation of the people in the affected region. The rehabilitation is classified into the following:

i. Physical Rehabilitation

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

- Reconstruction or restoration 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.

a) Relocation

Relocation is a very sensitive part of the physical rehabilitation process and it will be ensured that need based considerations (not the peripheral factors) drive the relocation policy. The local authorities, in consultation with the affected population and under the guidance of the State Government of Assam, 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 marginalized communities belonging to SC and ST into confidence.
- Making the processes as gender-sensitive as possible and giving due consideration to the needs of 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 necessary infrastructure such as primary and secondary schools, primary health centre are in proximity.

- Ensure provision of livelihood rehabilitation measures for relocated communities, wherever necessary, to the extent possible.

Social Relocation

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 will have components that do not lose sight of the fact that the victims must undergo the entire process of re-socialization and adjustments in a completely unfamiliar social milieu.

Revival of relocation Activities

Educational facilities may suffer greatly in a major disaster, such as COVID 19, placing considerable stress on children. Therefore, the following steps will be helpful in supporting children to recover and cope with the situation:

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

Rehabilitation of the elderly, women, children and differently abled

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

- Identify familiar environs to rehabilitate elderly, women and children.
- Make efforts to attach destitute, widows and orphans with their extended family; if that is not possible then identify foster families.
- Organize regular counseling to strengthen the mental health of women and children.
- Initiate various training including skill development programs to make the women

economically self-sufficient.

- Give due attention to health, nutrition and hygiene in the long-term rehabilitation package for women and children.
- Activate/reactivate the *Anganwadis* (day-care centres) within the shortest possible time.
- Make efforts to build residential female children's homes at the block level, with NGOs involved in running them
- Set up vocational training camps to improve the skills of children including orphan children.
- Promote self-help groups.
- Initiate various rehabilitation and disable inclusive disaster management activities for differently able people.

ii. 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 rehabilitation and recovery. 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.

Therefore, economic recovery will be based on:

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

As per NPDM, the state government would 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.

iii. Psychological Rehabilitation

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

Efforts will be made to focus more on the following:

- Psycho-therapeutic health programs.

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

Since Government facilities and special human resource availability for psychological rehabilitation are limited, support of voluntary organizations may be sought to help implement these measures. Besides, voluntary organizations active in the affected districts might be able to sensitize and train elderly in the village, *Aanganwadi* workers, Self-help groups and educated young women volunteers to extend a helping hand in organizing such efforts.

a) Funds Mobilization

Reconstruction and rehabilitation projects after a major disaster are usually resource intensive. Such projects are typically financed through the State exchequer. In the recent time, funds have been raised mostly through government sources by way of re-appropriation from other budget heads and additional taxation and supplemented through funds raised from multilateral/ bilateral funding agencies in close coordination with the Government. 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.
- Contracting with funding agencies and evolving detailed operating procedures for fund flow and corresponding covenants.

b) Mobilizing, Disbursement and Monitoring of Rehabilitation Costs

The domestic or internal sources of the 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 people, civil society and private philanthropies.
- Insurance/ risk transfer mechanisms.

Some of the important aspects of mobilizing and managing the funds of a large recovery program consist of the following and are summarized in Table 20:

- Review of the Damage and Loss Assessment (DALA).

- Develop a vision and specific time-bound goals for BBB.
- Estimate financial requirements of the recovery program.
- Identify likely sources of funds and examine various options.
- Define and enforce robust financial norms for the financial management.

Table 20: Important Aspects in Mobilizing and Managing the Funds of a Recovery Program

S.N.	Major Steps	Description
1	Review of Damage & Loss Assessment	Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluka) and districts
2	Develop 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 program	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 • Other Sources: Donors, Community contribution, Private sector CSR, PPP
5	Define and enfore robust financial norms for 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 a Management Information System (MIS)

c) Recovery of Reconstruction Costs

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

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

9.4 Monitoring of Recovery, Rehabilitation and Reconstruction Activities

Monitoring will be carried out at different stages of recovery, rehabilitation and reconstruction

processes. The transparency in operations and accountability in the process shall be ensured through periodic process and social auditing.

Further the feedback will be taken from the target groups as well. The Assam State Disaster Management Authority (ASDMA) will lead and monitor the activities during this phase. The authority will define the role for each government departments, private, public, non-government organizations, and individual volunteers. At the State, the ASDMA will be contacted first by any other agency during the phase and at district the DDMA will be approached. They will guide and lead the other agencies to avoid the duplicity of work. Also, on requirement basis, the ASDMA would contact any other agency, State or Central Governments.

The learning of entire rehabilitation and reconstruction activities shall be documented and shared. The lessons learnt would assist Government of Assam in improving recovery, rehabilitation and reconstruction interventions in the future.

CHAPTER 10: CAPACITY DEVELOPMENT- AN OVERVIEW

10.1 Background

It is universally recognized that capacity development is the key to effective and sustainable disaster risk reduction (DRR). It informs all stages of disaster management cycle and forms the core of mainstreaming DRR initiatives in development and building climate smart disaster risk resilience.

While 'capacity development' is the title of this chapter of the Plan, many government policy documents including the Disaster Management Act 2005, use the term 'capacity building' as well. Both these terms are used inter-changeably in this chapter as per the varying contexts.

The Disaster management Act, 2005 [Section 2 (b)] states that capacity-building includes

i. Identification of existing resources and resources to be acquired or created;

ii. Acquiring or creating resources identified under sub-clause (i)

iii. Organization and training of personnel and coordination of such training for effective management of disasters.

It will therefore be seen that the definition of capacity-building, as per the DM Act, is illustrative and not exhaustive. However, the stress is on identification and acquisition of required resources; training of personnel; and coordination. The National Policy on Disaster Management, 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.

Capacity development commonly refers to a process that is driven from the inside and starts from existing capacity assets. The framework underlines the need for capacity development of all the stakeholders, particularly women in DM, and building their ability to participate effectively in managing disaster risk.[30]

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 establishing ownership and commitment of the DRR agenda at the very outset. The sustainability of capacity development initiatives increases in direct

[30] National Disaster Management Plan, 2019, a publication of National Disaster Management Authority

relation to the level of participation and ownership of the internal partners. Mainstreaming of DRR is incomplete without mainstreaming of capacity building on DRR by different Departments and Agencies. Capacity building will also include creating enabling environment by making relevant provisions in existing laws, rules and regulations etc.

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

The SDMP aims at capacity development at all levels of government across all the line departments and various autonomous institutions. It also stresses the importance of capacity development efforts to promote community-based DM efforts, across the education sector covering schools to professional institutions.

i. ASDMA

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

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

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

ii. Opportunity for Capacity Building in Disaster Management

A strong institutional framework supporting overall capacity building for disaster management has been initiated in India by enacting and enforcing Disaster Management Act in 2005. The Act has clearly assigned the roles and responsibilities to local, district, state and national authorities for enabling disaster resilient and safe communities. The creation of NDMA and NIDM at national level, SDMA, DDMA, CDM and Disaster Response Forces at State level, funding mechanism at various levels, etc., have given a greater thrust to capacity building at every level. The Department of Revenue (Disaster Management), GoA, ASDMA, SEC, ASNDMC and DDMAs in all the districts have been established and are functioning. The Centre for Disaster Management is the nodal institute for DM related training in Assam.

iii. Capacity Development of Local Bodies- Rural and Urban

The capacities of Panchayats and ULBs will be developed in the sphere of disaster management. Without adequate capacity development, the local bodies cannot contribute effectively to disaster management or in ensuring the proper implementation of DM plans. Capacity development is also necessary for true empowerment of the bodies of local self-governance.

The elected leaders and officials of Panchayats and ULBs will 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 will also have sound understanding of the needs of proper post-disaster rehabilitation. The local leadership can play a big role in disaster management across all the stages from planning to execution.

Capacity development will aim at increasing the competence of local bodies in all aspects of disaster management with focus on mainstreaming DRR into development programs and projects, as also on promoting a culture of disaster prevention and preparedness. The capabilities of the local bodies will be developed in financial, technical, and managerial spheres. The Center for Disaster Management will develop need-based training programs for the capacity development of rural and urban local bodies.

10.2 Training of Communities

Enhancing the capacity of communities, as they are the first responders to disasters, is a critical part of the capacity development process. The need to build the knowledge of civil society,

communities, and volunteers on disaster risk reduction is well recognized and established and duly underlined in the Sendai Framework as well. Capacity building must include awareness, sensitization, orientation, and development of skills of communities and community leaders.

Assistance from NDRF, SDRF, Civil Defense, Civil Society Organizations (CSOs), NGOs, local Community-Based Organizations (CBOs), and Self-Help Groups (SHGs) will be sought and mobilized. The overall responsibility to give impetus to leadership and motivation for effective DRR and disaster response will rest with local authorities, PRIs and ULBs under the overall guidance of State and District authorities. Community training programmes will be made socially inclusive, with special emphasis on building the capacities of women, children, elderly, SC/ST and PWDs.

10.3 Disaster Resource Network

10.3.1 State and Districts

Government of India has encouraged each state to establish its own State Disaster Resource Network (SDRN) portal on the pattern of India Disaster Resource Network (IDRN). IDRN covers national level, state-level and district level agencies involved in disaster risk management. Assam has already established the State Disaster Resource Network (SDRN) portal providing state-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 and SDRN portal are to enable the decision makers to find answers on availability of equipment and human resources required to combat any emergency.

10.4 Integrating Science, Technology, and Innovation

10.4.1 Enhancing Disaster Management Capacity

According to NPDM, capacity development shall cover all aspects such as institutional, human, community and technology application. The NPDM underlines that, capacity development being a continuous process, must address challenges of staff turnover, task of educating new recruits, keeping pace with technical changes and incorporating the rapid advances in science and technology. In view of the Prime Ministers' 10 Point Agenda, National DM Plan 2019 calls for better access and support for innovation and technology as well as increased investment in DRR to develop new innovations that are both cost-effective and beneficial when applied in all disaster management phases: response, recovery, mitigation, and preparedness.

In Assam, significant DRR efforts have been ongoing for many years; however, further improvements and new methods of DRR beyond the conventional and traditional initiatives are urgently required. But this Plan puts added emphasis on addressing underlying causes such as climate change, poverty, urbanization, population density, and environmental degradation through fostering collaboration between various stakeholders such as government, academia, NGOs, and the private sector. Appropriate application of technology and innovations in disaster management will be crucial in this endeavour.

Actions for Science and Technology and Innovation -based DRR

To enhance the interfaces among science, technology, and policy making and the development and implementation of DRR innovations, the following measures may further improve current strategies and capacities for DRR in Assam.

Priority I – Understanding Disaster Risk

- Enhance disaster loss and damage accounting, state and local disaster risk assessment and communication of disaster risk, with a specific focus on urban risks. This will be done through: data standardization; appropriate and robust methodologies and tools; building the capacities of both the scientific community for dynamic research and innovation to cope with fast changing context of hazards and vulnerabilities, and DRR practitioners to apply such methods; and promoting the role of mass media, civil society and people working with communities to translate scientific information into understandable and accessible risk information. A multi-hazard, multi-scale, multi-stakeholder, and multi-faceted approach based on participatory processes will be the key to this process.
- Use space and disaster risk mapping technologies and strengthen the capacity for using these technologies for improved understanding of disaster risks at global, national and local level.
- Strengthen regional exchange on disaster risk information and science in order to better understand complex disaster risks including risks of trans-boundary, cascading and compound disasters.

Priority II – Disaster Risk Governance

- Strengthen science-policy-practice nexus at all levels (national, local, trans-boundary and regional) through: increased dialogue and networking among scientists, policy makers and practitioners; better evidence to inform decision making and proactive involvement of the science and technology community in regional, national and local platforms for DRR. Support these platforms to be multi-stakeholder partnerships, particularly including the private sector, civil society, media and communities at-risk to deliver science-based solutions and technological user-friendly tools and methods to reduce disaster risk and strengthen resilience.
- Enhance collaboration between local governments, academia and other partners to promote local communities' knowledge and traditions and to sustain and replicate many good practices that exist locally for science-based decision making.

Priority III – Invest in DRR for Resilience

- Make DRR an area of focus within education including networking between universities. Jointly develop research and higher education programmes that contribute to the building of resilient communities and societies. Promote knowledge broker education and training

programmes to help close the gap between disaster risk science and people including through community networks such as faith-based organizations

- Ensure risk-sensitive investments. Enhance the role of the science and technology community in building public private partnerships for the purpose of reducing vulnerabilities of communities and ecosystems-at-risk, preventing risks and building resilience of critical infrastructure, essential services as well as emerging industries.
- Develop young professionals in the field of multi-disciplinary disaster risk reduction. More women and girls should be engaged in DRR research and a gender marker should be a key element of many aspects of such enquiry.

Priority IV – Enhance disaster preparedness for effective response and to Build Back Better

- Promote the role of inter-disciplinary science and technology in effective pre-disaster planning, preparedness, response, rehabilitation, recovery and reconstruction to build back better. Promote the combination of traditional knowledge and modern science. Enhance regional cooperation, particularly for preparedness, response and build back better in trans-boundary disasters.
- Develop an efficient and effective cooperation among the science community and business sector by utilizing the advancements of the fast-developing information and communication technology (ICT) including big data.
- Sensitization and training of PRIs to involve them to identify early warning signs of disaster and initiate appropriate action with the concerned department.
- Research into innovative solutions to promote the whole-of-society engagement; innovative financial mechanisms to maximize social capital for DRR (such as a disaster resilience fund to provide urgently needed resources to disaster affected communities for quick recovery), and to help the business sector shift towards sustainable and resilient development alternatives.

In the following sub-section 10.5, specific actions on different capacity –building themes and sub-themes including integration of science, technology and innovation have been highlighted.

10.4.2 Use of Artificial Intelligence and Machine Learning and other modern Technologies in Disaster Risk Reduction in Assam - potentials and benefits

Recurrent floods, landslides, fire both domestic and forest fires among others are the major Natural and human-made disasters impacting the lives, and livelihoods incurring huge economic and environmental losses to the state. The state needs smart and timely decisions to avert, mitigate and manage ever-accumulating risks. In this respect, the use of artificial intelligence (AI) in the decision-making processes has shown both tremendous promise as well as scope for improvement. By saving time and rapidly analyzing large amounts of data, artificial intelligence can help prevent heavy economic losses owing to floods and other hazards and protect the development gains of the state.

Artificial intelligence (AI) leverages remotely sensed geospatial data from satellites to detect and mitigate potential disasters, and its use in damage mapping and image recognition saves lives during emergencies. Combining AI with hardware has also led to disaster relief robots and drones that deliver aid in risky situations. As a new and emerging technology, it can hasten the spread of critical information, improve understanding of disasters, enhance early warning systems, assess damage in new ways, and add to the knowledge base of social behaviours and economic impact after a crisis.

Predicting Natural Disasters with AI: Artificial intelligence has been helping us in various applications such as customer service, trading and healthcare. And now, researchers have found that AI can be used to predict natural disasters. With enormous amounts of good quality datasets, AI can predict the occurrence of numerous natural disasters, which can be the difference between life and death for thousands of people. Some of the natural disasters that can be predicted by AI are:

Flood: Various experts and researchers are developing AI based applications with the help of rainfall records and flood simulations to predict and monitor flooding. Currently, Google is building an AI platform to predict floods in India and warn users via Google Maps and Google Search. The data for training the AI system is collected with the help of rainfall records and flood simulations. Similarly, researchers are developing AI-based systems that can learn from rainfall and climate records and tested with flood simulations, which can predict floods better than traditional systems. AI can also be used for to monitor urban flooding. Researchers at the University of Dundee, United Kingdom are monitoring urban flooding by collecting cloud-sourced data with Twitter and other mobile apps. The data contains images and information about the locations and situations of the locality, which is recognized by the AI.

Cyclone: AI can use satellites to predict and monitor the path and intensity of cyclones and thunderstorms.

Earthquake: Artificial Intelligence can use seismic data to analyze the magnitude and patterns of the earthquake. For example, google and Harvard are developing an AI system that can predict the occurrence of an earthquake. Currently, Japan is using satellites to analyse the images of the earth to predict natural disasters such as earthquakes and tsunamis. Moreover, the AI platform is being used for monitoring the aging and deformations in structures, which can be used to reduce the damage caused by collapsing buildings and bridges and subsiding roads.

City Infrastructure Monitoring and Urban Resilience: Unauthorized construction is an issue in Assam that impacts safety and well-being of people in urban areas. For example, inadequate monitoring of the progress of building construction can lead to structures being located in high-risk areas such as those prone to floods. These unauthorized developments can be discovered early on through regular monitoring using high-resolution satellite images using AI. Further, cities can extract high-quality statistics using AI that can be used for sustainable urban development.

Land use Classification: AI analysis can assist in classifying land use in Assam. Compared with traditional image processing of the maximum likelihood method, AI classification based on Deep Learning can classify land use more accurately by using the ground surface texture information from satellite images. It can also identify land-use changes by comparing satellite images from two different time periods.

Disaster Response and Recovery: The far-reaching impact of many natural hazards requires the rapid analysis of large numbers of images, which was conventionally done manually by people. This involves extracting from satellite images such information as damaged locations, sediment volume, number of victims, and building wreckage, which are crucial for post-disaster response. Artificial intelligence (AI) is capable of rapidly analyzing large amounts of satellite images in a short period of time.

During the 2018 Hokkaido earthquake in Japan, AI was used for landslide detection. It took about 5 days for skillful engineers to distinguish between damaged places and misleading locations, such as farmlands and roads. Image interpretation by AI takes only 5 minutes to detect damaged places with an accuracy of 93% compared with human visual interpretation.

10.5 Capacity Development Themes

The capacity development is applicable to all aspects of disaster management. State agencies will take actions for capacity development of different stakeholders. It must be noted that the division of responsibilities between state and district are described in detail in the responsibility framework given in separate chapters. The capacity development themes for DRM and related responsibilities are summarized in table 21.

Table 21: Capacity Development for DRR Themes–State and District

S.N.	Thematic Area	Sub-Thematic Areas	Chapter (s) On Responsibilities
1	Deploying advanced technology &equipment	• Adopting the state-of-the-art technology • Identifying technology needs based on hazard risk, vulnerability and experiences. • Procurement of best and most appropriate equipment.	**Chapter 3, Volume 2, ASDMP**
2	Disaster Informati on system	• Maintaining the resource network and database. • Regular updating of the resource data. • Developing fail-safe communication with advance technology, improve data flows across State Dept. and authorized users. • Integration of HRVA data with disaster information systems, Ensuring reliable and credible database on disaster losses (direct and indirect) and post-disaster reconstruction	**Chapter 3, Volume 2, ASDMP**
3	Disaster Risk Governance	• Mainstream and integrate DRR and strengthen institutional mechanisms for DRM, promote participatory approaches, partnerships and networks, Promote quality standards, certifications, and incentives	**Chapter 3, Volume 2, ASDMP**

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 healthcare • 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	**Chapter 3, Volume 2, ASDMP**
5	DM and DRR capacities at local levels	• Trainings in DRM at different levels of local governance • Improve awareness and preparedness of stakeholders at all levels, Preparing DM plans, regular updating, and mock drills	**Chapter 3, Volume 2, ASDMP**
6	DRM in education, research and professional disciplines	• Incorporate subjects of relevance to DRM in school & college curriculum, • Introduce specialized programs, degrees, courses and diplomas. • Promote relevant research projects, programs within institutes and through research grants, Technical and professional programs relevant to various specialized aspects of DRM, Develop ToTs, Research in diverse areas of DRM	**Chapter 3, Volume 2, ASDMP**
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, Improve the alerts system to make it more relevant and effective at all levels	**Chapter 3, Volume 2**
8	Emergency Operation Centres-Strengthening	• Set up State and District level EOCs with adequately trained manpower, Enhance emergency response capabilities. • Strengthen EOCs, improve infrastructure, upgrade equipment with latest technology. • Improve capabilities based on experience after each disaster event, Deploy best of ICT Tools. • Conduct capacity audits of EOCs.	**Chapter 3, Volume 2, ASDMP**

		• Regular reviews and improvement of SOPs, protocols, etc. Develop Mobile control rooms	
9	Global Anthropogenic Climate Change Risks	• Recognize and address climate change risks in DRR • Strengthen adaptations to Global Agreement on Climate Change (GACC)	**Chapter 3, Volume 2, ASDMP**
10	Mainstreaming DRM	• Incorporating DRM into development plans and programs • Incorporating PM's Ten Point Agenda for DRR into development plans • Making DRR as an inherent part of all ministry, department, state development plans • Extending convergence to the domain of DRR	**Chapter 7, Volume 1, ASDMP**
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	**Chapter 3, Volume 2, ASDMP**
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	**Chapter 2, Volume 1, ASDMP**
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	**Chapter 2, Volume 2, ASDMP**

		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.	
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.	**Chapter 9, Volume 1, ASDMP**
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& 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	**Chapter 3, Volume 2, ASDMP**
16	Social Inclusion in DRM	• Gender-based vulnerabilities, Scheduled Castes and Scheduled Tribes, Elderly, Children, Persons with Disabilities and Transgenders	**Chapter 6, Volume 1, ASDMP**
17	Understanding Risk	• Observation Networks, Information Systems • Research, Forecasting, Zoning/Mapping, Monitoring • Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	**Chapter 3, Volume 2, ASDMP**

10.6 Capacity Development Scope

The scope of capacity development interventions for creating a robust disaster risk governance and disaster risk management regime in the state of Assam will be determined by varying specific hazard and risk contexts of different regions of the state. However, the overall capacity development initiative would have the following key elements:

- Awareness generation
- Training including training needs assessment, development of focused training modules for different stakeholders, development of training materials and organization of training for (a) Trainers and (b) Trainees
- Conduct of Mock Drills at community, school, hospital, PHCs etc. levels
- Imparting training through SDRF, trainers trained at state level, NGOs, other civil society organizations
- Development of SDRN at State and District level
- Provision for basic inexpensive equipment for medical first response, search and rescue, damage and loss assessment
- Basic training to enable community to act as first responders till assistance from State /District level is received.
- Preparation of simple village/ ULB level Disaster Management Plans and sensitization and training of community for implementation of such DMPs.
- Familiarization of community with escape routes to shelters
- Determination of and mock drills for moving the livestock to safer ground.

It is envisaged that the DRR Roadmap being prepared will have a well thought out capacity development strategy for DRR in the state of Assam.

CHAPTER 11: FINANCIAL ARRANGEMENTS

The financing of disaster management activities is a very important aspect of fiscal policy. According to the National Policy of Disaster Management (NPDM) 2009, the primary responsibility of disaster management lies with the State Government for undertaking rescue, relief, and rehabilitation measures during a disaster. However, the Union Government further supplements the efforts of the State Government through the logistic, technical and financial support.

The Disaster Management Act, 2005 provides the legal framework for disaster management and all related matters, including the financial aspects. As per the DM Act, financial assistance in the wake of disasters is provided through State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF). These funds have been created under the legal framework of Section 46 and 48 (1) (a) of the Disaster Management Act, 2005. The allocations to SDRF and NDRF are made by the Ministry of Finance as per Finance Commission recommendations.

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

11.1 15th Finance Commission

11.1.1 Background

Successive Finance Commissions had followed an expenditure-based approach to determine the allocation of funds for disaster management to State Governments. The 15th Finance Commission has, however, made a departure from this practice in its Report for the Year 2020-21, recommending a new methodology, which is a combination of capacity (as reflected through past expenditure), risk exposure (area and population) and hazard and vulnerability (disaster risk index) for determining State-wise allocation for disaster management.

This methodology has been continued for the five-year award period from 2021-22 to 2025-26 also. Similarly, the 15th FC has recommended continuation of mitigation funds at both the Union and State levels – National Disaster Mitigation Fund (NDMF) and State Disaster Mitigation Funds – to aid the implementation of mitigation measures in States for the award period, as provided in the Disaster Management Act, 2005.

Disaster management, as a subject and as a facet of Union-State relations, has evolved over the years. Initially, the focus was largely on disaster relief. Earlier Finance Commissions too used the term ‘disaster relief’ while drafting their recommendations. However, the Disaster Management Act expanded the area of concern and action of both the Union and State Governments to a wide range of disaster management functions, which included relief and response, preparedness and mitigation, as well as recovery and reconstruction.

The Act also led to the creation of a new institutional structure for disaster management with the setting up of the National Disaster Management Authority (NDMA) and State Disaster Management Authorities (SDMAs). The role of these institutions and the functions mandated by the Act had influenced the recommendations of Thirteenth and Fourteenth Finance Commissions (FC-XIII and FC-XIV). Successive Finance Commissions had taken a gradual and incremental approach to strengthening financial arrangements for disaster management. Based on their recommendations, a well-structured scheme of funds at the Union and State levels has been institutionalized.

11.1.2 The Evolving Context of Finance Commission's Recommendations

The evolving context behind the recommendations are--

i. Terms of Reference which lay stress on mitigation and preparedness too, besides relief and response and recovery and reconstruction;

ii. Impact of climate change;

iii. Expansion of the scope of disaster management after establishment of NDMA and SDMAs;

iv. Disaster management has become a more specialized area internationally, with a rich body of literature devoted to risk assessment, risk transfer and risk reduction. Its professional needs have also increased at the national and state levels, as States have undertaken diverse initiatives in different areas of disaster management; and

v. The involvement of non-government organisations (NGOs) and the private sector has also helped in expanding participation in disaster management activities, as evidenced recently in some disasters of rare severity.

vi. The insurance industry has witnessed significant growth in the last decade, especially after the increase in the limit on foreign direct investment in the sector to 49 per cent in 2015-16. Leading global insurance companies have set up operations in India in collaboration with domestic players. Therefore, with increased household income, the insurance sector can be leveraged to substantially reduce the financial burden of disaster management by households, particularly well-to-do ones.

vii. Finally, India is a signatory to three large global frameworks, which were created in 2015: Sustainable Development Goals (SDGs), Paris Agreement on Climate Change and Sendai Framework on Disaster Risk Reduction (SFDRR).1 These frameworks call for a set of inter-related actions on the part of governments and other stakeholders, which improve mitigation and adaptation, strengthen regulations, reduce risks and vulnerabilities and build greater resilience at the level of the state and civil society. India's commitment to these frameworks call for enabling actions so that we achieve the key indicators of these development frameworks.

11.1.3 States' Priorities

The State Governments, in their memoranda to 15th Finance Commission had listed their priorities. The main priorities are given below.

i. SDRF allocation for States needs to be augmented. Most States recommended that the existing criteria for allocation, which is based on past expenditures, needs to be reviewed and the considerations of risk and vulnerability need to be taken into account. However, a few States were of the opinion that allocations should continue to be based on past expenditures.

ii. Some States were of the view that the SDRF should be financed entirely by the Union Government, as they find it difficult to provide their matching contribution.

iii. States and SDMAs should have greater flexibility in disbursing relief. The norms of assistance for the SDRF and NDRF are nationally determined, and do not always have flexibility for the unique needs of certain areas, especially remote and hilly terrains

iv. The process of assessment for the determination of Union assistance through the NDRF as well as its release should be made faster and more efficient and transparent.

v. The existing norms of assistance should include more resources for recovery and reconstruction. At present, the allocations are not enough for the reconstruction of housing and infrastructure.

vi. Separate allocations need to be made for the resettlement of people in floodplains, coastal areas and hills who have been displaced as a result of the impact of climate change.

vii. Mitigation, which has emerged as an important component of disaster management, should be funded through Union allocation. States are currently funding risk reduction measures on their own, but these funds are insufficient for the task.

viii. States should receive allocation for preparedness measures, which improves their ability to act upon early warnings. These measures would include setting up State Disaster Response Forces, which reduces dependence upon the armed forces, and the National Disaster Response Force.

ix. Capacity-building grants introduced by the FC-XIII, which had been very useful in building state capacities in disaster management but were discontinued by FC-XIV, should be restored.

x. States should be provided greater technical assistance through national agencies for supporting their disaster management functions.

xi. The amount earmarked for State-specific disasters should be increased up to 25 per cent from the current 10 per cent of SDRF allocation, in view of the large number of local calamities not covered under the national list.

11.1.4 Key Features of Disaster Risk Financing

The mechanism of disaster risk financing in India reflects the distribution of responsibility in respect of disaster management. It is the State Governments which respond immediately to disasters – organizing rescue, evacuation and relief and providing people with assistance. After the disaster event, the responsibility for recovery and reconstruction also lies primarily with the State Governments. The Union Government extends secondary support through deploying the National Disaster Response Force and the armed forces at the request of State Governments. The Union Government and its agencies also provide financial and technical assistance whenever necessary.

As a result, it is the State Governments which incur most of the expenditures on disaster management. These expenditures are, at present, met through the SDRF. When States exhaust their SDRF resources, they can request financial assistance through the NDRF by submitting memorandums to the Union Government. The NDRF, which is set up at the Union level, replenishes and reinforces the State funds following a set of guidelines. This has been the central feature of disaster risk financing in India, and it has met the requirements of States for disaster assistance on a predictable basis. The broader impact of these allocations is reflected in improved early warning and preparedness nationally and, consequently, reduced human mortality over the years. However, as disaster risk has increased – both in terms of incidence as well as economic impact – the existing disaster risk financing arrangements appear less than adequate in terms of both source and application.

11.1.5 Allocation of funds to State Governments for Disaster Risk Management

The 15th Finance Commission has made a departure from response to include mitigation aspects also and recommended setting up of National and State Disaster Risk Management Fund (SDRMF). The share of Central and State Government in North Eastern States and the two Himalayan States of Himachal Pradesh and Uttarakhand is 90:10, whereas for all other States it is 75:25.

The total allocation for Disaster Risk Management Fund for 2020-21 is Rs 858 Crore for Assam and the same for 2021-26 for Assam is Rs 4,268 Crore. The Disaster Risk Management Fund has been recommended as a comprehensive fund, both for response and mitigation activities. The break-down of the Fund is Response and Relief (40%), Recovery and Reconstruction (30%), Capacity Building (10%) and Mitigation (20%). 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[31].

The Commission has recommended that mitigation funds should be set up at both state and national levels in line with the Disaster Management Act provisions. The fund will be used for local level and community-based interventions that help reduce risks and promote environment-friendly settlements

[31]XV Finance Commission Report 2021-26 (Paragraph 8.54 at page 237 of Vol. I)

and livelihood practices. The indicative list of mitigation activities that may be undertaken from State Disaster Mitigation Fund is at Annexure 8.2 of the XV Finance Commission report[32].

The recommendations of the commission related to financing of relief expenditure have been accepted by Government of India. The coverage of funds recommended by the Commission for financing of relief expenditure goes beyond the disaster response funds that existed earlier at the national (NDRF-National Disaster Response Fund) and state (SDRF-State Disaster Response Fund) levels.

11.2 State Disaster Response Fund

The State Disaster Response Fund in Assam shall be used only for meeting the expenditure for providing immediate relief to the victims of flood, drought, earthquake, fire, cyclone, hailstorm, landslide, cloudburst, heat wave etc. 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 expenditure from 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 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 percent of the annual funds allocation of the State Disaster Response Fund.

The two response funds at national and state level 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 State Executive Committee (SEC) may extend it beyond the prescribed time limit subject to the condition that expenditure on this account should not exceed 25 percent of State Disaster Response Fund allocation for the year. The SEC will organize contributions from the relevant State Government, administer the State Disaster Response Fund and invest the accretions to the State Disaster Response Fund in accordance with the norms approved by GOI from time to time.

[32]XV Finance Commission Report 2021-26 Annexure 8.2 of volume II (Page 306-309)

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

- Setting up/strengthening of Emergency Operation Centres (EOCs) in the State
- Training/Capacity Building of stakeholders and functionaries in the State
- Supporting disaster management centres in the state
- Preparation of Disaster Management Plans based on Hazards, Risks, and Vulnerability Analysis
- Strengthening of SDMA and DDMAs

i. Cash transfer from SDRF to disaster affected people including cash assistance to women for their empowerment

At present, there is no provision in the norms prescribed by the Ministry of Home Affairs for cash transfer of assistance to victims of disasters including cash assistance to women for their empowerment. The XV Finance Commission had specifically considered this issue and mentioned in their report that at the community and household level, disaster funds also need to be considered as means of transfer of resources to the people. When people have access to cash, they take several measures to address their welfare losses. They adopt coping strategies in response to disasters, and if they still have resources, they try to recover from the impact and resume their livelihoods. As the size of assistance is generally low, coping with disasters emerges as the primary objective. If people need better protection against disasters, they need to build and acquire assets. These assets could include household assets, such as houses or sources of livelihoods, or community assets such as roads, drainage and health centers. Assets provide a sense of wellbeing and act as a defense against uncertainties and losses associated with disasters. Households with more assets are less likely to experience welfare losses following the occurrence of a disaster event. A disaster assistance strategy, therefore, should not just help people cope with the impact, but should also help them recover from the impact and reduce their risk and vulnerability.

Further, as for disbursing assistance to women affected by disasters, it has been stated that, given the gender imbalances within households, the Commission has observed that cash assistance should be transferred to families in a way that women members of the household also get access to the money. Housing and livelihoods assistance should also be targeted at women. This is an area which requires significant reforms in recognizing the legal rights of women and their central role in ensuring the well-being of families[33].

However, in their recommendations, the Commission has not mentioned anything about cash assistance to victims of disasters and, as for women, the Commission has inter alia stated that other interventions such as disbursing assistance to women members of households will make disaster management more

[33]XV Finance Commission Report 2021-26 (Paragraph 8.28 and 8.29 at page 232 of Vol.I)

effective and efficient. NDMA, as a leading agency in disaster management, needs to be proactive and collaborate with States in pushing the agenda of reforms in disaster management[34]. The NDMA has not made any specific recommendation on this issue so far. Besides, the norms for assistance from NDRF/ SDRF are prescribed by the Ministry of Home Affairs. It is felt that as and when the Ministry of Home Affairs revises the norms prescribed in 2015, they might consider this aspect also.

There is a question whether the Government of Assam, if they so desire, can prescribe cash assistance to victims of disasters and to women affected in disasters. Section 12 of the D.M. Act, 2005 inter alia states that the National Authority shall recommend guidelines for *minimum standards of relief* to be provided to persons affected by disasters. Further, section 19 of the Act states that the State Authority shall lay down detailed guidelines for providing *standards of relief* to persons affected by disaster in the State; provided that such standards shall in no case be less than the minimum standards in the guidelines laid down by the National Authority in this regard.

However, it has to be kept in view that Assam is one of the special States which has to contribute only 10% to the SDRF as against 90% by the Central Government whereas, other than the North Eastern and two Himalayan States, all other states contribute 25% to their SDRF while Central Government contributes 75% share. Therefore, any liberalized standards of relief in Assam will generate similar demand from other States also, unless the norms prescribed for relief from NDRF/ SDRF are relaxed by the Central Government for all states. Therefore, the Government of Assam can disburse cash assistance to victims of disaster including disbursement to women, if the funds are released by the State Government from their own budget and not from SDRF.

11.3 State Disaster Mitigation Fund (SDMF)

Of the total State Disaster Risk Management Fund, 80% is to be utilized for response, relief, recovery and reconstruction. However, 10% of the Response Fund may be utilized for capacity development. Risk Management Fund may be considered as State Disaster Mitigation Fund, to be spent on the items indicated above to the extent of 20% of the State Disaster Risk Management Fund. It shall be considered as State Disaster Mitigation Fund in terms of section 48(1) (c) of the Disaster Management Act, 2005.

The recommendations of the 15th Finance Commission for the Mitigation Funds are as follows:

- Mitigation funds shall be set up at both national and state levels in the form of a National Disaster Mitigation Fund (NDMF) and State Disaster Mitigation Funds (SDMF), in accordance with the Disaster Management Act.
- These mitigation funds shall be used for those local level and community-based interventions which reduce the risks and promote environment-friendly settlements and livelihood practices. However, large-scale mitigation interventions such as construction

[34]XV Finance Commission 2021—26 Report (Paragraph (xiii) at page 262 of Vol. I)

of coastal walls, flood embankments, support for drought resilience etc. should be pursued through regular development schemes and not from the mitigation fund.

- The detailed guidelines for the constitution and utilization of these funds shall be issued by the Ministry of Home Affairs, in consultation with the National Disaster Management Authority (NDMA). These funds should be supervised by the NDMA at the national level and State Disaster Management Authorities (SDMAs) at the state level as per the Act.
- NDMA is finalizing guidelines for administration of State Disaster Mitigation Fund and National Disaster Mitigation Fund. However, an indicative list of items of work on which the Mitigation Funds may be utilized is given in Annexure 8.2 of the Report, referred to above, subject to the conditions mentioned in the preceding paragraph.

ii. Mitigation: Concept, Strategy and Scope

Mitigation refers to proactive measures aimed at reducing the risk, the impact or effects of a disaster or threatening disaster situation, while Preparedness means taking specific measures just before disaster strikes, to be in a state of readiness. Mitigation measures are also implemented in the course of recovery & reconstruction programmes, so that infrastructure and assets are in a better position to withstand the future disasters ("Build Back Better")

Mitigation measures will be grouped as *Structural* and *Non-structural measures*. Structural measures consist of engineering interventions such as construction of small dams, dykes, etc. to contain floods, or strengthening and retrofitting of existing structures to withstand the impact of a disaster. Non-structural measures typically include promoting environmental measures such as shelter belt plantations and mangroves; policy measures such as regulations, zoning, and enforcement of building codes; research and development for disaster risk reduction; and financial measures such as tax incentives etc. However, effective mitigation measures would involve a combination of structural and non-structural measures, multi-hazard risk assessment, life cycle analysis and coherence with the overall developmental programmes of the region.

iii. Schemes that may be undertaken under State Disaster Mitigation Fund by the State Government

As stated above, mitigation projects may be undertaken from Mitigation Fund at local and community level and large-scale interventions should be undertaken only through regular development schemes. The rationale for this exception is that Mitigation Fund should not be utilized, unless the expenditure is of very emergent level, to bypass the prior legislative approval.

The local and community level interventions have been included in the list of 64 items in Annexure 8.2 of the report of the XV Finance Commission. However this is only an indicative list of mitigation activities It may also include conduct of mock drills, procurement of essential inexpensive equipment for first aid or search and rescue equipment needed at rural and community level, community based disaster risk management training programmes, measures to promote environment-friendly settlements, mainstreaming of disaster risk reduction in the development plans at local and community level, interventions needed for social inclusion of marginalised communities at grass root level, empowerment of women through their active participation in various training programmes, medical

first response and search and rescue teams, involvement of self-help groups and civil society organisations in promoting disaster risk reduction and environment-friendly measures at local and community level, development of village level disaster management plans etc.

However, since the State Disaster Mitigation Fund is at the disposal of the State Disaster Management Authority (SDMA), if any additional activities are to be taken up which are not included in the indicative list at Annexure 8.2, the approval of the SDMA to the activities proposed to be undertaken with the outlay needed for undertaking such activities may invariably be obtained from SDMA.

It would be seen from the Indicative List at Annexure 8.2 that the activities shown therein are disaster specific. Besides, there are activities which are common to several disasters. So far such activities are taken up at local or community level, the SDMF could be utilized for that purpose. Similarly, Annexure 8.2 does not specify all disasters. The disasters like COVID 19 Pandemic, which has affected Assam also, is not covered in the indicative list. Similarly, there may be state-specific disasters which are not included in the Indicative List. Activities to mitigate the impact of such disasters can also be undertaken from SDMF provided these interventions are at local or community levels that help reduce risks and promote environment-friendly settlements and livelihood practices.

11.4 Alternate Sources of Funding

While NDRMF and SDRMF primarily are the main sources to meet the expenditure on response, relief, recovery and reconstruction and a key source to meet expenditure on mitigation at local and community level, it has to be conceded that it cannot meet the entire requirement of funds during various phases of disaster management and additional funds have to be provided to meet the requirement, particularly after the introduction of Goods and Services Tax, which has subsumed several components of National Calamity and Contingency Duty (NCCD). These options are discussed below.

i. Public Funded Schemes

The primary mechanism for funding DRR related schemes and projects in Assam 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 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, flood management and flood forecasting programmes of Ministry of Jal Shakti (MOJS). The Department of Space (DOS) has a Disaster Management Support Programme and Ministry of Earth Sciences (MOES) has a project on Early Warning System.

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

ii. 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 of each scheme. The flexi -fund component within the CSS would be used to achieve the following objectives:

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

iii. Externally Aided Projects

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

iv. DM concerns to be mainstreamed in Development Plans/ Projects

The Ministry of Finance, at the instance of NDMA, had issued instructions dated 19.06.09, 12.04.10 and 26.05.10 introducing a system of self-audit that when any development plan or project is formulated, it may be examined whether it would add to vulnerabilities or create new vulnerabilities. In that case the mitigation measures to reduce such vulnerabilities will be added to the project and the expenditure involved on the implementation of such measures will constitute a part of the total cost of the project.

v. Insurance and Risk Transfer

In the past, Finance Commissions have considered and rejected the involvement of Insurance Companies for providing disaster relief to affected people on the plea that it would be cheaper for the state government to directly provide relief to the disaster-affected people. However, 15th Finance Commission has felt that there is a strong case for introducing insurance and risk pooling in niche areas, where essential conditions for market-based risk management instruments exist.

The use of insurance instruments is most efficient for natural perils, which occur infrequently but have high potential impact. The cost of response and recovery for frequently occurring natural hazards (occurring once every five to ten years, depending on the peril) are best absorbed by public funds such as the SDRF and NDRF.

However, severe natural hazards occurring every ten to hundred years are best suited to be covered by an insurance policy or catastrophe bond. However, these insurance mechanisms need to be introduced with due diligence in partnership with insurance companies. The Pradhan Mantri Fasal Bima Yojana

(PMFBY), the government sponsored crop insurance and Weather Based Insurance, provides risk cover to farmers. This and similar initiatives will be explored further and localized in the context of Assam, to address the risk of local farmers.

vi. Reconstruction Bonds

As brought out by XV Finance Commission, in a post-disaster situation, State Governments can issue reconstruction bonds, with a maturity of three to five years, with the approval of the Union Government. People would like to contribute to recovery and reconstruction efforts, and they would prefer to invest in bonds, for reasons other than just financial returns. So, the State Governments could issue these bonds with a lower yield. However, the resources raised by these bonds should largely be spent on the construction of productive and social assets.

vii. Crowd Funding Platform for Disasters

Crowd funding has emerged as a key funding platform to mobilize resources for disaster relief and recovery. Both the Union and State Governments need to recognize the role of crowd funding and use it when disasters occur. While several crowd funding platforms come up following a disaster event, a platform set up by the government with specified objectives and an assurance of transparency can attract public contributions on a more significant scale. Setting up a crowd funding platform would require skills and expertise, which the Governments could consider outsourcing. Identifying the right time for crowd funding, setting up secure payment gateways and ensuring accountability and transparency are the most important considerations for the success of such an initiative. It is an area where both the Union and State Governments together should prepare operational guidelines[35].

With the advent of social media and the increased popularity of digital payments, people are now increasingly switching to the faster, more convenient way to meet urgent, pressing needs where a larger sum of money is needed. In fact, in Assam, the crowd funding platform has seen an increase of almost four times in the number of fundraisers set up from the state compared to the previous year. Another interesting observation is that Assam is a pioneering state in driving online fundraisers through closely knit online groups and communities. Almost 92% of all the fundraisers from the state are funded by individuals and groups using word of mouth on social media.

Fundraisers from Assam have collected nearly INR 1 Crore so far, for various causes: cancer care, treatment for rare medical conditions, kidney transplants or even to address local community concerns in rural areas, or in the aftermath of a disaster. During the floods of 2017, a group of volunteers raised over Rs 10 Lakh through their online fundraiser with the help of over 600 people from across the world. The funds were used to provide immediate relief, dry ration and set up medical camps in flood affected areas. Hundreds of families received instant help from supporters around the globe within a click. Similarly, doctors too, are now resorting to trustworthy online platforms to ensure more patients can avail quality healthcare and specialized medical facilities, undeterred by financial limitations.

The significant advantage of a crowd funding platform is that donors know for which purpose and for whose benefit they are contributing. There are several non-governmental organizations which might come forward to help the State Government to mobilize funds for disaster relief, recovery and

[35]XV Finance Commission 2021-26 Report (Paragraph 8.123 and 8.124 at page 252 ofVol. I)

reconstruction. For instance, during Assam floods in 2016, the crowd funding was undertaken by Ketto 36. A new Assam party, the Assam Jatiya Parishad had resorted to crowd funding before the elections37. A crowd funding campaign has been undertaken to help keep 'free vaccine' pledge and raise at least Rs.100 crore, of the needed Rs. 800 crores for vaccination of population in 18-45 age group in Assam 38. Recently Bhaskar Hazrika directed Assamese film Kothanodi - The River of Fables raised around 21 lakhs via crowd funding 39. The Milaap Foundation in Assam has also played a key role in crowd fund raising in Assam for various social causes 40. ASDMA can initiate crowd funding as per their need.

viii. Other Financing Options

The options for restoration of infrastructure / livelihoods, like utilization of the funds within State Sponsored Scheme (if any) for mitigation/restoration activities in the event of natural calamities, or contingency funding for any untoward occurrence may also be explored.

Opportunities of CSR investments may also be explored and elaborated for increasing State level resilience. As these days the corporate sector is adopting the States/ Districts for the specific interventions, the CSR investments may be covered under the umbrella of the Companies Act, 2013.

Summary of Recommendations of the 15th Finance Commission relating to Disaster Risk Management

(I) The ratio of contribution by Union and States to the State-level allocations for disaster management recommended by FC-XIII should be maintained. Thus, States are to contribute 25 per cent of funds of SDRF and SDMF except the North Eastern and Himalayan (NEH) States, including Assam, which shall contribute 10 per cent, and the rest is to be provided by the Union Government.

(ii) Mitigation Funds would be set up at both the national and State levels, in line with the provisions of the Disaster Management Act. *The Mitigation Fund should be used for those*

[36]https://www.ketto.org/fundraiser/yiforassam

[37]https://www.thehindu.com/news/national/other-states/new-assam-party-takes-crowdfunding-route-to-polls/article33849182.ece

[38] https://www.google.com/amp/s/www.hindustantimes.com/india-news/himanta-biswa-sarma-floats-crowdfunding-campaign-to-help-keep-free-vaccine-pledge-101621523804638-amp.html

[39] https://www.google.com/amp/s/www.magicalassam.com/2016/03/crowdfunding-assamese-movies.html/amp

[40] https://www.indiablooms.com/news-details/N/38409/milaap-foundation-brings-crowd-funding-concept-to-guwahati.html

local level and community-based interventions which reduce risks and promote environment-friendly settlements and livelihood practices.

(II) Allocation of disaster management funds to SDRMFs should be based on factors of past expenditure, area, population, and disaster risk index (which reflect States' institutional capacity, risk exposure, and hazard and vulnerability respectively). Assuming an annual increase of 5 per cent, the Finance Commission has arrived at the total corpus of Rs.1,60,153 crore for States for disaster management for the duration of 2021-26, of which the Union share is Rs. 1,22,601 crore and States share is Rs. 37,552 crores.

(III) Total States allocation for SDRMF should be subdivided into funding windows that encompass the full disaster management cycle. Thus, the SDRF would get 80 per cent of the total allocation and the SDMF 20 per cent. The SDRF allocation of 80 per cent may be further distributed as follows: Response and Relief – 40 per cent; Recovery and Reconstruction – 30 per cent; and Preparedness and Capacity-building – 10 per cent. While the funding windows of the SDRF and SDMF are not interchangeable, there could be flexibility for re-allocation within the three sub-windows of SDRF.

(IV) The allocation for the NDRMF would be based on expenditure in previous years. Assuming an annual increase of 5 per cent, the total national allocation for disaster management is estimated to be Rs. 68,463 crores for the duration of 2021-26.

(V) The allocation for the NDRMF should also be subdivided into funding windows like that of States' allocation for disaster management. Hence, the NDRF would get 80 per cent of the total allocation for the NDRMF, with further division into 40 per cent for Response and Relief, 30 per cent for Recovery and Reconstruction and 10 per cent for Preparedness and Capacity-building. The NDMF would be allotted 20 per cent of the total allocation for the NDRMF. While the funding window of NDRF and NDMF shall be maintained, there could be flexibility for re-allocation within these sub-windows.

(VI) To discourage excessive and unsubstantiated demands from States, all Central assistance through the NDRF and NDMF may be provided on a graded cost-sharing basis. States should contribute 10 per cent for assistance up to Rs. 250 crores, 20 per cent for assistance up to Rs. 500 crore and 25 per cent for all assistance exceeding Rs. 500 crores.

(VII) A Recovery and Reconstruction Facility may be set up within the NDRF and SDRF. Assistance for recovery and reconstruction is generally a multi-year programme, and the assistance, shared between the Union and States, needs to be released annually against expenditures and only as a percentage of total cost.

(VIII) State Governments need to have essential disaster preparedness to respond effectively to disasters. Their institutions and facilities must be equipped and well-functioning to meet the exigencies of a situation. The preparedness and capacity-building grants could be used to support the SDMAs, SIDMs, training and capacity-building activities and emergency response facilities. A similar window of preparedness and capacity-building would be made available within the NDRF, which could be used to support national agencies.

(IX) Major capital works required for proper upstream river basin management (to mitigate annual flood disasters caused by river erosion) with gestation periods of ten to fifteen years

cannot be accommodated through Finance Commission award. Therefore, Finance Commission has recommended that such projects should be considered as national priority projects. Only such holistic projects can help address flood mitigation properly. A piecemeal approach will simply result in yearly washing away of river embankments.

(X) There should be six earmarked allocations for a total amount of Rs. 11,950 crores for certain priority areas, namely, two under the NDRF (Expansion and Modernisation of Fire Services and Resettlement of Displaced People affected by Erosion) and four under the NDMF (Catalytic Assistance to Twelve Most Drought-prone States, Managing Seismic and Landslide Risks in Ten Hill States (this would include Assam), Reducing the Risk of Urban Flooding in Seven Most Populous Cities and Mitigation Measures to Prevent Erosion).

(XI) In order to strengthen institutional capacities, a dedicated capacity should be set up to supervise the NDRMF and SDRMF and augment disaster funding through other sources. In addition, a disaster database should be developed to help assess the impact of expenditures on different aspects of disaster management.

CHAPTER 12: INTERNATIONAL AND REGIONAL COOPERATION

As per the existing legal and policy framework, international and regional cooperation for disaster management is the domain of the Government of India. But as disaster management is a state subject and the State Governments are the end beneficiaries of such cooperation in times of disaster related emergencies, this Chapter presents an overview of the provisions of the international and regional cooperation in the context of India in terms of their implications for the State of Assam.

India has been at the fore-front in supporting and participating in most of the international initiatives that strive towards achieving a safer planet for the future generations. At the international level, India has been working at the bilateral and multilateral level, to promote the agenda of resilience building and sustainable development of nations and communities. India has been an active member at the global level for contributing significantly towards the adoption and implementation of international agreements including SFDRR, COP21 Paris Agreement and SDGs (2015-2030). With multi-dimensional initiatives and expertise, India remains committed to playing a key role in strengthening regional and international cooperation efforts for mitigating reducing the impacts of disasters.

At the regional level, from organizing South Asian Annual Disaster Management Exercise (SAAD Mex, November 2015, New Delhi), to hosting the Asian Ministerial Conference for Disaster Risk Reduction, 2016, India has been making consistent efforts to synchronize and institutionalize the regional cooperation on disaster response among the Asia-Pacific and SAARC member countries. Further, at the global level India is a participant in the International Solar Alliance (2016) and Coalition for Disaster Resilient Infrastructure (CDRI), aimed at achieving safer, disaster resilient and sustainable planet.

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

Working in tandem with nation's policy, practices and international commitments, the Government of Assam and its agencies have also been working towards developing appropriate plans and programmes to achieve the broader objective of achieving the resilience and sustainable development for the state of Assam.

12.1 Accepting Foreign Assistance

As a matter of policy, the Government of India does not seek foreign assistance in the wake of a disaster. However, if the national government of another country voluntarily helps as a goodwill gesture in solidarity with the disaster victims, the decision on acceptance of such offers is taken solely by the Central Government. The primary responsibility for reviewing such foreign offers of assistance rests with the Ministry of External Affairs, which consults and coordinates with the Ministry of Home Affairs, Government of India.

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

In the case of contributions from NRIs, PIOs and foreign non-governmental bodies, donations may be accepted through the Prime Minister's and Chief Minister's relief funds including the recently established PM CARES Fund in the wake of the COVID-19 pandemic in the country. 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.

12.2 UN Agencies

In the case of an offer of assistance from UN Agencies, the Government of India evaluates and considers all such offers on its merits and issues directions to the concerned State/s accordingly[41]. Government of Assam (GoA) will follow the directions of GoI, while accepting or coordinating with the concerned UN agency. GoA will work with UN agencies and international NGOs, those rendering their humanitarian assistance to the people in affected area/s, or receiving any technical/financial support in coordination with the relevant Central Ministries/Departments in accordance with applicable norms, protocols and directions.

UN agencies like UNDP, UNICEF, FAO, WHO may extend assistance in the event of a disaster, if such a proposal has been approved by the Central Government or the assistance is being provided under an on-going program, already approved by the Central Government. Such assistance will not be in terms of cash but it may be in terms of technical and logistic support, including human and material resources. The assistance will be routed through the Central Government or the State Government, if extended under an on-going program in that state.

12.3 Regional and Local Key Agencies

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

i. NGOs & CBOs Engagement Strategy

There is a network of 55 registered Community-Based Organisations and voluntary agencies in Assam active in the field of disaster management. The Disaster Management Manual 2015 lays down the guidelines for engagement of and coordination with NGO at State, District, Sub-division and block levels to cater to disaster preparedness activities during normal time and to response to any disaster situations.

[41] NDMP 2019

NGOs and CBOs in Assam have been playing a crucial role in disaster relief and response. Besides, they motivate and mobilise community participation in long-term disaster rehabilitation and reconstruction. There are some NGOs in the State having access to large resources and capacity to extend material, financial, as well as technical support in times of disasters. Some of the NGOs in the state are involved in developing and propagating alternate technologies in the field of construction.

There is a need for broader and intense GO-NGO collaboration strategy to meet the emerging challenges caused due to disasters and climate change and the salient features of this strategy are as follows:

1. **Replicating micro-level initiatives:** The community-focused approach, which is the main strength of NGOs, can be a limitation without conscious efforts to
replicate successful micro-level initiatives for wider impact. This can be achieved only through continuous dialogue and engagement between state and NGOs, which would create greater understanding amongst them and facilitate policy changes for replication of micro-level experiments.
2. **Optimal use of resources.** In Assam, where limited resources, logistic and infrastructure facilities cause many problems, optimal use of available financial and human resources, organisational energies and support systems is a must for timely disaster response and effective disaster reduction measures. This can't be achieved without effective GO-NGO partnership.
3. **Check Overlapping, Duplication, & Confusion.** Timely response to natural disasters remains a difficult task in Assam, where a majority of people live in dispersed rural settlements with inadequate communication facilities. Involvement of multiple actors, especially NGOs, makes it possible to reach humanitarian aid to marooned victims and initiating restoration work in cut-off zones. However, without coordination, such engagement of multiple actors could result in duplication, over lapping, and confusion. Adequate coordination of efforts made by govt. and NGOs can only ensure proper sharing of responsibility in the disaster response process.
4. **Supplement Govt's Response with Sector-focused Initiatives.** Experience in Orissa and in other parts of India shows that NGOs focus on sector-specific issues such as livelihood, community organisation, community asset creation, women group formation, etc. accelerates social and economic recovery afterdisasters. Such initiatives meaningfully supplement larger infrastructure reconstruction initiatives of the government. Similarly, while the state follows a universalistic approach in supporting victims, NGOs could adopt a community-oriented approach and cater to needs of vulnerable groups who otherwise find it hard to cope with the impact of disasters.
5. **Strengthen Community-Based Disaster Preparedness.** In South-Asia poverty and low awareness explain higher human casualty and deeper adverse impact of disasters. Techno-intensive solutions for disaster response and reduction are hard to adopt in view of higher economic costs and uncertainties surrounding their adaptability to local socio-cultural situations. Success of disaster preparedness in such contexts depends more on effective community-based approaches to risk reduction and management, in which NGOs have a bigger role to play.
6. **Awareness Generation, Local DM Planning and Training:** NGOs and CBOs will be encouraged to participate in raising awareness of the communities, information dissemination, training and capacity building of local volunteers, advocacy and planning, immediate rescue, relief and first aid, ensuring safe drinking water and sanitation, damage assessment, promotion of insurance, technical and material aid in reconstruction and monitoring for strengthening the

disaster management efforts. Groups of trained volunteers will be formed who will offer their services during the time of disasters.

7. **Effective use of NGO network for Collective Action:** There are various NGO Network forums in different regions of Assam including Lower Assam Network Forum, Inter-Agency Group etc. presently coordinating with the ASDMA and other District Administration for rapid damage and needs assessment, mobilization and distribution of relief materials etc. However, this is purely response and relief centric activities. These NGOS will be engaged in community-based disaster management activities such as local level DM planning, training of DM volunteers, conducting research and action research studies on issues such as preparing resilience index of the district, blocks and panchayats, piloting risk reduction initiatives, introducing technology and good practices in local climate adaptation and coping and community resilience building strategy against disasters and climate change.
8. **GO-NGO cooperation and Convergence**: Scaling up of NGO engagement would need: institutional and legal framework, incentives, sectoral collaboration, NGO role in policy-making, etc. An enabling policy environment is sure to strengthen GO-NGO partnership for disaster reduction and social development. A number of steps need to be taken to strengthen GO-NGO collaboration, focusing on issues such as: 1) capacity building support needed by NGOs for disaster management; 2) norms for partnership, consultation, and coordination; 3) stage and type of collaboration.

Table 22: A Broad Set of Issues and Action Points Related to NGOs' Involvement as follows:

S.N.	Issues	Action Points
1	Geographic spread of NGOs	**Develop a database of NGOs at all levels working on disaster management focusing on geographic outreach and thematic capacities of the organizations. (Action: ASDMA and DDMAs with the help of other Departments and NGOs)**
2	Volume of support provided by NGOs	**Compile statistics on quantum of support provided by NGOs at all levels, both international and national. (Action: ASDMA and DDMAs with the assistance of NGOs)**
3	Coordination	**Establishing inter-agency mechanisms for coordination and networking activities (information and knowledge management, training and capacity building, collaborative advocacy, quality and accountability) at all levels. (Action: DDMAs, NGOs)**
4	Accessibility	**Establish protocols for cooperation and ensure access to the affected areas with support from government agencies at respective levels like NDRF and SDRF, as they have good logistics base to reach inaccessible areas. (Action: ASDMA, DDMA, NGOs, CBOs)**
5	Hazard and vulnerability based planning	**Conduct community centric hazard and vulnerability analysis at all levels, and develop disaster management plans accordingly. (Action: DDMA, NGOs)**
6	Community participation	**Ensure community participation in assessment, planning, implementation and monitoring of activities at all levels. (Action: DDMA, NGOs, CBOs)**

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

It is proposed that in every district, there will be a lead NGO which will work at the grass roots level and coordinate with all other NGOs, at the local/regional level, and represent them, as required and agreed.

ii. Corporate Bodies and PSUs

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

Further, it is intended that corporate bodies would address the following:

- The corporate sector would play an active role in preparedness and planning through raising community awareness in their project areas on various aspects of disaster preparedness.
- Corporate Sector will be encouraged to allocate CSR Fund/ Responsible Care Fund etc, for the disaster management activities, including the capacity building of the surrounding community.

- Providing specialized equipment (earthmoving equipment, boats, logistics etc.) for disaster response.
- The corporate sector will develop a fund for preparedness and post-disaster activities including mobilization and creation of contingency fund for relief and recovery activities.
- Provision of technical know-how to manage disasters (especially industrial accidents, fire incidents etc.)

The existing arrangements for international and regional cooperation for disaster management at the national level constitute the larger backdrop against which appropriate outside help could be sought in times of grave emergencies in the state of Assam.

CHAPTER 13: MONITORING, MAINTAINING AND UPDATING THE PLAN

13.1 Introduction

Regular monitoring, periodic maintenance and updating of the State Disaster Management Plan (SDMP) at regular intervals is crucial, as this would ensure that the Plan always remains relevant and responsive. The Plan is intended to be a dynamic document that needs to evolve and adapt in response to emerging issues and challenges, such as the unprecedented outbreak of COVID-19 pandemic in India during 2020-21 in general and the State of Assam in particular.

Review and revision of the State Disaster Management Plan is a continuous process, which will be undertaken periodically, at least once in a year, by incorporating the updated information, changes in Government policies, initiatives, and the lessons learned from any recent disaster and also by taking into consideration the relevant technological developments as well as the global and local experiences. The risk of a community at micro level depends on its specific hazard, vulnerability, exposure and capacity in its local context. These factors are likely to vary across time leading to changes in the risk profile of different vulnerable districts and communities therein, necessitating amendments in the State Disaster Management Plan.

The evaluation of the effectiveness of DM plan will be carried out in the light of local experiences from the ground. Real-world experience of disaster induced emergencies and state and community response to them will determine whether the goals, objectives, decisions, actions, and timing outlined in the plan led to a mitigation of the impact of a disaster both in terms of prompt and effective response on the one hand, and efficacy of the achieved outcomes on the other.

The DM planners will be aware of lessons learnt from the recent disaster events and good practices adopted elsewhere in similar disaster situations. The trainings, mock drills and exercises are crucial to evaluate the operational aspects of the plan, fill up the gaps and improve the efficiency of the plan. The threatening disaster situations and occurrences of actual disasters are also the occasions for evaluating the plan, making innovations, and accordingly updating the plan, SOPs and guidelines. As per the section 23 (5) of the DM Act 2005, the State Disaster Management Plan (SDMP) is required to be reviewed and updated annually.

13.2 Orientation Training

The State Executive Committee (SEC), the nodal agency tasked with developing the State DM plan, with the help of ASDMA, will design and organize orientation training programmes at the state level for wider dissemination of ASDMP 2022 and the strategy of its implementation to all other departments of the state government and other concerned agencies associated with the plan execution. These key stakeholder agencies in turn will train their personnel, so that they have the knowledge, skills and abilities needed to perform the tasks identified in the ASDMP.

Each department/agency will assign a nodal officer for DM and prepare an adequate training schedule. The objective is to enhance the capacity of officers and employees of the concerned state departments and other stakeholders to enable them to undertake implementation of the Plan promptly and effectively.

13.3 Workshops and Drills

Each nodal agency will hold the DM workshops, training programs with mock exercises/ simulation drills, at least twice a year. Such programs are crucial to ensure full preparedness and to maintain operational readiness of the disaster response teams, institutional mechanisms, and the equipment required in case of emergency. It also helps to test their readiness to deploy required resources within the shortest possible time following the DMP activation. They shall be conducted in a manner like the drills carried out by the firefighting department or the army units.

These workshops and drills will be held at the pre-designated locations under the guidance of designated incident commanders and associated departmental heads. These trainings go beyond the concepts and guidelines into inculcating in the individuals the critical importance of working as a coherent team for the emergency response, with a clear chain of command. The workshops and drills will also provide an opportunity to practice and update plan and SOPs[42].

13.4 Testing of effectiveness of the Plan

Test of the effectiveness of a plan involves a combination of factors including planned exercises in response to 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 will capture information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, or lessons-learned. Members of the planning team will reconvene to discuss the problem and to consider and assign responsibility for generating remedies across all mission areas.

Remedial actions would involve revising planning assumptions and operational concepts, changing organizational tasks, or modifying organizational instructions (i.e., the SOPs/ Guidelines) for implementation. Remedial actions would also involve reassessment of capabilities, revisiting the assumptions made in the DMP, and finding solutions to overcome the deficiencies.

The final component of remedial action process is the mechanism for tracking and following upon the assigned actions. As appropriate, significant issues and problems identified through periodical review will provide the necessary information to revise the plan accordingly.

[42]National Disaster Management Plan, 2019 (Page 329)

13.5 Revise and update the Plan

This step completes the DM planning process. It focuses on adding the relevant information and the lessons learnt while executing the existing plan and starting the planning cycle all over again. All the relevant stakeholders will establish a process for reviewing and revising the plan. Reviews will be a recurring activity.

The State DM plan will be reviewed at least once in a year. The following factors and events in time will inform the review, revision and updating of the plan:

- Any major incident leading to the review and the required revisions in the DM plan.
- Addressing significant changes in the 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 state/ 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 if the situation so demands, the appropriate authority will make necessary amendments. All the concerned State government departments will cooperate and actively participate in the process of the Assam State DM plan (SDMP) review and updating, which will be done annually[43].

[43]National Disaster Management Plan (Page 330-331)