सत्यमेव जयते

A STEP BY STEP GUIDE

towards developing Disaster Resilience in states and UTs of India

nidm

Resilient India - Disaster Free India

National Institute of Disaster Management

(Ministry of Home Affairs, Government of India)

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Resilient India - Disaster Free India

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सत्यमेव जयते
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Foreword

Ministry of Home Affairs (MHA), Government of India, had instructed the National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India, to prepare a step-by-step guide to improve disaster resilience in India's States and Union Territories (UTs), as well as prepare a strategic plan for the region using the practical lessons learned from the 2019 MHA-UNDP study report titled "Disaster Risks and Resilience in India-An Analytical study".

This Step-by-Step Guide elaborates on the steps for improving disaster resilience of state governments and UTs in India in the light of the now well-known DM framework, taking into account all listed responsibilities of government agencies responsible for disaster management identifying institutions, communities and individuals engaged in DM practices. It improvises and builds upon the current Disaster Management Framework and related mandates. This Guide, however, is confined to the disasters and sub-themes in the MHA-UNDP Report. States and UTs are encouraged to expand this Guide to cover additional requirements arising from their own contextual risks and vulnerabilities.

This Step-by-Step Guide should be read by all stakeholders to understand their role, position themselves and act accordingly, and contribute towards realizing the common goal of building a disaster resilient state and UT.

tajhassan

Sh. Taj Hasan, IPS
Executive Director
NIDM

Executive Summary

India has made a clear beginning towards establishing an effective Disaster Management (DM) System. The enactment of the Disaster Management Act (DM Act, 2005), articulation of the National Policy on DM, putting in place plans at the National, State and District Levels, release of Guidelines (thematic and cross – cutting), at the National, State and District Levels, and raising of the National Disaster Response Force (NDRF) constitute major milestones in its journey towards safety. This guide presents the broad rubrics of implementation of DM in India. It suggests a two-pronged approach, namely:

(1) **In the short-term,** with available resources, by:
   (a) undertaking a Pilot District Program capable of subsequent up-scaling,
   (b) taking head-on the current residual DM agenda.
   (c) using prudently technology, and

(2) **In the long-term,** with additional resources, by:
   (a) a massive Human Resource Development exercise, and
   (b) reducing consciously the residual DM agenda.

The stage is set for *Disaster Management (DM)* in India. The basic legal framework is in place. The needed finances are available in a systemic way. The central and state administrations are prepared. Drills and rehearsals are ensuring stakeholder ownership and practiced readiness. And, we have the early experiences in the recent past, both the elating success on the reduced losses during the cyclones, and the humbling unaddressed high vulnerability of the built environment during the *earthquakes*. The *residual agenda* is glaring at us and will humble us when hazards occur next.

This Step-by-Step Guide presents the agenda that needs to be addressed to make substantive progress- by the year 2030, the deadline set for many international agreements to conclude, for which is a India signatory. It includes:

(a) Articulating *systems and processes*,
(b) Building the needed *human resources*, especially *technical human resources*,
(c) Beginning the implementation of the DM measures of **Mitigation** and **Preparedness**, especially the retrofit of the select and prioritized elements of the built environment,
(d) Embarking on the long-term agenda of solving the difficult problems, and
(e) Ensuring detailed *documentation* of all new disasters to capture the perishable lessons.

It is prudent to make an *imperfect start* now than to wait for the ideal one to emerge.

Chapter 2 emphasizes that implementing DM today is not business as usual for any of its stakeholders, because many beginnings need to be made; new initiatives are required. Thus, the new thrusts to be made by the stakeholder are articulated. Clearly, the center of action should gravitate to the district and municipal levels, with state governments and UT administrations doing the continual overseeing of the implementation actions. This is the focus of this Step-by-Step Guide. Also, there are big ticket items and nuances in each of the Six Phases of Disaster Management Cycle; the Guide clarifies these for each of the phases, namely *Prevention*, *Mitigation*, *Preparedness*, *Response*, *Rehabilitation and Reconstruction*. More directly, it is expected that for DM to be effective, there is need for:

(1) Increased focus on SDMAs and DDMAs,
(2) Close coordination between the departments,
(3) Deployment of competent manpower and/or capacity development of existing manpower,
(4) Greater community participation,
(5) Formal quantitative prioritization of activities along with specified timelines for completion of the same,
(6) Use of Technology, and
(7) Launch of new initiatives based on pilot projects, e.g., Pilot Districts Program.

Chapter 3 focuses on *Risk Analysis*. Implementing DM requires a *change of culture-in thought*, *word and deed;* this is a gradual process. Also, the number of generalist and specialist hands required is large, even in a small state or UT; these many hands are unavailable currently. These two realities imply that Disaster Management needs to be implemented in a phased manner. To prioritize the actions, a quantitative approach is required, which considers

the realities, constraints and available resources; this is risk analysis. It includes the constituents of risk, the method of risk analysis and the need interpretation of the results jointly by the principal stakeholders.

Chapter 4 elaborates that implementing DM requires a *person-independent* way of working with a predetermined flow of documents within the persons along the chain of command; it involves *proposals*, *discussions* and *approvals*. The activities are administrative, legal, financial and operational in nature. The administrative activities mentioned herein are the fore-runners, because they create the top-most level in hierarchy of chain of command. The actions to be undertaken are towards establishing the essential systems for DM, namely: *State Executive Committee, State Disaster Management Authority*, and *District Disaster Management Authorities*. Also, there are activities to be streamlined in ermsn of coordination within Departments of the State Government, and with State Disaster Response Force, Civil Defence & Home Guards and State Police Forces & Fire Services. Also, two additional systems need strengthening, namely: (a) the essential *techno-legal regime* building resistance in the built environment, and (b) a system of enforcing the same that will assure adherence to the established construction practices that protect both quality control and quality assurance. Further, the Chapter elaborates the mechanism of funding DM activities, especially in light of the *recommendations of 15th Finance Commission* for mitigation activities. Further, the chapter stresses on smoother flow of DM operations by integrating the incremental needs for assuring disaster resilience in the existing method of governance and functioning of the state. Some of the special features that are highlighted are: participation, capacity development and partnerships between all stakeholders, especially in cross-cutting themes.

Chapter 5 presents how technology can be capitalized on in the six phases of the DM. *Technology* can be leveraged to assess, communicate and determine the effectiveness of DM measures. While monitoring is essential to quantify hazards, an even bigger role of technology is in the *mitigation* and *reconstruction* activities, namely in arriving at hazard resistant new constructions and in retrofitting of existing constructions. This is done through experimental and analytical studies. Herein, there is need for significant R&D on aspects that are region-specific, either in terms of local materials or vernacular typologies. On the preparedness front, scenario development exercise is heavily technology intensive. And, mock drills and exercises can be very effective in decision making, especially through improved communications-oral and visual. In response too, communications and IT play the central role. On the rehabilitation, medical services have benefited significantly from advanced diagnostic and treatment facilities.

Chapter 6 clarifies that it is prudent to nibble the mountain steadily than to gobble it. This is the central strategy of implementation of DM initiatives. While there will be timelines and resources set aside, two clear steps are required. Firstly, all DM activities should be prioritized as *vital*, *essential and desirable*. Here:

(1) The **vital activities** towards DM should be implemented in the short-term; these are of immediate nature, for which the funds should be **allocated, if necessary at the cost of excluding other activities, as they belong to a category of over-riding priorities;**

(2) The **essential activities** towards DM should be taken up in the medium-term; these are of urgent nature, for which the funds should be **made available without fail;** and

(3) The remaining **desirable activities** towards DM can be considered in the long-term; these are important, for which the funds should be made available eventually.

And secondly, there should be an independent external third party agency that will monitor continually the implantation activities. In this regard, an online dashboard should be prepared and displayed at publicly. It should showcase the developments in development of disaster resilience in the state and UT. Also, it should provide a summary of work done so far in term of a *Disaster Preparedness Index*. Towards this end, the activation of the Incident Response System and energizing the *Emergency Operations Centers* is a pre-requisite

Finally, **Chapter 7** assures that this gigantic task is achievable, if the states and UTs can feel and act on a sense of urgency, prioritize their actions, commission the due human resources, and monitor their progress towards making course corrections. This Step-by-Step Guide should be read by all stakeholders to understand their role, position themselves and act accordingly, and contribute towards realizing the common goal of building a disaster resilient state and UT.

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The *Ministry of Home Affairs* (MHA) Government of India, had asked the *National Institute of Disaster Management* (NIDM), Ministry of Home Affairs, Government of India, to prepare a *step-by-step guide* to improve disaster resilience of States and Union Territories (UTs) of India, based on the practical lessons learnt from the 2019 MHA-UNDP study report.

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(2) Shri Paras N. Rai, Member, Bihar State Disaster Management Authority,

(3) Shri Kamal Lochan Mishra, Executive Director, Odisha State Disaster Management Authority, and Additional Relief Commissioner, Government of Odisha, and

(4) Ms. Ardra Agarwal, Commissioner of Relief, Government of Gujarat, and Chief Executive Officer, Gujarat State Disaster Management Authority.

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List of Abbreviations & Acronyms

AG	Advocate General of the State
C(DM)	Principal Secretary, Secretary or In-charge of Disaster Management
C(DDMA)	Chairman, DDMA
C(ULBs)	Commissioners of Urban Local Bodies
CBO	Community Based Organization
CGG	Center for Good Governance, Hyderabad
CM	Chief Minister
CS	Chief Secretary
CSOs	Civil Society Organizations
DC	District Collector, District Magistrate or Deputy Commissioner
DDMA	District Disaster Management Authority
DDMO	District Disaster Management Officer
DEOC	District Emergency Operations Center
DG(SDRF)	Director, SDRF
DGF	Director General of Fire Services
DGP	Director General of Police
DIME	Design, Implementation, Monitoring and Evaluation
DM	Disaster Management
M	Minister (Revenue) or Minister (DM)
M(SDMA)	Member, SDMA
MHA	Ministry of Home Affairs
NCDM	National Center for Disaster Management
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NGO	Non-Governmental Organization
NIDM	National Institute of Disaster Management
NPDM	National Policy on Disaster Management
PRI	Panchayati Raj Institution
PDS	Public Distribution System
R&D	Research and Development
S	Secretary of Departments
S(SDMA)	Secretary, SDMA
S(DDMA)	Secretary ex officio, DDMA
S(PRIs)	Secretaries of Panchayati Raj Institutions
SAR	Search and Rescue
SAU	State Agriculture University
SATI	State Administrative Training Institute
SCERT	State Council for Education, Research and Training
SDMA	State Disaster Management Authority
SEC	State Executive Committee
SEOC	State Emergency Operations Center
SIDM	State Institute of Disaster Management
SPTC	State Police Training College
SRSAC	State Remote Sensing Applications Center
S&T	Science and Technology
SR&D	State R&D Bodies
SS&T	State S&T Bodies
UNDP	United Nations Development Program
ULB	Urban Local Body
UT	Union Territory
VC(SDMA)	Vice-Chairman, SDMA

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PART - 1
Introduction

1 INTRODUCTION

The words "Disaster Management" (DM) have reached the desks of:

(1) All the ministries, departments and offices concerned of the government of India and state governments, and UT administrations;

(2) Almost all the educational institutions across the country, and

(3) Nearly all small, medium and large industries in the country.

The next step is to internalize it. One convincing way of doing this is by practicing it. But, for the effort of about 132 Crore people in India to be *effective*, an organized, proactive and prioritized effort is required.

1.1 Disaster Management In India

The concerted efforts towards Disaster Management (DM) were triggered by a series of events in the 1990s that prompted the government to build formal systems and processes to address the subject of DM in a holistic manner. In a sort of firsts, the *National Centre for Disaster Management (NCDM)* was established in 1995, which later became the *National Institute of Disaster Management (NIDM).* In August 1999, the Government of India set up a *High Powered Committee* under the chairmanship of Mr. J. C. Pant, formerly Secretary (Agriculture), Government of India. This was just prior to the devastating super-cyclone of Odisha in 1999. The responsibility for handling disasters remained with the Ministry of Agriculture till 2001. In February 2001, immediately after the 2001 Bhuj Earthquake in Gujarat, an *All Party National Committee on Disaster Management* was constituted with the Prime Minister as the Chairman. The Committee recommended the formation of the *National Disaster Management Authority* under the Ministry of Home Affairs, Government of India. And, in deference to the recommendations of Pant Committee, the responsibility of handling Disaster Management was transferred to the MHA in June 2002. Although the Pant committee recommended the setting up of a Ministry of Disaster Management, this did not fructify in the form recommended. Later, the 2004 Indian Ocean Tsunami shook the conscience of the nation and the Government decided to enact a law on DM to provide for requisite institutional mechanism for drawing up and monitoring the implementation of the DM plans, ensuring measures by various wings of the Government for prevention and mitigating effects of disasters and for undertaking a holistic, coordinated and prompt response to any disaster situation. Thus, the Disaster Management Act, 2005 was enacted and notified on 26 December 2005.

1.1.1 Disaster Management Act, 2005

On 26 December 2005, the Government of India (GoI) took a defining step by enacting the *Disaster Management (DM) Act, 2005,* to spearhead and adopt a holistic and integrated approach to DM. The Act defines "Disasters" as a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence, which results in substantial loss of life or human suffering, or damage to or destruction of property, or damage to or degradation of environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area." It identified 34 disasters and grouped them into five sub-groups considering the related nature of disasters, namely: (a) Water and climate related disasters, (b) Geologically related disasters, (c) Chemical, industrial and nuclear related disasters, (d) Accident related disasters, and (e) Epidemic related disasters.

The Act lays down institutional, legal, financial and coordination mechanisms at the national, state, district and local levels. These institutions are not parallel structures and will work in close harmony. This new institutional framework is expected to usher in a paradigm shift in DM, from relief-centric response to a proactive regime that lays greater emphasis on mitigation, preparedness and prevention initiatives, which conserve developmental gains and minimize loss of lives, livelihoods and properties.

1.1.2 National Policy on Disaster Management, 2009

The *National Policy on DM (NPDM)* was released by

the *National Disaster Management Authority (NDMA)* in 2009, to build a safe and disaster resilient India by developing a holistic, proactive, multi-disaster oriented and technology driven strategy through a culture of prevention, mitigation, preparedness and response.

It seeks to evolve a holistic and integrated approach towards DM with emphasis on building strategic partnerships at various levels. The themes underpinning the policy are:

(1) Community-based DM, including last mile integration of the policy, plans and execution,

(2) Capacity development in all spheres,

(3) Consolidation of past initiatives and good practices,

(4) Cooperation with agencies at national and international levels, and

(5) Multi-sector synergy.

The objectives of NPDM are:

(1) Promoting a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education;

(2) Encouraging mitigation measures based on technology, traditional wisdom and environmental sustainability;

(3) Mainstreaming DM into the developmental planning process;

(4) Establishing institutional and techno-legal frameworks to create an enabling regulatory environment and a compliance regime;

(5) Ensuring efficient mechanism for identification, assessment and monitoring of disaster risks;

(6) Developing contemporary forecasting and early warning systems backed by responsive and fail-safe telecommunication with information technology support;

(7) Ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of society;

(8) Undertaking reconstruction as an opportunity to build disaster resilient structures and habitat for ensuring safer living; and

(9) Promoting a productive and proactive partnership with the media for DM.

1.1.3 National Disaster Management Plan, 2019

The *National Disaster Management Plan (NDMP)* was released by the *NDMA* in 2019, towards making India disaster resilient across all sectors, achieve substantial and inclusive DM by building local capacities starting with the poor and decreasing significantly the loss of lives, livelihoods, and protecting assets of different forms (including economic, physical, social, cultural, and environmental), while enhancing the ability to cope with disasters at all levels.

NDMP provides a framework and direction to the government agencies for all phases of disaster management cycle. The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in DM. It is in accordance with the provisions of the DM Act 2005, the guidance given in NPDM, and the established national processes.

The NDMP recognizes the need to minimize, if not eliminate, any ambiguity in the responsibility framework. Therefore, it specifies who is responsible for what at different stages of managing disasters. It is meant to be implemented in a flexible and scalable manner in all phases of DM, namely:

(1) Mitigation (prevention and risk reduction),

(2) Preparedness,

(3) Response, and

(4) Recovery (immediate restoration and build-back better).

While the names of ministries and departments of the center, state and UTs having specific roles and responsibilities are mentioned in the Plan, in the spirit of the DM Act, 2005, and the exigencies of humanitarian response, every ministry and department and agency is expected to contribute to DM going beyond their normal rules of business.

1.1.4 National Disaster Management Guidelines, 2007–2019

The NDMA has prepared 30 *National Disaster Management Guidelines (NDMGs)* in keeping with the *DM Act, 2005* **(Table 1.1).** Some of these are disaster-specific and the others are cross-cutting across all disasters. Each of these guidelines provides a detailed account of the major issues to be addressed towards preparing the states and UTs for mitigating the disasters related to each hazard and each cross-cutting theme. Also, each of these guidelines lists a number of actionable items in each chapter for implementation.

Table 1.1: List of National Disaster Management Guidelines released till October 2020

S.No.	Name of the Guideline	Release Date
1	Management of Glacial Lake Outburst Floods	October 2020
2	Task Force Report on NDM Guidelines on Management of Glacial Lake Outburst Floods	October 2020
3	Summary for Policy Makers on NDM Guidelines on Management of GLOFs	October 2020
4	Preparation of Action Plan - Prevention and Management of Heat Wave	October 2019
5	Landslide Risk Management Strategy	September 2019
6	Disability Inclusive DM	September 2019
7	Temporary Shelters for Disaster-Affected Families	September 2019
8	Prevention & Management of Thunderstorm, Lightning, Squall, Dust, Hailstorm and Strong Winds	March 2019
9	Boat Safety	September 2017
7	Cultural Heritage Sites and Precincts	September 2017
8	Museums	May 2017
9	Minimum Standards of Relief	February 2016
10	Hospital Safety	February 2016
11	School Safety Policy	February 2016
12	Seismic Retrofitting of Deficient Buildings and Structures	June 2014
13	Scaling, Type of Equipment and Training of Fire Services	April 2012
14	National DM Information and Communication System	February 2012
15	Management of Drought	September 2010
16	Management of Urban Flooding	September 2010
17	Management of Dead in the Aftermath of Disaster	August 2010
18	Management of Tsunamis	August 2010
19	Incident Response System	July 2010
20	Psycho-Social Support and Mental Health Services in Disasters	December 2009
21	Management of Landslides and Snow Avalanches	June 2009
22	Management of Nuclear and Radiological Emergencies	February 2009
23	Management of Biological Disasters	July 2008
24	Management of Cyclones	April 2008
25	Management of Floods	January 2008
26	Medical Preparedness and Mass Casualty Management	October 2007
27	Preparation of State Disaster Management Plans	July 2007
28	preparation of State DM Plan	July 2007
29	Chemical Disasters	April 2007
30	Management of Earthquakes	April 2007

1.2 International Frameworks for Disaster Management

Between 2005 and 2015, more than 150 Crore people have been affected by disasters in various ways, with women, children, youth and other vulnerable populations disproportionately affected worldwide. If additional losses due to climate change were accounted for, the estimates would be even higher. In the recent decades, a number of DM frameworks were proposed internationally under the umbrella of *Disaster Risk Reduction (DRR).* Two prominent ones, namely the *Hyogo Framework* and *Sendai Framework* (adopted in Japan), provide a general guidance for reducing risks from natural hazards. Brief accounts of the various frameworks for DRR are described hereunder.

(a) The Yokohama Strategy

Most natural hazards and subsequent disasters (with detrimental human and economic repercussions), such as earthquakes, floods and storms, increased globally in the 1970s and 1980s, so did awareness of the need for efforts to reduce their negative effects. The UN General Assembly proclaimed the *International Decade for Natural Disaster Reduction* from 1990 to 1999. These initiatives emphasized aspects that are relevant to mountain environments, geological hazards assessment, vulnerability of ecosystems, and climate change and natural disasters. Although many activities addressed hazards and hazard reduction alone, resilience also was a focus in discussions of disaster reduction and sustainable development. This paved the way for the change from a reactive to a more proactive prevention approach, which was promoted in the *Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation* [UN, 1994], adopted during the *First World Conference on Natural Disaster Reduction.* In this strategy, the close links between risk, disaster reduction, sustainable development, environmental protection, and poverty alleviation were the prime focus and apparent.

(b) The Hyogo Framework

Ten years later, during the **Second World Conference** on *Disaster Reduction in 2005,* 168 states adopted the first global framework for DRR. The core of the Hyogo Framework for Action 2005–2015 (HFA 2005) consists of 3 strategic goals, a number of guiding principles, 5 priorities for action, and considerations for implementation and follow-up.

The *Hyogo Framework* (during 2005-2015) focused on governance and risk identification, and sought five priorities for action by nations, namely:

(i) Make disaster risk reduction a priority,

(ii) Know the risks and take action,

(iii) Build understanding and awareness,

(iv) Reduce risk, and

(v) Be prepared and ready to act.

(c) The Sendai Framework

In 2013 and 2014, numerous consultations, conferences, and workshops took place for deliberation on the successor document to the Hyogo Framework. *The Synthesis Report on Consultations on a Post-2015 Framework on Disaster Risk Reduction* noted that "consultations yielded broad calls to address mismanagement of the environment, enhance social and environmental vulnerability assessments and account for ecosystem services. Others noted the significance of trans-boundary cooperation in the management of shared watersheds, deltas and mountain systems" [UN, 2015]. Also, emphasis was on integration of ecosystem services or the management of natural resources for the reduction of risks and the resilience of communities.

The *Sendai Framework* (during 2015-2030) focuses on reducing fatality rates, loss of livelihoods and loss of heath between 2020 and 2030. Also, it sought a substantial reduction of losses to economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries by preventing new disaster risks and reducing existing ones through the implementation of integrated and inclusive measures that strengthen resilience. This goal calls for a strong integration of DRR into development. Four priorities for action are identified:

Priority 1: Understanding disaster risk

Priority 2: Strengthening disaster risk governance to manage disaster risk

Priority 3: Investing in disaster risk reduction for resilience

Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction.

The main gaps identified in implementing the Hyogo Framework are the underlying risk factors, the need to foster a shared responsibility for disaster resilience at all levels, and the need to ensure adequate means of implementation. The gaps indicate a need to develop

an action-oriented framework that governments and other stakeholders can implement in a supportive and complementary manner and that helps to identify disaster risks to be managed and guides investment to improve resilience.

This new Framework (which is non-binding, like the *Hyogo Framework* was) presents one goal and seven explicit targets. Although, coherence with other global policy frameworks was found to be relatively weak, *Sustainable Development Goals* were developed to define the goals the global community should achieve and Sendai Framework provides the solutions for how to achieve these goals.

Both the Hyogo and Sendai Frameworks underline that DRR is not the responsibility of any agency in particular, such as the agency dealing with emergency management, but should be integrated into the development efforts to avoid creating new risks. DRR is to be considered a multi-stakeholder and cross-cutting issue as has been highlighted in all the four priorities as well.

(d) UN Sustainable Development Goals Cooperation Framework

Millions of people are falling back into poverty due to shocks ranging from both localized extreme weather events to major disaster events including drought, floods and storms and, as demonstrated by COVID 19, pandemic and epidemic diseases as well. Without a radical change of course to address the economic and human costs of disasters, development gains will be significantly set back in affected countries, hampering the prospect of achieving the *Sustainable Development Goals (SDGs).*

To help build resilience to climate and disaster risks, countries must be supported to identify and leverage relevant technical, financial, and organizational capacities in all sectors of society. The Guidance Note is intended to help Resident Coordinator Offices and UN Country Teams. It outlines the impacts of climate and disaster risks on progress towards achieving the SDGs and suggests appropriate actions for each phase in the UN Sustainable Development Cooperation Framework lifecycle to make them risk informed.

The 2030 Agenda for Sustainable Development recognizes and reaffirms the urgent need to reduce the risk of disasters. For example, *by reducing exposure and vulnerability of the poor to disasters* or building resilient infrastructure.

The **SDGs** provide an opportunity for India to align its developmental and disaster risk reduction-related objectives and priorities with global targets. As a signatory to SDGs, it is the primary responsibility of India to fulfil its commitments by 2030 to strengthen its resilience to combat natural hazards and disasters. Disaster risk reduction cuts across different aspects and sectors of development. There are **25 targets related to disaster risk reduction in 10 of the 17 sustainable development goals,** firmly establishing the role of disaster risk reduction as a core development strategy. Salient ones relevant to DM are mentioned briefly hereunder.

Goal 1: End poverty in all its forms everywhere

By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. Further, build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

Goal 6: Ensure availability and sustainable management of water and sanitation for all

By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

Target 9.a: Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island development states.

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

By 2030, ensure access for all to adequate, safe and affordable and basic services and upgrade slums. By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

Strengthen efforts to protect and safeguard the world's cultural and natural heritage By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

Goal 13: Take urgent action to combat climate change and its impacts

Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

Integrate climate change measures into national policies, strategies and planning. Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible.

Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries, including focusing on women, youth and local and marginalized communities.

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for 19 sustainable development goals.

By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

Disasters threaten development, just as development can create disaster risk. Disaster risk reduction, as an integrating element within the 2030 Agenda for Sustainable Development, represents such a change of course. Integrating disaster risk reduction across global efforts in support of the 2030 Agenda for Sustainable Development provides a practical and tangible bridge between the development and humanitarian communities, as well as an important rallying point for key stakeholders, including civil society and the private sector, who are highly motivated and essential participants in reducing disaster and climate risk globally, regionally, nationally, and locally.

(e) Paris Agreement on Climate Change

The *Paris Agreement* (signed in December 2015) is a legally binding international treaty on climate change. It's goal is to *limit global warming to well below 2ºC, preferably to 1.5ºC,* compared to pre-industrial levels. In the Paris Agreement, adopted in 2015 at the *21st Conference of Parties to United Nations Framework Convention on Climate Change,* the Member States committed to holding the global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C, with the aim to "significantly reduce the risks and impacts of climate change".

Countries are faced with the growing challenge of managing increasing risks from climate change and climate variability, putting development and the achievement of the Sustainable Development Goals at risk. The adoption in 2015 of the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on climate change, and the 2030 Sustainable Development Agenda provides a clear mandate for increased coherence in countries' approaches to climate and disaster risk reduction. Interventions to adapt to climate change and reduce disaster risks share common objectives, but too often they are developed and deployed through administrative silos. The wide range of institutions and government officials responsible for managing climate hazard exposures and reducing vulnerability often miss potential synergies and duplicate efforts. Governments are increasingly recognizing the benefits of greater coherence in climate change adaptation (CCA) and disaster risk reduction (DRR), exemplified by the number of countries that either have developed joint strategies or put in place processes that facilitate co-ordination across the two policy areas. Coherence is a means to integrate the pursuit of CCA and DRR in sustainable development. It is a process of co-ordination and can be operationalized horizontally across sectors; vertically at different levels of government; and through collaboration across stakeholder groups. Three main types of coherence can be identified:

(1) *Strategic:* Aligned visions, goals and priorities on CCA and DRR in national development plans and strategies, providing a framework for pursuing operational coherence

(2) *Operational:* Policy frameworks and institutional arrangements supportive of the implementation of aligned objectives on CCA and DRR.

(3) *Technical:* Strengthened technical capacities to assess the risks and opportunities, to identify and prioritize CCA and DRR measures and to finance them.

(f) Climate Services in support of CCA and DRR

The past decade has seen a shift in emphasis from assessing climate and disaster hazards to better understanding their risks. Despite this, there continues to be a gap in *exposure* and *vulnerability* data (the two key dimensions of *risk*) compared to *hazard data,* with the former often spread across ministries and levels of government. Human and technical capacity to access, generate and use the data and information available presents an additional barrier.

To overcome these challenges, incentives should be put in place to encourage owners of data to make it accessible. Centralised platforms with access to data and information, including risk models, observation systems (meteorological offices) and academia can facilitate robust risk assessments tailored to user needs. Strengthening capacities of stakeholders to use the data to conduct risk analysis (especially at the local level) should be another priority. To further guide decisions on *Climate Change Adaptation (CCA)*

and DRR within the deep uncertainty inherent in climate projections, climate data should be complemented with information on other ecological, economic and social factors that drive exposure and vulnerability. This, in turn, can help increase the acceptability of CCA and DRR measures by local stakeholders. Further, climate services are most effective when matched with tools that can translate climate information into a format that can guide decision-making processes, recognising broader drivers of risks, such as population growth and urbanisation.

Overall resilience building remains episodic and is rarely addressed in the international debate. Systematic procedures for hazard and risk assessment and the consideration of assessment results in development plans are essential to avoid future losses. DRR can be viewed not only as a targeted subject, but also as a cross-cutting theme for development. Many development agencies promote the full integration of DRR into sector policies and programmes. In the long run, an international strategy for DRR might be considered based on an integrated, multi-hazard approach. Any such strategy can address policies, planning and programming related to sustainable development, relief, rehabilitation and recovery in disaster prone countries. Proactive steps to reduce future losses and build resilience are more cost-effective than purely reactive responses to disasters. As such, DRR has to be considered as an investment in sustainable development and not as an extra burden for investors **(Table 1.2)**.

Table 1.2: Comparison of three Frameworks – SDGs, Paris Agreement and Sendai Framework

Aspect	UN Sustainable Development Goals	Paris Agreement on Climate Change	Sendai Framework for DRR
Background	Global agenda for action towards sustainable development	Agreement on global response to climate change Adaptation, mitigation and finance	Global framework to guide multi0hazard management of disaster risk
CCA and DRR	Climate action and DRR are cross-cutting issues, but explicitly mentioned in: – Goal 13 to combat climate chang e and its impacts – Goal 11 to make cities inclusive , safe, resilient and sustainable Climate action also contributes to the achievement of many of the other goals	Articles 7 and 8 explicitly focus on CCA and DRR – Article 7.1 on enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change – Article 8.1 on averting, minimizing and addressing loss and damage associated with the adverse effects of climate change	Paragraph 123 recognises climate change as driver of disaster risk, and points to the opportunity to reduce disaster risk in a meaningful and coherent manner
Role of Development Cooperation	Stresses the need for strengthened global solidarity, with the participation of all countries, all stakeholders and all people (Goals 17.16 and 17.17)	Recognises the "importance of support for and international cooperation on adaptation efforts" (Article 7.6) and the provision of scaled-up financial resources that aims to achieve a balance between adaptation and mitigation (Article 9.4)	Recognises that the ability of developing countries to manage risks may be strengthened through the provision of "adequate, sustainable and timely provision of support, including through finance, technology transfer and capacity building from developed countries and partners" (Paragraph 19)

1.3 MHA–UNDP Study

The Ministry of Home Affairs (MHA), Government of India, with support from the **United Nations Development Programme (UNDP)** India Office, in consultation with the State governments, undertook an analytical study to assist the state governments and UT administrations to measure various types of risks of disasters and benchmark their own performance on different aspects of DM in the states and UTs of India. This study is titled "Disaster Risks and Resilience in India - an Analytical Study." It contains:

(1) Quantification of natural and manmade disasters risks faced by the states and UTs, and

(2) Progress made so far towards holistic management of these risks, with regard to pre-disaster activities (prevention, mitigation and preparedness) and post-disaster activities (response, rehabilitation and reconstruction).

In Sections A and B of Annexure II, the MHA-UNDP Report lists 30 and 8 facets to be addressed, respectively. Further, in Section C of Annexure II of the *said Report,* the matrix of responsibilities of state governments and UTs under *NDMP* and *NDMA Guidelines on DM* are given for 7 thematic tracks, namely:

(1) Flood DM,

(2) Earthquake DM,

(3) Landslide and Snow Avalanche DM,

(4) Drought DM,

(5) Chemical (Industrial) Disasters,

(6) Preparedness and Response, and

(7) Risk Governance.

Further, under each of the above thematic tracks, the table has identified *activities, responsibilities of state governments,* and *agencies responsible.* The said activities listed are precise and self-explanatory, but the *responsibilities of state governments and UT administrations* listed are relatively imprecise.

1.3.1 Key Issues

The study is the first of its kind to reflect *qualitatively* on the **risks** of the states and their resilience to facing disasters. The states have varying degrees of risks and resilience, but the risks are much higher than resilience, thereby leaving open many layers of unattended and residual risks, which only invite disasters.

The salient observations of the study are noted hereunder:

(1) India has made significant **progress during the last 15 years** in:

(a) Establishing legal and institutional frameworks for DM, and

(b) Developing policies, plans, regulations, guidelines and standards for holistic DM.

But, their implementation in the states and UTs of these frameworks has been poor.

(2) Some path-breaking initiatives taken at the national level to develop and strengthen **early warning** systems of disasters (such as drought, cyclone and tsunami) have strengthened significantly the disaster preparedness of states and UTs. It has resulted in visible outcome of a sharp reduction in mortalities in such disasters. But, similar initiatives on early warning of other hydro-meteorological hazards (like floods, landslides, hailstorm, cloud bursts, lightning, and heat wave) need improvement.

(3) India has strengthened significantly its **capacity to respond to disasters** by the establishment and active engagement of the 12 battalions of the National Disaster Response Force (NDRF) (supplemented by 12 battalions of State Disaster Response Forces (SDRFs)). Currently, India has the largest disaster response force in the world. The NDRF has been responding to disaster situations (like search and rescue [SAR] from collapsed structures). But, the creation of NDRF has not reduced the dependence on the armed forces for responding to major disasters. Similarly, restructuring of the Civil Defence has not significantly augmented as intended the capacity of communities for disaster preparedness; no state or UT has restructured yet its Civil Defence to play this new role.

(4) The states and UTs have lagged in the **implementation** of national and global frameworks for DM, especially for disaster risk reduction (DRR). Very few states have developed high-resolution GIS-based digital risk maps (showing layers of hazard, vulnerability and exposure).

(5) **Disaster risk index** developed in the study should be improved, mapped and visualized on

a GIS-based risk platform and updated on a continuing basis for risk-informed development across all sectors and at all levels. Rapid urbanization triggered by the migration of rural poor to the cities in search of livelihoods is compounding the vulnerabilities of cities. Very few states have the capacity to assess and analyze such changing dynamics of risks, and much less to design policies, strategies and plans to address the risks

(6) The states and UTs are lagging behind in using available financial instruments for DM, except using the funds made available for *relief* and *rehabilitation* under *State Disaster Response Fund* and few centrally sponsored schemes and donor assisted projects. Only a handful of States have constituted **State Disaster Mitigation Funds** and District Disaster Mitigation Funds as mandated by the Disaster Management Act. As of 2019, the Government is yet to constitute the *National Disaster Mitigation Fund,* which is mandated under the DM Act, 2005. A recent study has shown that central investments on DM account for less than 1% of its budget and more than 80% of such allocations are spent on *disaster response* and *relief.*

(7) **Mainstreaming** is only a buzz word, which is routinely mentioned in the national policy, plan and guidelines and in every state's DM Plan, but has hardly been implemented in a structured and systematic manner. None of the states has developed mechanisms for monitoring and evaluating the implementation of the plans. In most states, DM continues to remain as one among many responsibilities of the department of Revenue, and in the states that have either established a separate department of DM or changed the nomenclature of the existing department of *Relief,* their work has not gone much beyond addressing issues of relief and rehabilitation. The paradigm shift in DM from *Response* to *Mitigation and Preparedness* has not taken place on the ground.

(8) Very few states have invested in any **post-disaster reconstruction project** to "build back better," as mandated under NPDM and NDMP. Currently, damaged houses can be repaired and rebuilt but only within the prescribed financial norms that would not permit reconstruction with disaster-resistant features. Similarly, damaged infrastructure can be "restored" only to "pre-disaster condition," but not reconstructed to withstand the shocks of future disasters. Therefore, the current norms are helping (in a way) to recreate the same unsafe houses and infrastructure and recreate old risks of disasters in new forms, every day and every month around the year.

(9) A serious lacuna of the DM system of the states as well as that of the centre is that they have not been able to develop a robust mechanism for **monitoring and evaluating the implementation of its policies, plans, guidelines, programs and projects.** None of the national and state plans has a time frame for implementation, none estimates resources required for implementation, none provides an idea about how such resources shall be mobilized, and what is even more important, none sets up targets and indicators for measuring the progress achieved in the implementation of the plans.

Surely the findings of the study would serve its purpose if there are serious reviews and introspections on *what has been done, what remains to be done and what can be done* with a definite time frame to catch up and close the gaps between promises and action. It would always be wiser to learn from such studies and analysis than being forced to learn from disasters with heavy costs.

In effect, the cumulative effects of the initiatives are visible clearly in advanced early warning systems, coordinated response to disasters and impending disasters, drastic reduction in disaster mortalities, and general increase in awareness about disasters at all levels. But, the effects are not so visible in DM at various levels, DM, and mainstreaming DM across different sectors of development.

1.3.2 Actions required

The MHA-UNDP study has identified three sets of items along which the states and UTs are required to act, namely:

(1) Set 1 related to **DM Act, 2005,**

(2) Set 2 related to **NPDM, 2009**, and ed to **NPDM, 2009**, and

(3) Set 3 related to **NPDM, 2019,** and the select **NDMGs** prepared by the **NDMA** during 2007-2010 **(Table 1.3)**.

These actionable items are listed in respective **Annexures A, B** and **C** of this Guide.

Table 1.3: List of NDMGs referred to in this Step-by-Step Guide

S.No.	Name of the Guideline	Release Date
1	Guidelines on Management of Floods	January 2008
2	Guidelines on Management of Earthquakes	April 2007
3	Guidelines on Management of Landslides and Snow Avalanches	June 2009
4	Guidelines on Chemical Disasters	April 2007
5	Guidelines on Management of Drought	September 2010
6	Guidelines on Preparation of State Disaster Management Plans	July 2007

1.4 This Guide

The MHA had asked the *National Institute of Disaster Management (NIDM)* to prepare a step-by-step guide to improve disaster resilience of states and UTs of India, based on the actions listed in the MHA-UNDP Study (and recalled in **Section 1.2.2**), and in consultation with the National Disaster Management Authority, Government of India.

1.4.1 Scope

This **Step-by-Step Guide towards improving Disaster Resilience of states and UTs of India** elaborates the said *activities* considering all listed *responsibilities of state governments* and *agencies responsible for DM in the light of the now familiar DM framework.* Where required, new *responsibilities* are identified of the *state governments* and new/additional agencies *responsible* are identified.

A Step-by-Step Guide consists of four distinct sub-elements, namely:

(a) The **Step-by-Step Process** to be adopted by the states and UTs;

(b) **Quantified destinations** along all seven verticals of implementation of the actionable items, namely *Flood DM, Earthquake DM,* Landslide and *Snow Avalanche DM, Drought DM, Chemical (Industrial) DM, Preparedness and Response, and DM Governance;*

(c) **A road map** (indicating the sequence of actions and expected changes) and **sign posts** (suggesting the pathways that need to be adopted depending on the results of the actions taken during implementation); and

(d) A system for an independent *external agency* to audit not only the *design* of the implementation plans, but also the actual *implementation* and *monitoring* on daily basis, and eventually the *evaluation* at critical milestones of the effort of the states and UTs during implementation of this Guide. This evaluation will be effective only on reaching the milestones, rather than on calendar clock dates.

The acronyms and abbreviations used on this Guide are listed in **Annexure D.**

Many other events cause damage to and loss of property beyond the ability of the states and UTs to cope with. This Guide however ONLY deals with the *disasters and cross-cutting themes* mentioned in the MHA-UNDP Report on "Disaster Risks and Resilience in India - an Analytical Study." This is in no way a reflection of the importance of those disasters and the associated consequent impact. It is hoped that the states and UTs will expand this Guide to cover additional requirements arising from the context in their own risks and vulnerabilities.

1.4.2 Preparation

The MHA had asked the NIDM to prepare a **step-by-step guide** to improve **disaster resilience of states and UTs of India,** based on the practical lessons learnt from the said MHA-UNDP study. NIDM tasked the *Center for Good Governance (CGG), Hyderabad,* to form a team of subject specialists and prepare the said Guide.

Under the overall guidance of Dr. Mohan Kanda (formerly Member, NDMA), as the **Project Advisor,** the CGG put together a group of subject specialists, with Maj. Gen. M. K. Bindal (Executive Director, NIDM), as the **Technical Advisor,** Professor Devi Prasad Juvvadi as the **Project Coordinator,** and Professor C.V.R. Murty as the **Project Team Leader,** to prepare this Guide. The full list of persons involved in the preparation of this guide is presented in **Table 1.4.**

1.4.3 Assigning Responsibilities

This **Step-by-Step Guide** recognises that while the responsibility of implementing DM actions lies with institutions, it is the human initiative that takes forward effective action. It cannot be gainsaid that in the ultimate analysis, methods and systems need to be institutionalized. The desired results can be achieved through institutional initiatives and efforts, rather than through individual contributions alone. While *leadership* is an essential *ingredient* of success, the overriding importance of institutional approaches needs to be recognized. Thus, when functionaries are identified to implement certain actions, it needs to be understood that terms such as *Secretary, Director, etc.,* represent the **departments or institutions** rather than the **individuals** occupying those positions.

Table 1.4: List of subject specialists who participated in the preparation of this guide

S.No.	Name	Designation
1.	Dr. Mohan Kanda, formerly Member, NDMA, New Delhi	Advisor
2.	Maj. Gen. (Retd.) Manoj Kumar Bindal, Executive Director, NIDM, New Delhi	Technical Advisor
3.	C.V.R. Murty, Professor, Department of Civil Engineering, IIT Madras	Team Leader
4.	Professor K. R. Sastry, Consultant, Hyderabad	Expert
5.	Professor Devi Prasad Juvvadi, Director (Agriculture, Human Development, and Monitoring & Evaluation Groups), CGG, Hyderabad	Project Coordinator and Expert
6.	Mr. G. Kiran Kumar, Sr. Knowledge Manager and Researcher, CGG, Hyderabad	Researcher
7.	Mrs. P. Lalitha, Consultant, CGG, Hyderabad	Researcher
8.	Dr. Hari Kumar, President, Geohazards Society (India) (GHS), New Delhi	Expert
9.	Mr. Mohammad Mudassir, DM Specialist, GHS, New Delhi	Researcher
10.	Ms. Bhagavathy Iyer, Consultant, GHS, New Delhi	Researcher
11.	Mr. Amit Tuteja, Head (DM & Climate Change Adaptation), Knowledge Links, Ghaziabad	Expert
12.	Mr. Jayant Raushan, Consultant, New Delhi	Researcher

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PART - 2
New Thrusts in Disaster Management

2

New Thrusts in Disaster Management

A disaster refers to a *catastrophe, mishap, calamity or grave occurrence* from natural or man-made cause, which is beyond the coping capacity of the affected community. DM involves a continuous and integrated process of planning, organizing, coordinating and implementing measures, which are necessary or expedient for:

(1) *Prevention,* where possible, of danger or threat of disaster, by appropriate forecast and warning,

(2) *Mitigation,* reduction of risk of disasters or their severity of consequences, by suitably designing and constructing the built environment,

(3) Capacity building of people and organizations on research and knowledge management,

(4) Preparedness of people to deal with disasters,

(5) Prompt Response to a threatening disaster situation or disaster,

(6) *Assessing* the *severity* or magnitude of the effects of disasters,

(7) *Rescue, relief* and *evacuation,* and

(8) *Rehabilitation* and *reconstruction.*

A typical DM continuum comprises six elements **(Figure 2.1),** namely:

(a) in the pre-disaster phase: *Prevention, Mitigation* and *Preparedness,* and

(b) in the post-disaster phase: *Response, Rehabilitation* and *Reconstruction.*

An institutional and legal framework binds all these elements together; these are described hereunder.

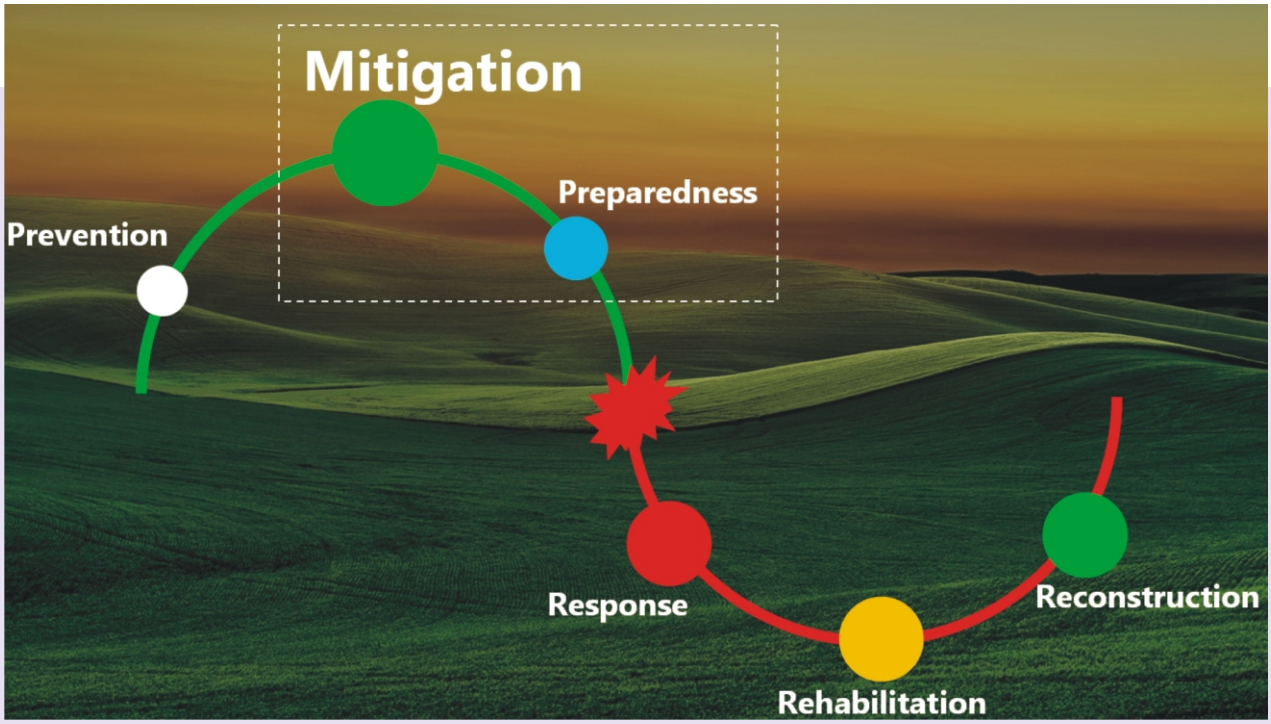


Figure 2.1: *Six Pillars* of the *DM Cycle: Mitigation* and *Preparedness* form the core of the pre-disaster initiatives

2.1 Stakeholders

Considering the current disposition of the large demography of the nation, a *contemporary approach* to DM is imperative. Also, this approach should be two-pronged, namely:

(1) *Bottom-up* with strong community participation, and

(2) *Top-down* with strong policy and dynamically adaptive implementation.

Communities need to take ownership of the DM initiatives, while governments need to facilitate proactive systems & processes and sufficient financial allocation. Thus, the entire process of DM should be an *inclusive* one, which draws the stakeholders own the overall objectives of the process.

The stakeholders in DM are from all quarters of the state or UT and beyond, including from:

(a) *State Government:* Departments, bodies and corporations;

(b) *Central Government:* Ministries, Departments, Subordinate Departments and Offices, Authorities, Public Sector Enterprises, Autonomous Bodies and Assisted Organizations;

(c) *Industry:* Companies, corporations and federations;

(d) *Non-Government Agencies;*

(e) *Public Sector Enterprises;*

(f) *Corporate Sector;*

(g) *Autonomous Organizations and Assisted Organizations:* NGOs, CVOs, PVOs, CBOs, NYKs, NCC, NSS, and NSO;

(h) *Academia:* Universities and institutes dealing with technical, medical, administrative, legal, financial and social subjects; and

(i) *R&D Organizations:* including Centrally Funded Technical Institutes, CSIR Institutes, ICAR Laboratories, and DRDO Laboratories.

While the primary responsibility for protecting lives and property from the impact of disasters lies with the state governments with the center providing support and assistance, the others largely have a role of engaging proactively in the DM initiatives coordinated by the state and the center. The principal actors in DM are presented in **Table 2.1;** it is they who steer the DM agenda of the state or UT.

Table 2.1: Principal actors in DM in a state or UT

S.No.	Office	
1	Elected representatives	Chief Minister Minister (DM) and/or Minister (Revenue), or Minister (Home) Mayors Elected representatives of Urban Local Body (ULBs) Elected representatives of Panchayati Raj Institute (PRI) *Chief Executive Members* of the District Council of an autonomous district, in the tribal areas (as referred to in the *Sixth Schedule of the Constitution*), or *Chairpersons* of the *Zilla Parishads,* where they exists
2	Key functionaries	Chief Secretary Principal Secretary, Secretary or In-charge of Disaster Management State Disaster Management Authority (SDMA) Secretary, SDMA Secretaries of Departments Director General of Police Director General of Fire Services District Collectors, District Magistrates or Deputy Commissioners Superintendent of Police District Disaster Management Authority (DDMAs)

S.No.	Office	
		District Disaster Management Officers, Secretary ex officio, DDMAs District Officers of Departments Commissioners of ULBs Secretaries of PRIs
3	Key organizations	NDRF SDMA SDRF DDMA
4	Nodal Agencies	Departments of the state government
5	Leadership Role to be played by	Secretaries of Departments

2.2 Six phases of Disaster Management Cycle

In all management environments, the urgent always crowds out the important. Therefore, while things that need to be responded to immediately should be given the attention they deserve, the importance of long-term planning and associated groundwork should not be neglected. In DM (as in life), the *urgent* and *important* works get done under duress **(Table 2.2).** But, the work involved in DM is not small to accomplish in a short time. It is huge, and needs substantive resources of human beings, time and money. Often, these are available in small packets. But, in DM, the key is the consistent flow of all these three resources. This limited resource coupled with the *Systems* and *Processes*, which are put in place, can accomplish substantive progress over a period of time.

Table 2.2: **Priority to Pre-Event activities in allocating Resources**

Important	**Urgent**	
	Not Urgent	Urgent
Not Important	None in DM	None in DM
Important	**Prevention** **Mitigation** (and associated Preparedness)	**Response** (*i.e.,* Rescue and Relief) (and associated Preparedness) **Recovery** (*i.e.,* Rehabilitation and Reconstruction)

Progress will be significant in DM only when the focus is on activities that have good gains in the long-run. Hence, a lion's share (say, 80%) of the resources should be pledged such effort; the pre-event activities related to Prevention and Mitigation are candidates for this along with the associated activities related to *Preparedness*. The rest of the resources (~20%) should address post-event activities related to *Response* and *Recovery* (i.e., *Rehabilitation* and *Reconstruction*) along with the associated activities related to Preparedness.

There are initiatives that neither have political mileage nor give administrative appeal nor are of paramount importance in protecting the people in the long-run. Typical among these are activities relating to the maintenance of structures, such as government buildings, roads, irrigation dams, power plants, and manufacturing units. Into the same category fall works, such as balancing reservoirs which, while serving the important purposes of both preventing floods and storing precious water for irrigation purposes, offer little political gain or administrative interest.

DM hinges on six aspects in the cycle of each hazard, namely *Prevention, Mitigation* and *Preparedness* before the occurrence of an event, and Response, Rehabilitation and Reconstruction after the event. Very few natural hazards give a prior warning. Already, the country has robust early warning systems for these meteorological disasters, e.g., cyclones, floods, lightning and heat waves. And, even though *earthquake forecasting* has been attempted for a century with rare success, *Prevention* (of the hazard) is not in focus. Thus, largely 5 aspects are in focus in DM, namely *Mitigation, Preparedness, Response, Rehabilitation* and *Reconstruction;* these 5 aspects are inter-related **(Table 2.3).** The elements on the diagonal boxes of the table are the main thrust of EDM, namely:

(1) **Safe Constructions:** Focus should be on ensuring that all *new constructions* are disaster resistant and *existing constructions* are retrofitted to become disaster resistant; this is particularly critical in earthquake-prone areas;

(2) **DM Plans:** *DM Plans* are different for national, state, district and town levels across the country. And, Plans at each level should flow from the plan at the next higher level;

(3) **Search & Rescue:** The emergency period of Response is dominated by the effort to identify and save survivors trapped under the rubble of collapsed structures;

(4) **Livelihood Restoration:** Re-starting economic activities at the earliest opportunity is critical after the earthquake emergency is over; and

(5) **Built Environment Restoration:** Providing all persons who lost their houses during the disaster to have their own roofs, and restoring all civic infrastructure are signs of restoring normalcy to the affected community.

And, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety in India.

Table 2.3: Inter-related elements in the five aspects of *Disaster Management*

Aspects	Mitigation	Preparedness	Response	Rehabilitation	Reconstruction
Mitigation	**Constructions**	Technical Education	Damage Assessment	Temporary Shelters	Permanent Shelters
Preparedness		**DM Plans**	Active EOCs & Mock Drills	Community Engagement	Owner Driven Reconstruction
Response			**Search & Rescue**	Trauma Counselling	In-situ or Relocate
Rehabilitation				**Livelihood Restoration**	Loss Compensation
Reconstruction					**Built Environment Restoration**

2.2.1 Prevention

Disaster Prevention hinges on 5 aspects, namely *Technology, Community, Decision Making, R&D* and *DM Actions;* these aspects are inter-related **(Table 2.4).** The elements on the diagonal boxes of the table are critical to Disaster Prevention; and these are described hereunder. Besides, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety of the state or UT.

Table 2.4: Inter-relations between the five aspects of *Disaster Prevention*

Aspects	Technology	Community	Decision Making	R&D	DM Actions
Technology	**Instrumentation**	Networks of Sensors	Online Monitoring	Extract Hazard Parameters	Awareness Campaign
Community		**Early Warning**	Decision Support System	Inputs to Mitigation Actions	Emergency Operation Centers
Decision Making			**Forecasting**	Assessment of Risk to Built Environment	Scenario Projection
R&D				**Prediction**	Estimation of Losses
DM Actions					**Evacuation**

(a) Instrumentation

The backbone of *technology* to predict the likely negative fallout of hazards is *instrumentation* to capture the parameters characterizing the *geophysical, hydrological, meteorological, climatological* and *biological hazards.* The critical aspect with respect to instrumentation is maintenance of the same to be in working order.

(b) Early Warning

Some hazards provide sufficient warning to take timely *evasive* action. The networks of sensors distributed across the state or UT provide valuable inputs to determine the need, level and timing of early warnings to alert the communities. The state or UT should play a proactive role by taking suitable DM measures to forewarn the stakeholders on the severity of the hazard, and coordinate the steps to be taken by them. Technology can be leveraged to prepare instrument-based warnings. But, a final *human intervention* is **necessary** before issuing the warning; and, the EOC should enter to take this decision.

(c) Forecasting

The process of decision-making is dependent strongly on the inputs provided by technology, especially on the *Online Monitoring* of the networks of instruments placed across the state or UT. Further, the said instruments should be integrated with a *Decision Support System* to assist the governments to take appropriate actions. Forecasting is necessary for possible impact of the hazards on the state or UT, to convince the stakeholders on the *urgency* of the DM steps to be taken.

(d) Prediction

Prediction has two meanings, namely *when will the event occur,* or when it occurs, *what will be its impact.* Both are *important,* but only the latter is possible in all hazards; the former will happen only in the case of limited hazards. In either case, long-term R&D is the mainstay of prediction. To assess the impact of the negative fallout of hazard, the components of the R&D program include:

(1) Extraction of hazard parameters from the data obtained from the instrumentation,

(2) Holistic study at the system-level through application of state-of-the-art models considering the hazard parameters extracted;

(3) Derive from the said study the inputs for the state or UT to undertake mitigation actions urgently needed in the future projects; and

(4) Assess the risk to the built environment, consisting of normal, important and critical and lifeline structures.

(e) Evacuation

Evacuation is appropriate for both human beings and livestock. Once the R&D studies provide an assessment of the risk to the built environment, it is possible to project the likely scenario of impending disaster. But, before the event truly unfolds, it is prudent to activate the Emergency Operation Centers to watch the developments of the hazard parameters, and undertake Awareness Campaigns to make aware the stakeholders.

2.2.2 Mitigation

Disaster Mitigation hinges on five aspects, namely *Typology, Education, Safety, Practice* and *Policy;* and, these aspects are inter-related **(Table 2.5).** The elements on the diagonal boxes of the table are critical to Disaster Mitigation; and, these are described hereunder. Also, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety of the state or UT.

Table 2.5: Inter-relations between the five aspects of *Disaster Mitigation*

Aspects	Topology	Education	Safety	Practice	Policy
Topology	**Typologies of Structures**	Manuals of Good Practice	Regulate Unsafe Typologies	Skilled Artisans	Change Bye-laws
Education		**Technical Education**	New technology	Continuing Education	Licensing of Engineers
Safety			**Full Scale Testing**	Retrofitting	Peer Review
Practice				**Safety Standards**	Risk Indexing
Policy					**Structural Safety Act**

(a) Typologies of Structures

Structural collapse is the prime reason for loss of life during disasters, and, buildings take a lion's share of about 95% of that. Also, lifeline structures (like social constructions like bridges, water related structures, electricity related structures, sewage treatment structures, roads and cyclone shelters) are necessary after disasters for continuance of life, governance, business and livelihoods. Further, there is a large stock of buildings, which is not necessarily disaster resilient. Thus, these structures need to be understood and protected through retrofitting.

Therefore, documenting typologies of the above several different kinds of structures is critical, because it will help in understanding their disaster resistance, options to retrofit existing structures (where required) and improvements needed to make new structures disaster resistant. For example, India has about 30 broad typologies of houses. Only a few of them are safe, namely the traditional typologies built over centuries along the Himalayas. But, these 30 odd typologies have not been studied quantitatively through experimental studies on full-scale houses and associated analytical studies. A long-term program is required to study and set standards for the complete set of typologies adopted in the construction of buildings and structures across the geographical spread of India, especially material preferences and design requirements.

(b) Technical Education

Technical education pertaining to disaster safety is a serious concern in India. Attention is fading from fundamental aspects that ensure holistic safety of structures, and moving to new technologies that provide speed and economy. Also, hands-on laboratory experience is diminishing owing to lack of resources to maintain and run teaching laboratories. For instance, currently, at the undergraduate level, no college in any state or UT has earthquake safety as mandatory part of the civil engineering curriculum. With about 82% of the people of India (about 100 Crores) living in seismic zones III, IV and V, the subject of earthquake safety should find place in the mandatory part of Civil Engineering and Architecture education.

(c) Full Scale Testing

Disaster resistant constructions do undergo damage when subjected to extreme loads, especially when shaken by earthquakes that produce large intensities of ground expected at the site. It remains to be examined if the said damage is life threatening in a given typology of the structure. Only full-scale testing can demonstrate quantitatively the likely damage in such situations. Currently, India has two facilities existing in the country for testing full-scale buildings (up to 3 storeys) and bridge piers (up to 10 m height). To cater to the needs of 100 Crore people living in moderate-to-severe seismic zones, more full-scale testing facilities need to be established, at least region-wise to begin with, towards making testing affordable and equitable. A multi-agency collaborative project is required to undertake full-scale testing of structures, so that eventually all buildings and structures of different typologies adopted in the country are evaluated.

(d) Safety Standards

While standards exist for design of structures to resist many hazards, some critical ones are either absent or outdated. For instance, India had a separate standard (IS 1893) for earthquake resistant design of structures from the early 60s. But, this standard was revised after long periods of time, especially during the 1980s to 2015. Many provisions need to be updated. Internationally, such important standards are revised once every 3 years. Also, new standards need to be authored pertaining to earthquake safety of the built environment. For instance, an Indian Standard is not available for earthquake safety of coastal structures. Preparation of safety standards for design of structures to resist various hazards should be taken up as a national mission for academia, R&D organizations and Industries to meet in the next 5 years. This effort should be based on sound R&D work undertaken in the country.

(e) Structural Safety Act

Structural safety compliance of all new constructions cannot continue with the government mandated IIT-NIT approval system, as is the current practice in most government projects. India should move to a more sustainable peer review approach in the matter of structural safety. A strong Structural Safety Act is required to set right many aspects of how structural safety is addressed in India, especially earthquake safety. Urban Local Bodies, Municipalities and Panchayats should put in place systems and processes for a Third Party Peer Review of the Structural Safety of all new constructions and retrofit of existing structures. Urgently, India should strengthen existing laws and their implementation, or have a new Structural Safety Act. It should resolve all contentious issues, including:

(1) Competency based structural safety related services to be provided by civil engineers and architects, and

(2) Professional consulting services related to peer-review, proof check, field tests, etc.

2.2.3 Preparedness

Disaster Preparedness hinges on five aspects, namely Sensitization, Content, Facilities, People and Systems; and, these aspects are inter-related (Table 2.6). The elements on the diagonal boxes of the table are critical to Disaster Preparedness; these are described hereunder. And, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety in the state or UT.

Table 2.6: Inter-relations between the five aspects of *Disaster Preparedness*

Aspects	Sensitization	Content	Facilities	People	Systems
Sensitization	**Communicating of Risk**	Risk Index	DM Plans	Media Linkage	Policy Makers
Content		**Mass Media Communication Material**	Print, Audio and Video Documents	Media Campaign & Events	Public Awareness
Facilities			**Emergency Operations Centers**	Disaster Response Network	Stockpile Rescue Facilities
People				**Mock Drills**	Chain of Command
Systems					**SDMAs, DDMAs and Departments**

(a) Communicating Risk

The risk to the built environment prevalent from each hazard should be communicated to the citizens. This communication should be based on a *quantitative* risk analysis exercise. Also, the results of the said risk analysis exercise helps the government allocate its available resources and undertake focused efforts in domains where the risk prevalent is high. Currently, assessment of risk is in the nascent stages in India. But, a start should be made, even though imperfect; it will evolve with increase in competence and experience. The method of assessing risk should be updated continually and the revised numbers projected. But, communicating risk should be with a focused goal of achieving a predetermined change in all stakeholders. The assessment of risk should start from the local level and grow to the district and state or UT levels. Often, the stakeholders are more ready for change immediately after the disaster. Hence, it is prudent to be ready with risk communication content and plans.

(b) Mass Media Communication Material

DM is every citizen's responsibility. Disasters can be managed better with improved awareness and preparation by each citizen. Hence, information and knowledge concerning the impact of disasters, ways of mitigating their negative consequences, role of each citizen, and benefits of undertaking mitigation measures needs to be showcased to the nation. Content should be carefully prepared by agencies known for creative work to suit different target audiences in the local language and a comprehensive mass media campaign should be launched.

(c) Emergency Operations Center

Emergency Operations Centers (EOCs) at the state and district levels play a crucial role in DM. All operations required to be performed (especially in the golden hour) should be rehearsed in the peacetime by communicating during social events (like seasonal large-scale festivities of the village or town). Good forecasting of the likely disaster is the key to making EOCs successful. They should be equipped with the state-of-the art facilities and manned by competent persons. SDMAs should ensure that the state and district EOCs are established and fully functional immediately.

(d) Mock Drills

An effective way of helping each citizen internalize DM is by performing Mock Drills at regular intervals in all academic institutes, housing colonies, and offices. This is the centerpiece of DM planning, and could be done at predetermined days of the year, at least one in a quarter, and on a surprise date in a year. Mock drills help understand reaction time and shortcomings in the preparedness.

(e) Active SDMAs, DDMAs and Departments

The key to DM Preparedness is a vibrant SDMA, which will motivate and inspire the DDMA to become action centers. Seamless, goal-driven partnerships are needed between NDMA and SDMAs, and between the SDMAs and DDMAs. The success of DDMAs will depend on how well they partner with the Departments of the state government, local NGOs and voluntary groups in the implementation of the DM plans.

2.2.4 Response

Post-Disaster Response hinges on five aspects, namely *Systems, Emergency, Logistics, Medical Response* and *Community;* and these aspects are inter-related (Table 2.7). The elements on the diagonal boxes of the table are critical to Disaster Response; these are described hereunder; and, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety in the state or UT.

(a) Emergency Operations Centers

The EOCs that rehearse adequately during DM Preparedness will become the nerve centers during DM Response. Because the EOCs serve these two major aspects of DM, EOCs should be up and running immediately. Towards this end, all stakeholders, departments and agencies involved in the EOCs should participate regularly in executing and/or monitoring ongoing activities of the state or UT.

(b) Search & Rescue

Saving the lives of people alive and trapped under the rubble of collapsed buildings and structures is a scientific activity. The S&R Teams should have knowledge of structural engineering, orthopedics and robotics to undertake the task. They should be trained on judging when to intervene in person and when to access through robots. Well trained SDRFs are of high value, which are pre-positioned in strategic locations of each state. Also, in some instances, there may be a need to evacuate persons from the affected areas; the same should be coordinated.

Table 2.7: Inter-relations between the five aspects of *Disaster Response*

Aspects	Systems	Emergency	Logistics	Medical Response	Community
Systems	**Emergency Operations Centers**	Disaster Response Force	Standard Operating Procedures	Infrastructure	Information Dissemination
Emergency		**Search & Rescue**	Incident Command Sys.	Paramedics	Community Responders
Logistics			**Temporary Shelters & Civil Supplies**	Equipment & Manpower	NGO Coordination Center
Medical Response				**Triage**	SH groups (Red Cross Trained)
Community					**Golden Hour Response**

(c) Temporary Shelters, Civil Amenities and Civil Supplies

Disasters render many homeless, and can severely impair transportation systems, and providing civil supplies in such a situation can be a challenge. When the houses are lost, the affected persons should be provided with temporary shelters with basic civic amenities, like water and sanitation. To ensure at least basic supply of essential items in the aftermath of disasters, communities need to be sensitized on the need to have emergency supplies (for a week at least) of essentials, and if their houses are damaged, they need to be provided the same. These essential supplies include medical items, food and water, along with other useful items, like footwear and torchlight.

(d) Triage

With injured patients at an emergency in a hospital, prioritizing which condition (cardiac, orthopedic, surgery or trauma) of the patient needs first decision making. Triage is vital here to determine the order in which the ailments will be treated. Emergency bays of hospitals should practice triage in their normal functioning. Training of personnel, especially the non-medical support staff, is vital.

(e) Golden Hour Response

Generally, about 72 hours after an event are crucial. The chances of survival can be increased substantially, if the injured can be given timely and appropriate support, especially in the first hour. Also, affected persons need to be given care and personal counseling. Communities need regular and accurate updates.

2.2.5 Rehabilitation

Post-Disaster Rehabilitation hinges on five aspects, namely *Compensation, Temporary Shelters, Psycho-Social Trauma, Livelihood* and *Community;* and, these aspects are inter-related **(Table 2.8).** The elements on the diagonal boxes of the table are critical to Post-Disaster Rehabilitation; these are described hereunder. And, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety in the state or UT.

(a) Ex-Gratia

Rehabilitation after a disaster is a complex task and it needs a comprehensive and collective effort. Giving Ex-gratia (given out of empathy to fellow human beings though not as compensation) to *kith-and-kin* of persons deceased during the disaster helps the poor. But, this is only a starting point of Rehabilitation process in DM.

Table 2.8: Inter-relations between the five aspects of *Disaster Rehabilitation*

Aspects	Compensation	Medical Condition	Psycho-Social Trauma	Livelihood	Community
Compensation	**Ex-Gratia**	Civil Supplies	Orphan Support	Minimum Wage	Donations
Medical Condition		**Physical Health Standards**	Rehabilitation Centre	Aanganwadi Activities	Community Spaces
Psycho-Social Trauma			**Mental Health Support**	Unskilled workers	Privacy for Counselling
Livelihood				**Economic Activities**	Employment Guarantee
Community					**Social Activities**

(b) Physical Health Standards

Temporary shelters provided should meet the WHO standards laid down to ensure basic hygiene and prevent additional challenges arising out of lack of cleanliness and medical safety.

(c) Mental Medical Support

While rehabilitating affected persons after disasters, their past medical record should be considered. Often, such medical records are not available. Hence, only experienced doctors should give personalized solutions. Such a system needs to be developed over a period of time. Standard operating procedures should be developed by foreseeing the post-disaster situation. A review of the current medical practices and facilities is necessary. Therefore, a plan is needed to elaborate how this medical system will service the sudden spike in the medical support.

(d) Economic Activities

Protection of livelihoods requires safeguarding the resources from where people draw their livelihood, e.g., water bodies, forests, rangelands, parks/gardens, and nurseries, besides industrial, commercial and government-owned service establishments. They hold the key to community resilience against the impact of disasters, because they determine the capacity to reduce their own vulnerability and prepare to counter sudden spikes in the demands during the disaster situations. Alongside, safeguarding animals and the role of animals in DM is a major facet of sustainable development in the backdrop of DM.

After a disaster, all employment activities are expected to be stalled for some time. The most crucial element of rehabilitation after a disaster is restoring economic activity. The affected people feel reassured that they can rebuild their lives if their employment is restored. Ensuring minimum wages is essential for unskilled workers. Bringing skilled men/women back to their regular economic activities at the earliest opportune time is a central part of the rehabilitating communities.

(e) Social Activities

While disaster recovery is a time-consuming process, the engagement with the community should start as soon as possible; and, it gives hope and strength to people and helps them come back to normal condition. For this to happen, planned social engagements can be helpful. Communities should be encouraged to have social gatherings, religious congregations, mass prayers, festivals, etc. This will help in re-establishing the human bonds within the community, and recovery can be made smoother.

2.2.6 Reconstruction

Post-Disaster Reconstruction hinges on five aspects, namely *Technology, Money, People, Site* and *Safety;* and, these aspects are inter-related **(Table 2.9).** The elements on the diagonal boxes of the table are critical to Post-Disaster Reconstruction; these are described hereunder. And, the elements in the off-diagonal boxes are the minimum mandatory actions that should be undertaken to work towards establishing disaster safety in the state or UT.

(a) Safe Type Designs

Each region of the state or UT has certain types of houses built commonly. The unsafe typologies should be outlawed. Often, these prevalent unsafe designs have been more readily accepted for reconstruction. Hence, it is better to identify 2-3 type designs, especially for the *Low Income Group* category, and prepare *disaster-resistant structural designs* of the type-design structures for different soil conditions in the state or UT. After a disaster, these type designs will be the starting points when discussing with the beneficiaries. By the proactive work of the state or UT, the iterations will be reduced and time for finalization will be shortened.

Table 2.9: Inter-relations between the five aspects of *Disaster Reconstruction*

Aspects	Technology	Money	People	Site	Safety
Technology	**Safe Type Designs**	Cost-Effective Design	Artisan/Owner Training	Local Materials	Testing
Money		**Compensation**	Compensation Policy	Land Title	Legalized Damage Assessment
People			**Owner or contractor driven**	Customization	Peer Review
Site				**Insitu or New Sites**	Land Use Planning
Safety					**Permanent Shelter**

(b) Compensation

When houses are damaged partially, compensation is paid to owners to restore them. The amount of compensation should depend on the grade of damage. Categorizing buildings depending on the damage sustained by them is a formal *structural engineering* exercise. *Damage Assessment Teams (DATs)* need to be formed, which are trained formally during peacetime on the nuances of the damages and their implications on life safety. Alongside, the needed techno-financial and techno-legal systems should be put in place before the next event, to make damage assessment after the disaster a *legally protected* technical exercise. Compensation should be paid only after a formal certification by the DATs. This post-disaster damage assessment is not the pre-disaster *Rapid Visual Survey* that is understood commonly.

(c) Owner or Contractor Driven Reconstruction

Even if the type designs are acceptable to the community, social dynamics will determine the choice, whether post-earthquake reconstruction will be *owner-driven* or *contractor-driven.* Specially trained NGOs should mediate this decision-making process and assist the government in speeding up the decision making and in starting the reconstruction work.

(d) In-situ or New Sites

Two thoughts may arise in communities after disasters that caused extensive collapse of houses - to build at the *same site* (in-situ) where the houses collapsed, or to go to a new site (relocate) and build afresh. If there is no special issue with the previous site (like permanent deformations of ground, liquefaction, fall of debris, and landslides), only then the in-situ option should be allowed. It may happen that only some would like to move to new site, while others may want in situ reconstruction. Again, a mediator NGO is necessary to help communities to take this decision.

(e) Permanent Shelters

Even with the aforesaid four crucial contentious issues sorted out, the realization of the permanent shelters should be a guided process. A *construction (project) management group* is needed to keep track of the progress and complete the work on time.

2.3 The shift to the New Paradigm

With over 132 Crores of people waiting to be provided basic protection against disasters, especially natural disasters, the scale of implementation is large of DM measures. This is not the time for doing incremental work, ticking boxes on paper, and making people live in a false sense of safety from impending negative fallouts of the prevalent hazards in India. For sure, to speed up and scale-up the implementation of DM, a fresh approach should be adopted that is **not just doing things better, but also differently:**

(1) It needs to be accurate, objective, and formal;

(2) It should leverage Information Technology and maximize decision making based on ground realities, rather than hearsay; and

(3) It should have timelines for meeting targets, and mechanisms to incentivize successful implementation.

2.3.1 Increased Focus on SDMAs and DDMAs

The **DM Act (2005)** has been in force since 2005 and the *National Policy on Disaster Management* was released in 2009, the *National Disaster Management Plan* **released only** in 2016, and subsequently revised in 2019. But, it is heartening to note that as on date, all states have formed the *State Disaster Management Authorities (SDMAs)* and the *District State Disaster Management Authorities (DDMAs),* with the exception of Telangana, which is yet to constitute the DDMAs. In fact, preparation of DM Plans is mandatory for all the States (SDMAs) and Districts (DDMAs), as adumbrated and required by Sections 23 and 31 of the DM Act of 2005, and also by the National Disaster Management Plan (NDMP), released by the Prime Minister on 01 June 2016.

The NDMP is the *first* national plan prepared in the country. It aims to make India disaster resilient and significantly reduce the loss of lives and assets. The plan is based on the four priority themes of the "Sendai Framework for Disaster Risk Reduction (SFDRR)," namely: understanding disaster risk; improving disaster risk governance; investing in DM (through structural and non-structural measures); and disaster preparedness, early warning and to "build back better" in the aftermath of a disaster.

Also, all the states have prepared the *State Disaster Management Plans* (*SDMPs*); and, of the 720 Districts in the country, 670 have prepared the *District Disaster Management Plans* (*DDMPs*). Furthermore, rapid progress is understood to be made by the Central Ministries in the preparation of their corresponding *Disaster Management Plans (DMPs).* It is hoped that these plans include the bare essentials: basic services to communities, infrastructure and livelihoods. Special attention is needed on making village disaster resilient, alongside efforts to making cities and towns disaster resilient.

With the DMPs in place of almost all districts, it is time to internalize these plans. More efforts are needed to bring onboard the SDMAs to increase the pace of implementing and mainstreaming DM in the development of the states. Hereafter, the focus should lie on creating the systems and procedures at work to support DM activities, and peacetime rehearsals at the *Emergency Operation Centers (EOCs)* to streamline the chain of command.

The Prime Minister of India, during the *Asian Ministerial Conference on Disasters Risk Reduction* held in New Delhi in November 2016, expressed the urgency of mainstreaming DM. He emphasized the immediate focus of DM through a 10-point DM Agenda, which addresses:

(1) Principles of DM should be imbibed in all *development sectors*;

(2) Efforts should be towards addressing disaster *risk faced by all stakeholders*;

(3) Greater participation and leadership of *Women in DM* should be encouraged;

(4) Efforts should be invested *mapping globally the prevalent disaster risk*;

(5) Technology should be leveraged to enhance the efficiency of DM Efforts;

(6) Network should be developed of *Universities to work on disaster issues*;

(7) Opportunities provided by *social media and mobile technologies* should be utilized;

(8) Technical and administrative capacities of individuals, departments & agencies, and DM initiatives should be built at the *local level*;

(9) Opportunity to *learn* from *disasters* should be ensured by establishing necessary systems;

(10) Greater cohesion should be brought about in *international disaster response*.

States and UTs will benefit by ensuring that these points are included in their DM Plans.

2.3.2 Coordination

Given the dimension and complexity of the process of DM, in-house inter-departmental coordination and ensuring harmonious relationships within and with external agencies assumes great importance. The mock drills and rehearsals are important opportunities for testing the efficacy of the system in relation to this requirement.

2.3.3 Manpower

The responsibility for the overall effort will be shouldered by the administrative machinery of the state government. When felt necessary, additional manpower will be hired temporarily to meet the requirements of the situation. Outside expertise (including technical and professional) will be sourced only where essential, and when in-house ability is absent.

2.3.4 Community Participation

If Abraham Lincoln's concept of democracy was one of putting in place a government *"of the people*, *by the people and for the people."* Now, the word *'with'* needs to be used in place of *'for'* to suggest that no democratic form of governance is complete without the requirement of inclusion being met. Unless people are involved and participate in the process, there can neither be inclusive policy-making nor ownership of the outcomes of public interventions. Therefore, strong community participation has been a significant element of the approach of NDMA.

2.3.5 Prioritization and Timelines

The mainstreaming of DM by the states and Union Territories is taking the time. Understandably, many activities need to be undertaken towards achieving this. It would be prudent to classify these activities into three sets, namely *Vital*, *Essential,* and *Necessary Measures*. Ideally, with the limited (human, financial and time) resources available at hand, about 80% of energy should be spent on the Vital Measures, about 15% on Essential Measures, and the rest on the *Desirable Measures*.

The task at hand is determining how to place the needed activities in the said three boxes. Towards this end, the available options need to be prioritized, through an ABC Analysis. Here, the activities proposed by various stakeholders should be examined carefully and placed in three sets **(Table 2.10),** namely:

(1) Vital Activities: These are activities towards DM, which are of immediate nature and must be done immediately (at all cost). Funds should be allocated immediately for these activities;

(2) **Essential Activities**: These are activities towards DM, which are of urgent nature and must be done. Funds should be made available without fail for these activities;

(3) **Desirable Activities**: These are activities towards DM, which need to be done, but at a later point of time (either because of priority or because the prerequisites to doing this work is not accomplished yet). These activities need not be driven; they will get done. Funds should be made available eventually for these activities;

Here, distinction should be made with another set of activities, namely **Prohibited Activities**. These are activities that should not be done at all, because they are bad practices, dangerous, not relevant, too expensive, out modeled, and those that need to be discontinued with immediate effect, if already underway.

A list of prioritized activities should come out of the above analysis. The precise timelines will depend on the dimension and complexity of the activities as well as geographical and demographical features of the state or UT. In general,

(a) Short-term involves the *Vital Activities;*

(b) Medium-term involves the *Essential Activities;* and

(c) Long-term involves the remaining *Desirable Activities.*

The physical timeline of the *short-, medium-* and *long-term* activities should match the timelines given in the NDMP. Therein, *short- (T_1), medium- (T_2),* and *long-terms (T_3)* are stated as years ending by 2022, 2027 and 2030, respectively. In view of passage of time since the release of the NDMP, the short term in this Guide shall be considered as 2024 instead of 2022.

2.3.6 Use of Technology

Informed and dynamic decision making is the key in DM. Towards this end, DM should leverage modern technology; this will help overcome the current lack of competent manpower sufficient to address the needs of the nation and slow arrival of critical information. It will require generous use of modern technologies and state-of-the-art equipment and tools, in all initiatives – especially in *Mitigation* and *Preparedness* initiatives. The value of the use of improved technologies is evident from the improved cyclone forecast in India in the recent times; finer accuracy in the arrival time and severity of the cyclone has helped in taking timely action to evacuate people from potential inundation areas.

Table 2.10: Categorization of activities related to DM

	Timelines			
	Short-term	***Medium-term***	***Long-term***	***Never***
Type	**Vital** *Activities*	**Essential** *Activities*	**Desirable** *Activities*	**Prohibited** *Activities*
Nature	Immediate	Urgent	Important	Detrimental
Funding	Should be allocated immediately	Should be made available without fail	Should be made available eventually	Should not be funded at all, ever
Start Time	Now	Now	Now	Now

Traditionally, in the *Post-Disaster Needs Assessment (PDNA),* the visiting teams of Assessors have been shown what is "considered" to be the damage. Many a time, for want of time to access far-flung areas by normal modes of transport, the visiting teams are constrained to wear the lenses given to them by the local hosts. Also, when the visiting team does not go to certain sites, they are constrained to accept "second hand" information provided by local government and other sources in the affected area. Often, this results in an incomplete assessment of the total situation. These shortcomings should be circumvented using technology, *e.g.,* with the use of Drone Technology and Satellite Imagery. It is time to resort to such objective strategies that are not only authentic, but also give a total picture of the disaster.

2.3.7 Pilot District(s) Program

Each state or UT needs to implement DM in all if its districts to protect its people. The full picture is not clear to most decision-makers at the level of DDMA. Hence, a slightly different approach should be adopted. A couple of districts should be identified, which has small land area (and small population) and is faced with at least three dominant disasters. For instance, one district identified can be that vulnerable to *floods, landslides* and *earthquakes,* while another can be that vulnerable to *chemical disasters.* All the elements of DM, from *Policy to Plan,* to *Financial Allocation,* to *Implementation,* to *Review* can be completed end-to-end over a short period of 1-2 years in a *Mission Mode.* Also, the IDRN Website should be used effectively in this process. To realize this, a number of strong steps need to be taken.

Towards this end, the state or UT should:

(1) Establish systems and processes needed along each vertical of DM in each of the identified districts,

(2) Establish the require techno-legal regime for effectively addressing *Mitigation, Preparedness* and *Response* activities,

(3) Engage communities in all verticals of DM in substantive ways,

(4) Activate all EOCs and making the stakeholders use this for seasonal and annual festivals, celebrations and activities, to rehearse the process of using the system,

(5) Document comprehensively the entire process, and

(6) Showcase the same to the remaining districts of the state or UT.

While few Districts may innovate and improve on the approach taken by the *Model Districts,* it is wishful thinking that most other Districts will follow it, at least to begin with and eventually improve on it to suit their requirements. Hence, an aggressive strategy is required to scale-up the success of the **Pilot District(s) Program** over a reasonable timeframe in all other districts of the state or UT, immediately after the Pilot District(s) Program is completed.

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PART - 3
Risk Analysis

3

Risk Analysis

Significant progress has been made in so far as the accuracy of forecasting of *cyclones, floods, lightnings,* and *heat waves.* But, the situation is not that bright with the other natural hazards. The forecasting of flood paths and their inundation areas and levels needs more hard work. Also, accurate estimation of the earthquake ground shaking is found wanting equally, *on account* of the absence of a sufficient number of moderate earthquakes. A determined effort is required to:

(1) Arrive at a *nationally agreed methodology* for accurately assessing and forecasting different hazards;

(2) Revise temporally the above assessment and forecast of hazards with *field data from across the state or UT;*

(3) Provide forecasts at a granularity that is meaningful at the last mile, *especially villages, towns* and *cities*. Also, the projected forecast for each hazard should be combined with *value addition* with respect to a place for each hazard. For instance, the IMD's forecast of a likely good monsoon at the national and state level may not be of much value to a farmer. A forecast is not a forecast, if it is not locally relevant. It should be specific to a place to help the annual crop of that place. Excess water may be harmful to one crop, but a boon for another. Likewise, *rainfall* in the catchment area of river Godavari in Maharashtra will affect downstream states of Telangana and Andhra Pradesh. The timing and the higher volume of water at the downstream areas is more vital than stating the mere arrival of the same; such forecasts do not give opportunities to undertake DM on a scientific basis. These nuances should be understood and implemented with value addition by each agency engaged in forecasting; and,

(4) Project prevalent *risk* from each hazard, and convolve them to get the composite risk.

Accomplishing these needs a mission mode approach for the nation to act swiftly towards implementing DM initiatives in a short time frame.

3.1 Need

DM authorities at the state and district levels should carry out risk analysis of the disaster-prone areas. *Assessing the* **hazard** is the early task. The preparedness of people to face disasters is correlated to the knowledge of the prevalent hazard. Therefore, hazard assessment will initiate a number of actions, namely:

(1) Awareness generation of the general public,

(2) Sensitization of policy makers and administrators,

(3) Risk analysis,

(4) Retrofit of existing structures, and

(5) Revision of bye-laws to provide for the expected severity of hazard in the construction of new structures.

Next, *assessing* the **vulnerability** of the built environment is a key aspect of risk analysis. Often, it is the failure (damage and/or collapse) of the *buildings and structures* that characterizes the disasters. Also, different hazards require different levels of rigor to undertake the assessment of the vulnerability assessment of the *buildings and structures.* Further, *quantifying* the **exposure** is crucial for the different assets that are exposed to the hazard, namely people, property, investments, businesses and governance. The essential action is to prepare a detailed inventory of all such assets in the state or UT. This database should be available online and updated dynamically.

Finally, *analyzing the* **risk** is necessary for communicating risk to different stakeholders. While *hazard, vulnerability* and *exposure* are assessed **quantitatively,** the state-of-the-art methods of Risk Analysis provide only **qualitative** measures of the likely impact. This shortcoming notwithstanding:

(1) The state or UT will learn the possible scenario of the impending disasters and have a quantitative projection, though only indicative, of the likely consequences.

(2) The departments that own the physical assets will learn about which of their assets need immediate attention in terms of retrofit of existing structures,

(3) The development authorities, ULBs and PRIs that provide approval for construction of new structures, will revise their bye-laws to be sensitive to the prevalent risk.

(4) The *State Disaster Management Authority (SDMA)* and *District Disaster Management Authorities (DDMAs)* will get a likely quantitative estimate of the likely losses during each disaster and the resources needed to be mobilized in the aftermath of the disaster.

(5) General public will learn the *dos* and *don'ts* with regard to:

  (a) What to look for when *constructing new buildings* and *structures, and when retrofitting existing ones,* and

  (b) What preparedness actions are needed to face the impending disasters, and behavioral training needed in the aftermath of the disasters; and

(6) Policy makers and administrators will understand the necessary changes in policy and in techno-legal and techno-financial systems.

(7) The state will be able to implement a long-term risk reduction program for the hazards it is at risk to with clear strategies, timelines and budgetary requirements

For doing all this, the use of remote sensing data and GIS tools becomes necessary. Also, after performing the Risk Analysis, it is mandatory to do a ground check; here, experiences from past events and collateral evidences are useful to strengthen the conclusions of the Risk Analysis.

3.2 Method

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item 3.1 and 4.1)

It is a truism that the best is the enemy of the good! In the nascent days of implementing DM at the district level, an imperfect start is understandable, and, until a more refined assessment of risk is made available by subject specialists, it is important to move forward with *first-cut* projections of risk. Towards this end, it is better to adopt a consensus method (like the *Delphi Method)* to go forward with a *gut feeling,* rather than to wait for accurate assessment.

The *Risk Analysis* entails four steps, namely:

(1) Hazard Assessment,

(2) Exposure Assessment,

(3) Vulnerability Assessment, and

(4) Risk Analysis.

Details are elaborated hereunder of individual steps involved in each of these four steps.

3.2.1 Hazard assessment

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item 3.1 and 4.1

Annexure III (page 264) Matrix C Items 1.1.5, 2.1.2, 3.1.3, 4.1.1 and 4.1.3)

Detailed hazard assessment studies should be carried out to determine the intensities likely to be manifested at each location in the state, namely the severity of threat that a maximum credible natural hazard is likely to pose at each location in the state. Such an exercise should consider possible magnitudes, frequencies and distribution of the natural events of each hazard predominant in the state or UT. Towards this end, the state should:

(1) Identify the list of predominant hazards in the state or UT;

(2) Commission the following agencies to work on detailed assessment of different hazards the state or UT is at risk to:

  (a) The *national specialist technical agency* competent to provide comprehensive assessment of select hazards, which are studied centrally, e.g.,

(i) *Central Water Commission (CWC), Central Ground Water Board (CGWB),* ministry of Jal Shakti, Government of India, for **floods** and *ministry of Agriculture* and *Farmers Welfare (MAFW)* for **droughts,**

(ii) *Bureau of Indian Standards (BIS),* ministry of Consumer Affairs, Food & Public Distribution, Government of India, for **earthquakes,**

(iii) *Geological Survey of India (GSI),* ministry of Mines, Government of India, for **landslides,** and

(iv) *Snow and Avalanche Study Establishment (SASE)* and *Border Road Organization (BRO),* ministry of Defence, for **snow avalanches.**

(b) Independent technical agency (governmental or private) competent to provide comprehensive assessment of other hazards, like **chemical disasters;**

(3) Conduct hazard assessment of the state consistent with the realistic and scientific procedure used at the national level for arriving at the national level hazard assessment (by BIS) for seismic hazard assessment, and by the CWC for flood hazard assessment). If the procedure needs to be updated, the same should be undertaken in association with the relevant committees of the central agencies.

(4) Develop realistic and scientific hazard zonation maps for each hazard at appropriate *scales commensurate with the use of the same.*

(5) Share and communicate the assessed *hazard* in *simple language* and in granularity consistent with the audience and intended application by the stakeholders (to technical users, community and other stakeholders).

(6) Integrate findings of hazard zonation in *local development planning, building regulations, master plans,* and *development control regulations (DCRs)* at the state, district and local levels.

Responsibilities

Ministry/Department of Agriculture and Farmers Welfare
Ministry/Department of Consumer Affairs, Food & Public Distribution
    Bureau of Indian Standards (BIS)
Ministry/Department of Earth Sciences
    India Meteorological Department (IMD)
    National Center for Seismology (NCS)
Ministry of Environment, Forests and Climate Change (MoEFCC)
Ministry of Jal Shakti
    Central Water Commission (CWC)
    Central Ground Water Board (CGWB)
Ministry of Mines
    Geological Survey of India (GSI)
Ministry of Defence
    Snow and Avalanche Study Establishment (SASE)
    Border Road Organization (BRO)
Ministry of Housing and Urban Affairs, New Delhi
    Building Materials and Technology Promotion Council (BMTPC)
Department of Atomic Energy
    Atomic Energy Regulatory Board (AERB)
    Bhabha Atomic Energy Research Center (BARC)
Department of Science & Technology
    Survey of India (SoI)
Department of Scientific & Industrial Research
    National Geophysical Research Institute (NGRI)
Department of Space
    National Remote Sensing Center (NRSC)

Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Rural Development, Urban Development , Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

State level academic institutes and organizations involved in relevant S&T and R&D
National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.2.2 Exposure assessment

Systems and processes should be established to assess, document, synthesize and share information on the *exposure* of the existing population and built environment to the hazards predominant the state is at risk to. Towards this end, the state or UT should:

(1) Commission (through due process) an agency to undertake exposure assessment of the assets, systems, services and other elements exposed to hazards in the State. Seek the assistance of NDMA to identify an agency competent to provide comprehensive assessment of exposure of population, built environment and economic activities to each hazard predominant in the state or UT;

(2) Articulate a scientific method of assessing exposure of the said elements to each hazard predominant in the state or UT,

(3) Prepare an inventory of the different items of the built environment under the jurisdiction of each department and create database based on the following categorization of buildings and structures:

   (a) *Category 1 – Structures of national importance:* strategic assets (e.g., defence installations), vital installations (e.g., nuclear and thermal power plants, and water works), high court, historical monuments, museums, heritage buildings and structures;

   (b) *Category 2 – Lifeline structures:* hospitals, public utilities (e.g., electricity installations, transmission and distribution lines, water systems (e.g., dams, reservoirs and supply pipelines), telephone exchanges, transport systems (e.g., Bridges and flyovers, highways, ports and harbors, airports, railways, metro-rail systems, railway stations and bus stations)), fuel tanks & pipelines, health centers, Emergency Operations Centers (EOCs), police and fire stations, other designated buildings, industries, and commercial centers;

   (c) *Category 3 – Public utility structures:* Sewage pipe networks and treatment plants, public institutions, government offices, universities and public libraries and residential areas of key officials ensuring governance continuity;

   (d) *Category 4 – Other important structures:* Schools, colleges and academic institutes, government and business continuity facilities (e.g., legislative assembly, secretariat, and government offices, including of the district collectors and commissioners of police), disaster shelters, and buildings of financial institutions, such banks and lending organizations; and

   (e) Category 5 – Other buildings: multi-storied buildings, and formal & informal housing;

(4) Carry out detailed assessment of the exposure of the assets of state to various hazards;

(5) Prepare a comprehensive database of the assets, systems, services and other elements exposed to the various hazards in the state or UT;

(6) Share this database with agency undertaking risk assessment studies of the state or UT;

(7) Draw inferences from the data collected on exposure and compare with that on physical infrastructure (buildings) from the *Vulnerability Atlas of India of the Building Materials and Technology Promotion Council (BMTPC),* and on social aspects (population exposure and other demographic and economic parameters) from *Census of India (CoI)* database. Disseminate differences in the same to BMTPC for its consideration,

(8) Disseminate the outcomes of the exposure assessment to the EOC of the state, government departments, insurance companies, private sector companies, community, and private stakeholders, and

(9) Develop a ranking method (high, medium and low) to define the exposure of identified elements, and disseminate the outcomes of the exposure assessment to the community, private stakeholders, building development departments, and Insurance companies.

Responsibilities

Ministry of Housing and Urban Affairs, New Delhi
Building Materials and Technology Promotion Council (BMTPC)
Department of Science & Technology
Survey of India (SoI)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works (Roads and Buildings), Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, Planning, Home, Rural Development, Energy, and other departments that undertake construction of assets*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.2.3 Vulnerability Assessment

Undertake vulnerability assessment of the built environment to the Hazards predominant in the state. Towards this end, the state or UT should:

(1) Seek the assistance of NDMA to identify national level agencies competent to provide comprehensive assessment of *vulnerability* of built environment to each predominant hazard.

(2) Contact the respective agencies and commission the work of vulnerability assessment.

(3) Undertake an ABC analysis of the inventory of built environment to prioritize the same: *A – Top Priority, B – Not Now, C - Not necessary*

(4) Agree on a methodology for structural vulnerability assessment to assess the *vulnerability* of the building stock, infrastructure, services, and critical public utilities (e.g., dams, disaster shelters, bridges, roads, airports, telecommunications, transport, electricity, and waterways).

(5) Undertake vulnerability assessment of the different dominant typologies of buildings. If such competence is not in-house in the Department, then the services of a professional organization may be sought. Employ 4-level telescopic method of assessing structural vulnerability of *buildings,* such as *Rapid Visual Screening (RVS), Detailed Visual Survey (DVS), Simplified Quantitative Assessment (SQA) & Detailed Quantitative Assessment (DQA).*

(6) Provide for different typologies of buildings and structures: (a) structural *vulnerability curves* and structural *fragility curves* for scientific use, and (b) simplified categorization of vulnerability on a scale of *low, medium* and *high* for use in immediate DM actions.

(7) Share building vulnerability data for *risk assessment* studies,

(8) Share the building vulnerability information to the concerned government departments and authorities for improving the preparedness and resilience, along with the prioritized list (as mentioned above) of the buildings and structures,

(9) Integrate findings of structural vulnerability in local development planning, building regulations, master plans, and development control regulations,

(10) Develop such telescopic methods of assessing structural vulnerability of *infrastructure & other elements* of built environment (e.g., dams, disaster shelters, bridges, roads, airports, telecommunication, transport, electricity, and waterways), which employs a 4-level telescopic method of assessing *structural vulnerability of infrastructure & other elements* of the built environment,

(11) Undertake *structural vulnerability* assessment of *infrastructure & other elements* of the built environment,

(12) Share *vulnerability data* of infrastructure & other elements of the built environment for *risk assessment studies,* and

(13) Disseminate the *vulnerability* information of *infrastructure & other elements* of built environment to EOC of the State, PRIs, ULBs, government departments and the select NGOs and CBOs.

Responsibilities

Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.2.4 Risk Analysis

Systems and processes need to be built to assess, document, synthesize and share information to all stakeholders on the risk prevalent in the state against each hazard, and to use the same in development planning and DM planning in the state. Towards this end, the state or UT should:

(1) Seek the assistance of NDMA to learn the strategies for identifying agencies competent to provide comprehensive risk assessment of built environment to hazards the state is at risk to.

(2) Commission an agency (after due process) for the work of risk assessment of the built environment by convolving the hazard, exposure and vulnerability to quantify the risk of each typology in each geographical region.

(3) Agree with the agency the methodology to be adopted for risk assessment of buildings, including the quality of available inputs:

  (a) Hazard sources and characteristics (magnitude, frequency and intensity distribution) of previous events (including historical data on different parameters involved in risk assessment),

  (b) Hydro-meteorological, climate geological, geophysical and geotechnical information,

  (c) Past detailed studies of hazard assessment, exposure inventory development, and vulnerability assessment,

  (d) Expected outputs of risk assessment studies, including direct and indirect losses.

(4) Provide the agency with the outcomes of the studies carried out on hazard assessment, exposure inventory development and vulnerability assessment of the built environment,

(5) Perform structural risk-assessment of the building stock, and report the outcomes of the study as structural risk to different typologies of buildings,

(6) Validate the risk maps based on ground-truthing of some salient structures,

(7) Define the risk of the buildings stock on a scale of low, medium and high,

(8) Share the full database of building risk information with the concerned departments and authorities,

(9) Prioritize the structures based the levels of risk as Vital, Essential and Desirable categories, and prepare an action plan for carrying out retrofit where required,

(10) Prepare GIS maps to reflect the varying risk across the state,

(11) Prepare the structural risk assessment methodologies for infrastructure, services and critical public utilities (e.g., dams, disaster shelters, bridges, roads, dams, airports, telecommunication, transport, electricity, and water),

(12) Undertake the structural risk assessment of infrastructure, services and critical public utilities, and

(13) Integrate findings of risk assessment in DM Planning, Local Development Planning, Building Regulations, Master Plans, and Development Control Regulations.

Responsibilities

Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.3 Hazard–specific inputs

The *Risk Analysis* of a State with regard to different Hazards is not uniform across all hazards. Each hazard has its peculiarities and the same need to be incorporated suitably in the methodology of Risk Analysis.

3.3.1 Floods

(MHA-UNDP Report: Annexure III (page 265) Matrix C Item 1.1.5)

Flood Risk Analysis of states is a national effort and a part of the ongoing activities of the *Ministry of Jal Shakti (MoJS), Government of India* (through the *Central Water Commission (CWC),* New Delhi). Therefore, it is best for the state to coordinate with MoJS, CWC and the National Disaster Management Authority (NDMA) to get the necessary R&D undertaken by the CWC, as required and relevant to the state. Based on the *NDMA Guidelines of Management of Floods* and the State DM Plan, the CWC should be engaged (along with assistance of *National Remote Sensing Center (NRSC) and State Remote-Sensing Applications Center (SRAC))* to undertake the *Flood Hazard Assessment, Vulnerability Assessment and Risk Analysis;* here the state has the responsibility to provide factual data on the Exposure of the people and assets to the flood hazard at different locations of the state.

Furthermore, since most rivers flow across states and trans-boundary rivers, this activity should be performed at the level of the river basin of each river, even if they are in the land area of the adjoining states. For this reason, this activity is best handled at a national level and that too by a governmental agency.

(a) Methodology

The state or UT should work closely with national agencies (CWC, MoRW, etc.) to:

(1) Agree on methodology to be adopted for flood risk assessment, including quality of inputs:
  (a) Flood source model (historical hydro-meteorological data: rainfall pattern, run-off),

(b) Flood characteristics (intensity, magnitude and frequency),

(c) Soil information about its cover, texture and depth,

(d) Database from detailed studies of macro-hazard, exposure, and vulnerability,

(e) Intensity of ground shaking at each site, and

(f) Population exposure characteristics, and expected outputs (*e.g.*, direct & indirect losses).

(2) Undertake flood risk assessment of the assets, systems, services and other elements exposed to flood hazard in the state or UT.

Responsibilities

Ministry of Earth Sciences
Central Water Commission (CWC)
India Meteorological Department (IMD)
Department of Scientific & Industrial Research
National Geophysical Research Institute (NGRI)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.3.2 Earthquakes

(MHA-UNDP Report: Annexure III (page 264) Matrix C Item 2.1.2)

Again, this is a national effort and part of the responsibility of BIS, Ministry of Commerce. The state should coordinate with MoES, BIS and NDMA to get the necessary R&D undertaken as required and relevant to the state or UT. Based on *NDMA Guidelines of Management of Earthquakes* and the State DM Plan, the BIS should be engaged (along with assistance of SoI, GSI, NRSA and State SRAC) to undertake Hazard Assessment for the state. This activity should be performed for all the states and UTs together.

(a) Methodology

The state or UT (in close collaboration with national agencies such as BMTPC, SoI, GSI and NRSA) as well as state or UT level agencies should:

(1) Agree on the methodology to be adopted for earthquake risk assessment, including the quality of inputs:
   (a) Earthquake source model (historical data, earthquake sources (points and faults)),
   (b) Earthquake path characteristics,
   (c) Site geotechnical characteristics (including soil layers),
   (d) Database from detailed studies on hazard, vulnerability and exposure,
   (e) Intensity of ground shaking at each site,
   (f) Structural fragility curves, and
   (g) Population exposure characteristics, and the expected outputs, including direct and indirect losses.

(2) Undertake seismic risk assessment based on the above methodology.

Responsibilities

Ministry of Consumer Affairs, Food & Public Distribution
Bureau of Indian Standards (BIS)
Ministry of Earth Sciences
National Center for Seismology (NCS)
Ministry of Mines
Geological Survey of India (GSI)
Department of Science & Technology
Survey of India (SoI)
Department of Scientific & Industrial Research
National Geophysical Research Institute (NGRI)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

3.3.3 Landslides and Snow Avalanches

(MHA-UNDP Report: Annexure III (page 264) Matrix C Item 3.1.3)

The specific actions needed with regard to managing landslides and snow avalanches are hereunder.

(a) Methodology

The state should agree on the methodology to determine the spatial and temporal landslide and snow and avalanche risk assessment, by including the quality of inputs:

(1) Physical threshold models require detailed spatial information on:
   (a) Regional hydrological, lithological, geological and geomorphological features,
   (b) Slope conditions including existing and potential instability, and
   (c) Land use information;

(2) Landslide and snow avalanche characteristics,

(3) Site geotechnical characteristics (including soil characteristics that control initiation of landslides),

(4) Old and recent reactivated landslides,

(5) Database from detailed studies of hazard, exposure and vulnerability,

(6) Influence of other hazards (such as regional pattern and intensity of rainfall, and intensity of earthquake ground shaking at each site) and also other anthropogenic factors that can cause landslide and snow avalanches, and

(7) Population characteristics, and the expected outputs, including injuries, fatalities and economic losses.

Responsibilities

Ministry of Jal Shakti
Central Water Commission (CWC)
Ministry of Earth Sciences
India Meteorological Department (IMD)
National Center for Seismology (NCS)
Ministry of Mines
Geological Survey of India (GSI)
Ministry of Defence
Snow and Avalanche Study Establishment (SASE)
Department of Space
National Remote Sensing Center (NRSC)
Department of Scientific & Industrial Research
National Geophysical Research Institute (NGRI)
Department of Science & Technology
Survey of India (SoI)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D
Technical Consultancy Firms

(b) Documenting and Mapping

The state or UT should:

(1) Constitute a multi-disciplinary technical Task Force of subject specialists to catalogue, study and explore all known landslides;

(2) Identify the areas that are affected perennially by landslides and snow avalanches (including the first time slides) and assesses the probability of occurrence of such events within a specific seasons or periods;

(3) Correlate and develop landslide and snow avalanches inventory containing information about the causative factors, time of occurrence, frequency, intensity, and scale supplemented using satellite data and images;

(4) Plan to prepare, analyze and interpret landslide hazard zonation maps of high resolution on GIS platform to provide morphological, land use and geological details to assist in determining the process and identifying the causes of occurrence of landslides;

(5) Prepare thematic maps using the above data to provide ready to use information on geology, geomorphology, lineament, broad lithology, land use, land cover, drainage, infrastructure, incidence of landslides based on terrain, the spatial extent of landslides, and details of slopes.

(6) Create a web-portal and disseminate information about the landslide and snow avalanches prone areas to regulate construction activities;

(7) Identify community settlements in areas prone to landslide and snow avalanches; and

(8) Develop landslide and snow avalanche maps on the GIS platform and use the same in development planning and preparation of local DM Plans.

Responsibilities

Ministry of Jal Shakti
- *Central Water Commission (CWC)*

Ministry of Earth Sciences
- *India Meteorological Department (IMD)*
- *National Center for Seismology (NCS)*

Ministry of Mines
- *Geological Survey of India (GSI)*

Ministry of Defence
- *Snow and Avalanche Study Establishment (SASE)*

Department of Space
- *National Remote Sensing Center (NRSC)*

Department of Scientific & Industrial Research
- *National Geophysical Research Institute (NGRI)*

Department of Science & Technology
Survey of India (SoI)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D

3.3.4 Droughts

(MHA-UNDP Report: Annexure III (page 273) Matrix C Items 4.1.2 and 4.1.4)

The specific actions needed with regard to managing droughts are:

(a) Forecast

The state or UT should:

(1) Monitor the weather parameters every day, track surface and ground water levels every week, and monitor crop sowing and standing crop situation every week, across the state or UT,

(2) Compile the above data and share with the national agencies engaged in providing a forecast of drought condition, water deficit and crop vulnerability, and

(3) Assist national agencies towards improving dynamically the methods of scientific forecasting of drought, water deficit, and crop vulnerability using daily weather parameters.

It is desirable for the state or UT to develop in-house competence in the technical effort of forecasting effects of droughts.

Responsibilities

Ministry of Jal Shakti
Central Water Commission (CWC)
Central Ground Water Board (CGWB)
Ministry of Earth Sciences
India Meteorological Department (IMD)
National Center for Seismology (NCS)

Department of Space
National Remote Sensing Center (NRSC)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Planning, and Water Resources*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Planning, and Water Resources*

State Remote Sensing Applications Center (SRSAC)

National level institutes and organizations involved in relevant S&T and R&D

(b) Database of Micro-Level Details

The state or UT should:

(1) Establish automated weather stations at each village level to: (i) capture temperature, wind, solar radiation, precipitation data, and (ii) monitor reservoir and lake water levels, and surface water and ground water levels,

(2) Record soil moisture using remote sensing and manual sensors,

(3) Monitor crop sown area and standing crop situation,

(4) Monitor fodder availability,

(5) Track rural migration and local uptake of the PDS,

(6) Monitor prices of essential commodities, and

(7) Prepare and update a robust database of the above micro-level details.

These actions need to be undertaken separately, at the end of SW and NE monsoons, as applicable.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Water Resources, and Irrigation & Command Area Development*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Water Resources, and Irrigation & Command Area Development*

(c) Estimating Crop Vulnerability

The state or UT should:

(1) Determine exposure to drought of each crop at different stages,

(2) Develop crop yield sensitivity index for rainfall deviations,

(3) Estimate adaptive capacity of a crop in a particular area, and

(4) Assign weights for each of these indicators and determine crop vulnerability.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department (IMD)
Ministry of Agriculture & Farmers' Welfare
Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW)
Department of Space
National Remote Sensing Center (NRSC)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Planning, and Water Resources*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Planning, and Water Resources*

State Agriculture University (SAU)

(d) Crop Advisory

The state or UT should:

(1) Analyze daily rainfall data of SW and NE monsoon of drought-prone blocks for rainfall deviation,

(2) Prepare and issue crop advisory to the Blocks that are likely to face water deficit, in the form of drought tolerant crops and moisture conservation,

(3) Publicize contingency measures for groundwater conservation and ensure seed procurement for subsequent season in case of rainfall deficit at the end of NE monsoon, and

(4) Suggest alternate crops/enterprises.

These actions need to undertaken separately, at the end of SW and NE monsoons, as applicable.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department (IMD)
Ministry of Agriculture & Farmers' Welfare
Department of Agricultural Research and Education (DARE)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration*

State Agriculture University (SAU)

(e) Water Conservation, Re-distribution, and Management Plan

The state or UT should:

(1) Prepare comprehensive water conservation, re-distribution, and management plan for the areas in the state that are likely to experience water deficit,

(2) Encourage water saving irrigation practices through drip and sprinkler methods,

(3) Educate public about water conservation through mass media campaigns,

(4) Repair water distribution networks and prevent leakages,

(5) Ration available water for human and commercial needs,

(6) Monitor exploitation of ground water resources for non-drinking purposes, and

(7) Issue health advisories and ensure emergency medical services.

These actions need to be undertaken separately, after SW and NE monsoons, as applicable.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department (IMD)
Ministry of Jal Shakti
Central Ground Water Board (CGWB)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration

(f) Revision of DM Plans

The state or UT should:

(1) Analyze changes in geo-climatic conditions for possible drought disaster events,

(2) Analyze long term temperature and precipitation variations,

(3) Assess physical vulnerability to various hazards,

(4) Develop Social Vulnerability Index (SVI) to qualitatively assess social vulnerability,

(5) Assess risks based on hazard, exposure and vulnerability analysis,

(6) Consider short and long-term climate change trends for land use and infrastructure development, and

(7) Map disease hazard and epidemic risk arising due to variations in temperatures.

These actions should lead to preparation of the District DM Plans and revision of the State DM Plans.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department (IMD)
Department of Space
National Remote Sensing Center (NRSC)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, Irrigation & Command Area Development, Panchayati Raj, and Municipal Administration*

(g) Disaster Management Center

The state or UT should:

(1) Appoint a exclusive technical team for *Drought DM Team* in SDMA with requisite facilities and staff, and

(2) Create a reporting structure for the *Drought DM Team* to work with the SDMA and *Principal Secretary, Secretary or In-charge of Disaster Management.*

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, and Irrigation & Command Area Development*

District Collector, District Magistrate or Deputy Commissioner
DDMAs

DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Planning, Agriculture, Planning, Animal Husbandry, and Irrigation & Command Area Development*

(h) Drought Action Plan

The state or UT should:

(1) Prioritize allocation of available water resources,

(2) Ensure water availability for human consumption, crop and animal husbandry,

(3) Minimize standing crop loss by providing life saving irrigations,

(4) Protect livestock assets through supplementary feeding,

(5) Suspend water usage for construction in urban areas,

(6) Increase food access through PDS and rural employment,

(7) Create awareness on water conservation/ rationing through mass media campaigns, and

(8) Issue health and crop advisories.

3.3.5 Chemical Disasters

(MHA-UNDP Report: Annexure III (page 264) Matrix C Item 5)

This is a national effort and part of the responsibility of the Government of India ministries and bodies: (a) Petroleum & Explosive Safety Organization (PESO), Department of Promotion of Industry and Internal Trade Ministry of Commerce & Industry (MoC&I), (b) Oil Industry Safety Directorate (OISD), Ministry of Petroleum and Natural Gas (MoP&NG), (c) Ministry of Chemical and Fertilizers (MoC&F), and (d) Ministry of Environment, Forests and Climate Change (MoEF&CC). The state or UT should coordinate with PESO, OISD, Ministry of Labour and Employment (MoLE), MoP&NG, MoC&F and NDMA, to undertake the necessary R&D as required and relevant to the State. Based on the NDMA Guidelines on *Chemical Disaster* and on *Chemical (Terrorism) Disaster,* the SDMP, the state or UT should engage with PESO and OISD (along with assistance of MoC&F, MoEF&CC, MoP&NG, and MoLE) to undertake the *Chemical Hazard Assessment* of the state or UT. This activity should be performed by each state and UT. The specific actions needed with regard to managing chemical hazards are listed hereunder.

(a) Documenting and Mapping

The state or UT should:

(1) Constitute a multi-disciplinary technical task force of subject specialists to catalogue, study and explore all known hazardous chemical industries and transportation;

(2) Identify the areas that may be affected by chemical disaster;

(3) Plan to prepare, analyse and interpret chemical hazard zonation maps of high resolution on GIS platform to guide future development and land use;

(4) Prepare thematic maps using the above data to provide ready to use information on chemical risk maps;

(5) Create a web-portal and disseminate information about the chemical accident prone areas to regulate community settlement in the vicinity of chemical units;

(6) Identify the community settlements in areas prone to chemical accidents; and

(7) Develop chemical risk maps on the GIS platform and use the same in development planning and preparation of local DM Plans.

Responsibilities

Ministry of Chemicals & Fertilizers (MoCF)
Ministry of Commerce
Department for Promotion of Industry and Internal Trade (DPIIT),
Petroleum and Explosives Safety Organization (PESO)
Ministry of Environment, Forest and Climate Change (MoEF&CC)
Central and State Pollution Control Boards (CPCB and SPCBs)
Ministry of Labour and Employment (MoLE)
Ministry of Petroleum and Natural Gas
Oil Industry Safety Directorate (OISD)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Agriculture, Irrigation & Command Area Development, Public Works, Geology & Mines, Water Resources, Panchayati Raj, Science & Technology, and Planning*

National level institutes and organizations involved in relevant S&T and R&D

(b) Revision of DM Plans

The state or UT should:

(1) Analyze population profile living in the vicinity of Hazardous Chemical Industry;
(2) Assess physical vulnerability to chemical hazards;
(3) Develop *Chemical Disaster Risk Index (CDRI)* to qualitatively assess vulnerability;
(4) Assess risks based on hazard, exposure and vulnerability analysis;
(5) Consider short and long-term impact of any chemical disaster, and
(6) Map Chemical hazard and associated risk arising due to use of HAZCHEM.

These actions should lead to preparation of the *District DM Plans* and revision of the *State DM Plans.*

Responsibilities

Ministry of Chemicals & Fertilizers (MoCF)
Ministry of Commerce and Industry
Department of Promotion of Industry and Internal Trade (DPIIT)
Petroleum and Explosives Safety Organization (PESO)
Ministry of Environment, Forest and Climate Change (MoEF&CC)
Central and State Pollution Control Boards (CPCB and SPCBs)
Ministry of Petroleum and Natural Gas
Oil Industry Safety Directorate (OISD)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Planning, Industrial Safety and Hazard, Pollution Control Board, Panchayati Raj, and Municipal Administration*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Planning, Industrial Safety and Hazard, Pollution Control Board, Panchayati Raj, and Municipal Administration*

National level institutes and organizations involved in relevant S&T and R&D

(c) Disaster Management Center

The state or UT should:

(1) Appoint an exclusive technical team for Chemical DM in SDMA with requisite facilities and staff, and

(2) Create a reporting structure for this Chemical DM Team to work with the SDMA and Principal Secretary, Secretary or In-charge of Disaster Management.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Revenue
Directorate of Industrial Safety and Health

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Revenue

National level institutes and organizations involved in relevant S&T and R&D

3.4 Interpretation of Results

Risk analysis provides valuable pointers, namely:

(1) Locations that have maximum risk,

(2) Hazards that cause disproportionately large risk,

(3) Factors that contribute most to risk,

(4) Efforts that provide only marginal reduction of risk,

(5) Actions that will cause a substantial reduction in risk.

These are the starting points for a detailed discussion of the meetings of SDMAs, where the states leadership, where the Chairman and Members of SDMA will hear the expectations from the elected representatives, realities from the bureaucrats, suggestions from the risk analysts, constraints from officers of the Revenue Departments, and needs from the implementers. Then the SDM should apply itself to arrive at a list of actions in the order of priority for implantation.

3.5 Responsibilities

The responsibilities of the key functionaries in the state government or ut administration pertaining to Risk Analysis are presented in **Table 3.1.**

3.6 Timelines

The timeline of activities pertaining to Risk Analysis within which they need to be completed are presented in **Table 3.2.**

Table 3.1: Responsibilities of key functionaries and units of state government or UT administration pertaining to Risk Analysis

Section	*Activity*	*Key functionaries and units of the state government or UT administration*								
		CS	*C(DM)*	*Ss*	*S(SDMA)*	*DC*	*DDMO/ S(DDMA)*	*ULBs, PRIs*	*SRSAC*	*SS&T, SR&D, SAU*
3.2	**METHOD**									
3.2.1	Hazard Assessment		✓	✓	✓	✓	✓			
3.2.2	Exposure Assessment		✓	✓	✓	✓	✓			
3.2.3	Vulnerability Assessment		✓	✓	✓	✓	✓			
3.2.4	Risk analysis		✓	✓	✓	✓	✓			
3.3	**HAZARD–SPECIFIC INPUTS**									
3.3.1	Floods		✓	✓	✓	✓	✓			
3.3.2	Earthquakes		✓	✓	✓	✓	✓			
3.3.3	Landslides & Snow Avalanches		✓	✓	✓	✓	✓			
3.3.4	Droughts		✓	✓	✓	✓	✓			
3.3.5	Chemical Disasters		✓	✓	✓	✓	✓			

Legend:

CS	: Chief Secretary
C(DM)	: Principal Secretary, Secretary or In-charge of Disaster Management
Ss	: Secretaries of departments
S(SDMA)	: Secretary, SDMA
DC	: District Collector, District Magistrate or Deputy Commissioner
DDMO / S(DDMA)	: District Disaster Management Officer, Secretary *ex officio*, DDMA
ULBs, PRIs	: Urban Local Bodies, and Panchayati Raj Institutions
SRSAC	: State Remote Sensing Applications Center
SS&T, SR&D, SAUs	: State S&T Bodies, State R&D Bodies, and State Agriculture University

Note:
In a Union Territory, the Equivalent Officer/Office may be considered.

Table 3.2: Timelines for completion of activities pertaining to Risk Analysis

Section	*Activity*	*Timeline*		
		Short-term	*Medium-term*	*Long-term*
3.2	**METHOD**			
3.2.1	Hazard Assessment	✓	The constituents of risk and risk analysis must be reviewed and updated periodically.	
3.2.2	Exposure Assessment	✓		
3.2.3	Vulnerability Assessment	✓		
3.2.4	Risk analysis	✓		
3.3	**HAZARD–SPECIFIC INPUTS**			
3.3.1	Floods	✓	The risk analysis must be reviewed and updated periodically.	
3.3.2	Earthquakes	✓		
3.3.3	Landslides & Snow Avalanches	✓		
3.3.4	Droughts	✓		
3.3.5	Chemical Disasters	✓		
Note: Please see Section 5.4 for descriptions of short-, medium- and long-term timelines.				

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PART - 4
Disaster Management Systems and Processes

4

Disaster Management Systems and Processes

Disaster Management involves organizing and managing resources and responsibilities for dealing with all humanitarian aspects of emergencies before and after their negative fallout. This effort is undertaken to lessen the impact of disasters in the five phases of the DM continuum, namely Prevention, Mitigation, Preparedness, Response and Recovery **(Figure 1).**

Nature will continue its actions. It is when the man-made actions (like developing the built environment) do not comply with these natural actions that disasters occur. Man-made disasters can be mitigated to a large extent (through intelligence), physical and operational protection, and structural hardening. Preventing man-made disasters through these dominantly active options is expensive. Also, the fury of natural hazards is orders of magnitude higher than that of the man-made. Hence, passive options alone are considered to be affordable, and to a large extent, effective in addressing natural hazards.

The paradigm shift that India has ushered in through the DM Act, 2005, has placed greater emphasis on proactive effort instead of on reactive effort. This means that a large part of the attention should be paid to pre-event phases of the DM Cycle, especially Mitigation and Preparedness. These need to be pursued vigorously at a spirited pace. Unfortunately, the vulnerability of the existing built environment is high and the preparedness of communities is low to face these hazards. Thus, India will need to continue to enhance the efficacy of post-event activities, namely Response and Recovery.

Sustainable development has many facets to it. Of these, two are prominent, namely:

(1) Regulatory and administrative machinery:

DM requires consistent involvement of all stakeholders which are placed on a gentle ramp of time – neither too steep nor too shallow to jeopardize the pace of development. This requires systems and processes to be established and practiced diligently. On the implementation side, of utmost importance is the discipline to follow these established systems and processes. Institutionalization is the need of the hour.

(2) Physical built environment:

For all stakeholders, the mantra needs to be to "get it right the very first time." The prerequisites for doing this "by the book" are:

(a) Strong leadership at all levels,

(b) Availability of competent Human Resources with state-of-the-art knowledge, modern skills, and positive attitude, and

(c) Uncompromised implementation at the site with due oversight of the techno-legal mechanisms.

Furthermore, the traditional tenets of sustainable development of the physical built environment are applicable even here, including: (i) adopting re-cycle and re-use policy, (ii) using natural materials as much as possible, in place of engineered materials, and (iii) employing passive green technologies in contrast to active technologies.

4.1 Administrative Arrangements

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B1.1, B1.3 and C7.1)

Developing a culture of safety and prevention across the people of India needs to be the focus. The primary

responsibility of DM rests with the states and UTs. While the task may sound too daunting, an imperfect start is the perfect start! So, the work should begin simultaneously at all the levels, and the dialogue must be completed within a targeted time. The key initiatives needed are described hereunder, which will help the states and UTs manage disasters in an effective manner.

4.1.1 State Government

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A1)

If the minds of over 132 Crores of people have to align towards the same goal of well-being and safety of all, creating systems and processes is mandatory at the states and UTs. In DM, this is achieved by articulating in print the policies, plans, guidelines, norms and procedures in line with the DM Act, 2005. This needs to be achieved at all levels, namely the national, state, district, city, town, village and community levels. Each of these should flow and be consistent with the higher level document. By all means,

(1) A State can have additional items beyond those listed in the NPDM;

(2) A District can similarly add a few items;

(3) A Town or a City can do the same; and

(4) So can a Community.

The urgency of completing first the documents at the higher levels cannot be underscored. Also, while drawing up DM plans at the various levels (National, State or UT, and District), the international understanding of sustainable development goals (e.g., UN SDGs) should be the guiding light at all times. Launching the relevant UN interventions towards DM should stay as a backdrop of activities in India.

Towards streamlining the effort of a large number of people nationwide to be engaged in the activities of DM, each should have plans, guidelines, norms and procedures customized with additional items, and without jeopardizing the intent of the corresponding document at the higher level(s).

(a) Establish the SDMA

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A1.1, A1.2 and A1.3)

The state or UT should:

(1) Constitute the SDMA, in accordance with the provisions of Section 14 of the DM Act, 2005, consisting of the following members:
   (a) Vice Chairman,
   (b) Members (up to a maximum of eight (8)), and
   (c) Chief Executive Officer (Ex-Officio: Chairman, State Executive Committee (SEC)).

The state may decide whether or not the Secretary (SDMA) will be a Member of SDMA.

(2) Appoint the following:
   (a) *Vice Chairman:* It should be a person of public eminence with a proven record in DM, worked formerly as a the General of the Indian Army, the Admiral of the India Navy, or the Air Chief Marshall of the Indian Air Force, Retired Chief Secretary of a State, Director General of Police, or political leader with known aptitude for the subject of DM.
   (b) *Members:* They should comprise a mix of former civil servants (at the level of Secretary to the Government of a State), former Officers of the Indian Army, Navy and Air Force of rank less than the General of Indian Army, former Police Officer of the rank less than the Director General of Police or equivalent rank, eminent scientists, distinguished academicians, or public men (including representatives of NGOs and CBOs of repute).

Responsibilities

Chief Minister
Minister (Revenue) or Minister (DM)
Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

(3) Notify the formation of SDMA, in accordance with the provisions of Section 14(1) of the DM Act, 2005, through a notification in the Official Gazette.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(4) Prepare and notify the rules for the functioning of SDMA, SEC and DDMAs.

Responsibilities

Chief Minister
Minister (Revenue) or Minister (DM)
Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

(5) Convene meetings of the SDMA as per the annual schedule prescribed in the rules for the functioning of the SDMA.

Responsibilities

Secretary, SDMA

(6) Prepare the staffing pattern, pay scales, service rules, etc., of the personnel of the SDMA along with the organogram, clearly indicating those who are ex-officio, and those who need to be appointed. The full-time officers and other staff may comprise:

(a) Employees of the State Government on deputation,

(b) Recruited directly for the SDMA, or

(c) Consultants (individuals) on a part-time basis.

(7) Seek approval from the competent authority of the said pattern, pay scales, service rules, etc., of the personnel of the SDMA, and fill the posts at the earliest.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA

(b) Constitute the SEC

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A1.4)

The state or UT should:

(1) Constitute the SEC in accordance with the provisions of Section 20 of the DM Act, 2005, consisting of the following members (ex-officio):

(a) *Chairman*: Chief Secretary of the state or UT, and

(b) *Members:* Four Secretaries to the government of such departments as the state or UT may think fit.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

(2) Notify the formation of SEC, through a notification in the Official Gazette.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(3) Refer to Section 4.1.1(a)(4) for the rules for the functioning of SEC.

(c) Establish the DDMAs

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A1.5, 1.6, 1.7 and 2.3)

The state or UT should:

(1) Constitute the DDMAs in accordance with the provisions of Section 25 of the DM Act, 2005, consisting of the following members:

(a) Chairperson: District Collector, District Magistrate or Deputy Commissioner (ex-officio)

(b) Co-Chairperson:

(i) Elected representative of the local authority,

(ii) Chief Executive Member of the District Council of an autonomous district, in the tribal areas (as referred to in the Sixth Schedule of the Constitution), or

(iii) Chairperson of the Zilla Parishad, where a Zilla Parishad exists.

(c) Members (up to a maximum of seven (7)), and

(i) Chief Executive Officer of DDMA (ex-officio),

(ii) Superintendent of Police of the district (ex-officio),

(iii) Chief Medical Officer of the district (ex-officio), and

(iv) Not exceeding 2 other district-level officers appointed by the state Government.

(2) Notify the formation of DDMAs, through a notification in the Official Gazette.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(3) Refer to Section 4.1.1(a)(4) for the rules for the functioning of DDMAs.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

(4) Convene meetings of DDMAs as per the annual schedule prescribed in the rules for the functioning of DDMAs.

Responsibilities

Secretary, DDMA

(5) Prepare, in accordance with the provisions of Section 25 of the DM Act, 2005, the staffing pattern, pay scales, service rules, etc., of the personnel of DDMA along with the organogram, clearly indicating those who are ex-officio, and those who need to be appointed. The full-time officers and other staff may comprise:

(a) Employees of the state Government on deputation,

(b) Recruited directly for DDMA, or

(c) Consultants (individuals) on a part-time basis.

(6) Seek approval from the competent authority of the said pattern, pay scales, service rules, etc., of the personnel of DDMA, and fill the posts at the earliest.

Responsibilities

Chairman, DDMA
Secretary, DDMA

(7) Create separate posts of District Disaster Management Officers (DDMOs) to aid and assist the District Magistrates in matters related to DM. The DDMOs will be designated and function as secretaries (ex-officio) of DDMAs. They will perform functions at the district level similar to those of the Commissioner (DM) and/or Secretary (Rev.) at the state level.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management of states and UTs

(8) Prepare staffing pattern, pay scales, service rules, etc., of DDMOs, and seek approval of the state government.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management of states and UTs
District Collector, District Magistrate or Deputy Commissioner

(d) Prepare the District DM Plans

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A2.6)

Fortunately, the basic policies, plans, and guidelines on many aspects of DM are available already at the national level, even though some norms and procedures may have to be added. While the NPDM is in the nature of an overarching policy framework, at the lower levels, i.e., the states, districts, towns and villages, additional imperatives will have to be factored in, to respond to local imperatives, such as the terrain, the disasters to which given areas are vulnerable, and the social, economic and cultural features of the people. This is applicable also to the DM framework starting with the act, and through the policy, the guidelines, and the plans, up to the measures (structural and non-structural) arising therefrom. Only when such tiered documents (of policies, plans, guidelines, norms and procedures) are made available at all levels, do the hands that implement DM initiatives feel comfortable that their effort has a destination. Also, especially in governmental systems of transfers, the changing hands that handle the ongoing and new DM activities should have these documents as recourse to seeking clarity.

With this the states and UTs should embark on preparing their parallel documents. In this exercise, the designated officers should be co-opted from the districts. In turn, the participants from the districts should embark on preparing their parallel documents, this time co-opting the designated officers from the towns and cities and the communities also.

In accordance with Section 16 of the DM Act, 2005, the State DM Plans (SDMPs) are in place in all states and UTs, except the newly formed UTs of Jammu & Kashmir and Ladakh, where they are under preparation. The very purpose of preparation of the SDMP is for implementing it. The implementation of the SDMP is part of the document.

The preparation of the District DM Plans (DDMPs) in each state and UT is a logical major step to help the states and UTs manage disasters in an effective manner. As in the State DM Plan, the urgency of the preparation and implementation plan of the DDMPs cannot be overstated. The DDMPs should be drawn up with fine details in line with the SDMP.

Revising the SDMP, DpDMP and DDMPs should be an annual activity. Also, the plans should be re-examined after every mock drill, actual disaster events, changes in the physical boundary of the state or UT, government directives, and management and operational changes. Necessary changes should be incorporated immediately thereafter.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management of states and UTs
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *and Planning*

(e) Coordination in regard to multi-state disasters between

Central Government and Governments of other states and UTs

At times, disasters impact more than one state or UT, wherein the impact of disasters occurring in one state or UT spreads over to the areas of other states and UTs. Also, to undertake preventive measures in respect of certain disasters (such as floods), the actions may be needed in the adjoining State(s) or/and UT(s). When managing such situations, a coordinated approach and actions are needed between the connected states and UTs before, during

and after the event. The central government and NDMA should identify disasters of such nature, and, in consultation with the states or UTs concerned, put in place a standing mechanism to deal with the issues of management of disasters of such nature, involving states and UTs, central ministries and departments, and other national agencies concerned.

Responsibilities

Ministry of Home Affairs
Secretary
Secretary, National Disaster Management Authority (NDMA)

Chief Secretaries of states and UTs
Principal Secretary, Secretary or In-charge of Disaster Management of states and UTs
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *and Planning*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *and Planning*

4.1.2 Departments of State Government

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A2.4, A2.5, A2.8 and A2.9)

In accordance with Section 20 of the DM Act, 2005, the preparation of the Departmental DM Plans (DpDMPs) in each state and UT is an integral step to help the states and UTs manage disasters in an effective manner. In the SDMP, the DpDMPs have been articulated with fine details and integrated in the development agenda of the state or UT, including the roles and needs of the departments in DM of the state or UT.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of all departments

In accordance with Section 25 of the DM Act, 2005, guidelines should be prepared for integrating DM in development plans and projects of the state or UT. In this regard, the state or UT should:

(1) Constitute a drafting group to prepare the Departmental Guidelines for integrating DM in the departmental development plan, for each of the departments of the State government. The composition of the drafting group of each Department shall be:

(a)	Chair	:	Secretary of the Departments concerned
(b)	Secretary	:	Joint Secretary (SDMA)
(c)	Members	:	(1) Heads of Offices of concerned Department; and
			(2) Senior representative of reputed S&T Institutions relevant to the Department.

Responsibilities

Secretary, SDMA

(2) The drafting group shall hold an initial discussion to review of on-going development plans, and prepare a first draft of guidelines to integrate DM in the departmental development plan.

Responsibilities

Secretaries of All Departments

(3) Circulate the first draft to all officers of departments and authorities, heads of institutes of R&D and S&T, and experts in DM. Ensure that the heads of departments, authorities and institutes of R&D and S&T, circulate the same to all persons concerned in their department, authority or institute.

Responsibilities

Secretaries of All Departments

(4) Convene a meeting of the drafting group to examine the responses, and prepare a revised draft.

Responsibilities

Drafting group

(5) Convene a meeting of SDMA, consider the draft of each Department, provide guidance to prepare the final draft, prepare the final draft with the assistance of the respective states, and forward the final draft for approval of the state government or UT administration.

Responsibilities

SDMA
Secretary, SDMA
Secretaries of Departments

(6) Consider the final draft for approval of the state government. And, after due approval, Notify the approved Departmental Guidelines to integrate DM in the Departmental Development Plans & Guidelines through a notification in the Official Gazette.

Responsibilities

State Government

Developmental plans of departments keep changing over time. Hence, the state or UT should review them at least annually to ensure that concerns related to DM are integrated therein. Also, in accordance with Section 29 of the DM Act, 2005, the state or UT should review measures taken by Departments for Mitigation, Capacity Building and Preparedness, and issuing guidelines as necessary. Towards this end, hold a meeting annually to review Departmental Development Plans to ensure that concerns related to DM are integrated therein, before the preparation and finalization of the Annual Plan and the State budget, of the following:

(1) Chief Secretary,

(2) Secretary (Finance),

(3) Secretary (Planning),

(4) Commissioner (DM), and/or Secretary (Revenue),

(5) Secretary/Secretaries of Department/Departments concerned, and

(6) Secretary (SDMA).

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

4.1.3 State Executive Committee

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A3)

The SEC constituted as per Section 3.1.1(b). In accordance with Sections 21 and 22 of the DM Act, 2005, the roles and responsibilities of the SEC are articulated hereunder:

(1) While the DM Act, 2005, seeks the sub-committees of the SEC to be constituted, to begin with no sub-committee of SEC is suggested at this juncture. This is because the main task for now is to mainstream DM into the regular functioning of various Departments. Once the basics of DM are mainstreamed into the regular functioning of the various Departments, sub-committees may be constituted (on an adhoc basis) as and when felt necessary for specific purposes and durations.

(2) The main activity of SEC is to coordinate and monitor implementation of the NDMP, NPDM and SDMP. All actions identified in **Section 3.1.3** are towards achieving this goal.

(3) Take on board the Vulnerability Assessment and Risk Analysis **(See Chapter 2)** in the appropriate places in the SDMP, DpDMPs and DDMPs of the districts concerned, towards assessing the vulnerability of different parts of the State to different types of disasters and specifying measures to be taken for their prevention and/or mitigation.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(4) Convene a meeting of the following to review the progress of implementation of the SDMP, DpDMPs and DDMPs in each District:

(a) Chair : Chief Secretary

(b) Secretary : Secretary (SDMA)

(c) Members :
(1) Chairman, SDMA,
(2) Commissioner (DM),
(3) Secretary of Department concerned, and
(4) District Collectors, District Magistrates or Deputy Commissioners.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(5) Prepare a Check Memo for the scrutiny of the technical designs of all development plans and projects involving construction to ensure that disaster resilient features have been duly incorporated.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary of Department concerned
Representatives of Department of Finance Planning

Joint Secretary, SDMA
Outside Experts from national institutes or organizations with background in the subject of the Project

(6) Organize the mock drills for testing the efficacy of the preparedness plans at all Governmental or Non-Governmental levels to respond to any threatening disaster situation or disaster. And, based on the lessons learnt from them, give directions for improving the DM plans at all levels in the state or UT for the future, where necessary, for enhancing disaster preparedness.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
Secretary of Department concerned with Drills
Director General of Police
Director General of Fire Services
Director, SDRF

(7) Advise, assist and coordinate activities of the departments, district authorities, statutory bodies and other governmental and non-government organizations engaged in DM in the state or UT, including regarding actions to be taken in Response to any threatening disaster situation or disaster, and towards this end:

(a) Upgrade the Emergency Operations Centers (EOCs) at the state or UT and district levels with:
  (1) State-of-the-Art Equipment,
  (2) Continuous Training, and
  (3) Frequent checks on readiness and efficiency of the EOC;

(b) Ensure that the telecommunication systems are functional at all times; and

(c) Convene immediately on the receipt of a warning or occurrence, be tuned to the developments, and give guidance until the response phase is over.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
Secretary of Department concerned

(8) Promote general education, awareness and community training on disasters to which different parts of the state or UT are vulnerable, and the measures that may be taken by such community to prevent the disaster, mitigate the impact of and respond to such a disaster, and towards this end:

(a) Enhance the levels of awareness and preparedness of all departments to respond to disasters;

(b) Device and organize modules for general education, awareness and training of NGOs, CBOs, PRIs, ULBs, NCC, NYKS and NSS to respond to disasters;

(c) Undertake trainings for increasing awareness of communities to respond to specific disasters;

(d) Make the general public aware of matters related to general education, awareness and community training to prepare for disasters, through electronic and print media such as TV, radio, pamphlets and leaflets (at specific times), and social media; and

(e) Introduce a capsule on DM in all syllabi and curricula of all education institutions (schools, colleges and universities) of the state or UT.

Note:

The various professional bodies and academic councils under the purview of Government of India (such as the medical, architecture, engineering, management and law) should incorporate appropriate modules in the curricula of the programs accredited by them.

Responsibilities

Member, SDMA
Secretary of Department concerned

(9) Perform such other functions as may be assigned to it by the SDMA or as it may consider necessary, including:

(a) Raise, train and equip the State Disaster Response Force (SDRF) with the assistance of NDRF (guidance may be sought from states, like Bihar, which already have raised SDRFs).

Responsibilities

Responsibilities
Ministry of Home Affairs
National Disaster Response Force (NDRF)

SDMA
Secretary, SDMA
Director, SDRF
Director General of Police
Director General of Fire Services

4.1.4 State Disaster Management Authority

The SDMA is the hub of DM activities in the state or UT. While most activities are undertaken by the departments and bodies of the state or UT, the critical role of interfacing with the larger population of the state or UT is coordinated by the SDMA.

(a) Constitute the Advisory Committee of SDMA

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A2.1)

Once the SDMA is constituted, the SDMA should:

(1) Propose the composition, membership, terms of reference and rules for the functioning of the Advisory Committee, and seek approval of the state government or UT administration; and

(2) Constitute the Advisory Committee of SDMA in accordance with the provisions of Section 14 of the DM Act, 2005, consisting of experts in the field of DM having practical experience at the national, state or district levels, up to a maximum of nine (9) members, who are;

(a) Subject specialists having background in each of the **hazards** to which the State is vulnerable, with at least 25 years professional experience in government or academia in prevention, mitigation or preparedness,

(b) Subject specialists having background in **cross-cutting themes** of DM, namely medical response, logistics and telecommunications, with at least 25 years professional experience in prevention, mitigation or preparedness, and

(c) Distinguished citizens having an interest in any of the **6 pillars** of DM (namely prevention, mitigation, preparedness, response, rehabilitation and reconstruction), with at least 25 years experience in serving the community.

In special instances, experts from renowned CSOs, UN bodies and international NGOs working on DM issues may be special invitees to the meetings of the Advisory Committee.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
Vice Chairman, SDMA

The state or UT should:

(1) Notify the constitution of the *Advisory Committee* of SDMA, through a notification in the *Official Gazette.*

Responsibilities

Chief Secretary
Commissioner (DM) and/or Secretary (Revenue)

(b) Lay down the State DM Policy

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A2.2)

The SDMA may, in accordance with the provisions of Section 18 of the DM Act, 2005:

(1) Constitute a drafting group to prepare the State DM Policy. The following shall be the composition of the group:
   (a) Chair: Member (SDMA) concerned with the preparation of the State DM Plan
   (b) Secretary: Secretary (SDMA)
   (c) Members
      (1) Heads of the departments concerned;
      (2) District collectors, district magistrates or deputy commissioners of the districts vulnerable;
      (3) District Superintendents of Police of vulnerable districts (not from the same districts as the district collectors, district magistrates or deputy commissioners listed above);
      (4) Representative of the Armed Forces;
      (5) Representative of NDMA;
      (6) Representative of NIDM;
      (7) Representative of NDRF;
      (8) Representative of SDRF;
      (9) Representative of S&T Institutions;
      (10) Eminent academicians from engineering, medical and law streams;

(11) Prominent NGOs working (at the national, state and district levels) on DM;

(12) Representatives of National Agencies/Institutes dealing with the management of the hazards to which the state is vulnerable (GSI, IMD, NRSA, NGRI, etc.,); and

(13) Three social workers of eminence.

The State can co-opt other members based on need of persons with specific specialization.

Responsibilities

Member, SDMA, concerned with the preparation of State DM Plan
Secretary, SDMA
Director, SDRF

District Collectors, District Magistrates or Deputy Commissioners of vulnerable districts
District Superintendents of Police of vulnerable districts

(2) Hold meetings of the drafting group to prepare the first draft State DM Policy.

Responsibilities

Drafting Group

(3) Circulate the first draft to a wider group of stakeholders (all heads of departments, authorities, heads of institutes of R&D and S&T, and experts in DM), and hold consultation meetings with them as required, and ensure that they circulate the same to all persons concerned in their organizations.

Responsibilities

Secretaries of departments *or their representatives*
District Collector, District Magistrate or Deputy Commissioner

(4) Examine the responses received from wide circulation, prepare a revised draft, convene meeting(s) of the drafting group to discuss the revised draft, and finalize the draft State DM Policy.

Responsibilities

Drafting Group

(5) Convene a meeting of the SDMA, consider the revised draft State DM Policy and provide guidance to prepare the final draft.

Responsibilities

SDMA

(6) Circulate the final draft for public comments, including from all Secretaries of Departments, Heads of Authorities, Heads of Institutes of R&D and S&T, and experts in DM.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments
Heads of Authorities
Commissioners of ULBs
Secretaries of PRIs

Heads of R&D Organizations
Heads of S&T Institutes & Universities

(7) Examine the responses received, and finalize the State DM Policy duly incorporating the suggestions received from wide circulation.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(8) Seek approval by the state government of the finalized State DM Policy, and, after due approval, notify the State DM Policy through a notification in the Official Gazette.

Responsibilities

Chief Secretary
Commissioner (DM) and/or Secretary (Revenue)

4.1.5 District Disaster Management Authorities

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A5 and Matrix B Item B1.2)

At the district level, DDMAs should act as the district planning, coordinating and implementing body for DDMP, and take all measures for the purposes of DM in the district in accordance with the guidelines laid down by NDMA and SDMA, and comply with the directions in this regard of the state governments or UT administrations. In this regard, in accordance with the provisions of Section 28 of the DM Act, 2005:

accordance with the provisions of Section 28 of the DM Act, 2005:

(1) The DDMA should propose the composition, membership, terms of reference and rules for the functioning of an Advisory Committee, and seek approval (through SDMA, or Commissioner (DM) or Secretary (Relief)) of the state government or UT administration;

(2) The Advisory Committee shall consist of experts in the field of DM having practical experience at the national, state or district levels. It shall have nine (9) Members, composed of:

(a) Subject specialists having background in each of the hazards to which the District is vulnerable, with at least twenty five (25) years of professional experience in government or academia in prevention, mitigation or preparedness;

(b) Subject specialists having background in cross-cutting themes of DM, namely medical response, logistics and telecommunications, with at least 25 years professional experience in prevention, mitigation or preparedness; and

(c) Distinguished citizens having an interest in any of the 6 pillars of DM (namely prevention, mitigation, preparedness, response, rehabilitation and reconstruction), with at least 25 years experience in serving the community, and/or CSOs and NGOs having experience in DM of working in the field at the local level.

Responsibilities

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(3) The state government or UT administration (after due approval) shall notify the formation of the Advisory Committee of DDMA, through a notification in the Official Gazette.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management

Furthermore, in accordance with the provisions of Section 30(2) of the DM Act, 2005, the DDMA should:

(1) Ensure that DDMPs are as per NDMA Guideline on State Disaster Management Plans.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

(2) Extend support and assistance to the Independent External Agency/Agencies for Design, Implementation, Monitoring and Evaluation (DIME) (appointed by the State Executive Committee) for monitoring implementation of the SDMP, DpDMPs and DDMPs. See **Section 5.5.1.** The NPDM and State Policy on DM are instruments for creating the enabling environment for plans to be made and implemented.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(3) Read together and take necessary actions regarding preventing or mitigating the effects of specific disasters articulated in the SDMP and DDMP.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(4) Take the following actions towards the capabilities for responding to any disaster or threatening disaster situation in the district:

(a) Provide continuous and periodical training to enable the personnel to remain zoomed to contemporary developments in the subject of DM;

(b) Acquire state-of-the-art equipment for DM activities, especially response, and ensure up-gradation of the existing equipment as and when required;

(c) Provide inputs to the department-wise reviews held by the state government or UT administration with the secretary and head of the department present at the meeting;

(d) Test the DDMPs through drills and rehearsals, and the lessons learnt disaster-wise to result in the updating thereof;

Responsibilities

Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(e) Organize training programs periodically for the personnel of PRIs, ULBs, Civil Society Organizations (CSOs), namely the NGOs and CBOs, to sensitize them on the contemporary developments in DM; and

(f) Ensure dissemination after adding value to the early warnings received from the State Government or UT Administration.

Responsibilities

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

In view of critical importance of DDMAs, which are responsible for all phases of DM (as compared to SDMAs and NDMA, which are not engaged directly in the response activities after the emergency phase), it is recommended that SDMA in association with the DDMAs develop a **Handbook on Disaster Management for DDMAs,** which provides guidance to the district administration and functioning of DDMAs. This should capitalize on the extant good practices, e.g., the **Handbook for DMs functioning as Returning Officers** during national and state elections.

4.1.6 State Disaster Response Force

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B1.6)

The state or UT should create response capabilities from within their existing resources. To start with, each state or UT may aim at equipping and training one battalion equivalent force. They should include women members for looking after the needs of women and children. The NDRF battalions and their training institutions are required to assist the states and UTs in this effort. DM training should be provided in the respective Police Academies and Police Training Colleges in the basic and in-service courses for both the gazetted and non-gazetted officers. In this regard, the state or UT should:

(1) Raise, equip and train one battalion of SDRF, duly ensuring the intake of adequate number of women; and

(2) Appropriately modify to include capstones related to DM in the extant curriculum and syllabus in Police Training College of both the basic and in-service courses.

Responsibilities

Director General, NDRF

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
SDRF
Director, SDRF
Director General of Police
Director General of Civil Defence
Principal, State Police Training College

4.1.7 Civil Defence and Home Guards

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B1.5)

The Civil Defence and the Home Guards serve the purpose of assisting the local authorities in the management of events, such as games and sports, and religious festivals. They lack the training and familiarity with the specialized equipment required for DM. Hence, they should not be deployed in DM related activities. In this regard,

(1) Provide training to the volunteers of the Civil Defence and the Home Guards on specialized services to be undertaken after disasters and the equipment required to be used in DM. They should be deployed in DM-related activities after due certification.

(2) Conduct the said trainings periodically, because both the Home Guards and the Civil Defence are voluntary groups.

Responsibilities

Ministry of Home Affairs
Secretary, National Disaster Management Authority (NDMA)
Director General (Fire Safety, Home Guard and Civil Defence)

Chief Secretary
Principal Secretary (Home), if applicable
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

4.1.8 State Police Forces and Fire Services

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B1.4)

The State Police Forces and the Fire Services are crucial immediate responders to disasters. Hence, the state or UT shall evaluate preparedness at all governmental or non-governmental levels to respond to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such Preparedness. The personnel of the Police Forces and Fire Services should be sent for necessary training, where necessary, to acquire multi-hazard rescue capability. See Section 3.1.3(6). Also, the state or UT shall ensure that the necessary action initiated by the central government and NDMA on up-gradation of fire services have been implemented and effective at the state level.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Chief Secretary
Principal Secretary (Home), if applicable
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
SDRF
Director General (Police)
Director General (Fire Services)

4.2 Legal Arrangements

Virtues cannot be regulated. Hence, the main focus of the state or UT should be to ensure that the built environment is compliant with the laws, rules or other regulations put in place by the appropriate authorities. With many government departments having their own construction wings, and with unregulated development of built environment on the rise with apartment buildings and housing societies, the DM initiatives should reflect these facts and adopt a path that will result in disaster resilient built environment.

4.2.1 Techno-Legal Regime

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B4.2, 4.3, 4.4 and 8.6, and Matrix C Item C1.2.4)

The importance of the techno-legal environment being kept contemporary and duly updated cannot be over-emphasized. A continuous and meaningful dialogue is needed, by the authorities concerned at all levels, with the stakeholders engaged in the techno-legal environment, especially the national and state levels, so that the process of learning from earlier mistakes, and emulating best practices, can continuously inform the updating of the state or UT policy and plan documents at all levels. Certainly, the practice of DM will provide valuable experiences that will need to be again taken back to the discussion table, and eventually help revise the policies, plans, guidelines, norms and procedures, and even the DM Act possibly.

The crucial stakeholder groups in DM are engineers and artisans. Two formal schemes that are urgently needed are:

(1) Licensing of Civil Engineers (different from mere registration), which involves periodic verification of the competence of engineers through a written and oral examination.

(2) Certification of Artisans (different from mere registration), which involves periodic verification of the competence of artisans through hands-on training followed by an examination. Some SDMAs (e.g., BSDMA and GSDMA) have prepared documents on this subject, which may be of help.

In this regard, the relevant acts, rules and regulations warranting amendments need to be identified and brought in conformity with the DM Act, 2005, in a phased manner by State Government and UT Administration along with its other agencies concerned. Towards this end, the state or UT should:

(1) Convene a meeting of the following:

(a) Chair	:	Chief Secretary
(b) Secretary	:	Secretary, SDMA
(c) Members	:	Commissioner (DM) &/or Secretary (Revenue) Secretary (Law)

Advocate General of the State,
Secretaries of Departments concerned,
Representative of NDMA (Government of India)

(2) Review all laws of the State being administered by different departments, and make recommendations to make the provisions thereof compatible with the imperatives of DMs.

Responsibilities

Representative of National Disaster Management Authority (NDMA)

Chief Secretary
Advocate General of the State
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Law, Skill Development, Employment Generation Schemes, Health, Public Works (Roads & Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, Irrigation*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Law, Skill Development, Employment Generation Schemes, Health, Public Works (Roads & Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, and Irrigation*

(a) Institutional Mechanisms

Appropriate legal systems and institutional mechanisms are needed towards ensuring disaster resilient built environment in the state or UT. In this regard, these need to be planned and created to develop capacity, especially in statutory systems and processes that the state or UT can benefit from. Therefore, the state or UT should:

(1) Establish legal and institutional mechanisms to issue licenses to engineers involved in constructions and buildings, after a due competence verification process.

(2) Design capacity development programs to enhance technical capacity (with respect to earthquake safety) of the following:
   (a) Design & construction engineers, architects & planners,
   (b) Overseers and supervisors,
   (c) Artisans, and
   (d) Developers, builders and contractors.

(3) Begin the process of training engineers of the public and private sectors, and the Faculty Members of engineering and architecture colleges, engaged in development of built environment in their respective disciplines, and license the competent ones after a due competence verification examination process

(4) Begin the process of training local diploma holders engaged in construction in their respective streams, and certify the competent ones after a due competence verification examination process

(5) Begin the process of training local construction workers (Artisans of the public and private sectors) in their respective trades, and certify the competent ones after a due competence verification examination process.

(6) Incorporate provisions in the local Building Bye Laws and DCRs, which require that only licensed engineers shall be permitted to undertake the structural design and construction of buildings and structures, and only certified artisans shall be employed to undertake the skilled work.

(7) Permit engagement only of licensed engineers alone to approve designs and constructions in the state or UT.

(8) Permit engagement only of certified artisans alone to construct buildings and structures in the state or UT.

(9) Establish a council in the state or UT of licensed engineers and certified professionals.

(10) Incorporate provisions and rules to fix accountability of Licensed Engineers to empower the PRIs and ULBs to take appropriate legal actions (such as blacklisting, debarring from services, cancellation of license etc.) for any violation by the Licensed Engineers.

Responsibilities

Responsibilities
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, Law, Rural Development, Urban Development, Public Works (Roads & Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, Irrigation, Skill Development, Employment Generation Schemes, Health, other departments having physical assets

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, Law, Rural Development, Urban Development, Public Works (Roads & Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, Irrigation, Skill Development, Employment Generation Schemes, Health, other departments having physical assets

Commissioners of ULBs
Secretaries of PRIs

R&D Organizations
S&T Institutes & Universities

(b) Revision of Municipal Regulations

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B4.3 and B4.4, and Matrix C Items C1.4.1, C2.2.3, C2.4.1, C3.4.1, C3.4.2 and C4.2.4)

The states and UTs need to establish techno-legal and techno-financial regime in consultation with the NDMA. These should be tailored to address the hazards to which they are at risk and sensitive to priorities of the state or UT. It is best to evolve these through a consultative process. Developing a forum will be beneficial for the exchange of views and forging cooperation among departments and agencies to share experiences, best practices and advocacy actions for furthering the cause.

Municipal regulations, such as **development control regulations (DCRs),** building bye-laws and structural safety features, are primary determinants of the safety of the built environment. They should be reviewed periodically to identify safety gaps (especially from the point of view of earthquake, flood, landslide and other hazards) and modifications made to align them to the revised building codes of the Bureau of Indian Standards (BIS). This is a function of the SDMP.

The state or UT should:

(1) Engage a technical team to review, revise and update the Town & Country Planning Act, Land Use & Zoning Regulations, Building Bye-Laws and Development Control Regulations, to incorporate all relevant provisions of design codes necessary in disaster-resilient construction;

(2) Develop Risk-Sensitive Land Use Planning to address the hazards that the state or UT is faced with. In particular,

  (a) Adopt a land use strategy which restricts high intensity activities and high value properties in hazard prone areas;

(b) Make available existing detailed hazard zonation maps for understanding the hazard accurately. For instance, with regard to landslides, it will help in:

(1) Ensuring that the older landslides which may have been vegetated and unrecognizable and also potential run-out zones that could similarly be affected are included in the hazard;

(2) Restricting new development in high-risk areas (such as weak slopes) and prevent unscientific slope modifications to maintain the slope stability;

(3) Include an assessment of soil piping in the detailed risk mapping, if required, and

(4) Undertake soil and slope stability studies to mitigate the negative effects of landslides and earthquakes;

(c) Recommend mitigation measures in the land use plans for high-risk areas that overlap with developed areas in the jurisdiction;

(d) Prepare hazard maps of suitable scales to facilitate micro-level planning;

(e) Recommend relevant time-bound mitigation measures in high-risk areas where development has already taken place;

(f) Disseminate information about the landslide risk within the jurisdiction of the RSLUP, especially in the developed areas, and

(g) Develop a simple model Risk Sensitive Land Use Planning (RSLUP) Guide for hazards to which the State ort UT is expected to be vulnerable to, by considering critical aspects like landslides, rock-fall or soil liquefaction (in earthquake prone areas). The RSLUP should include:

(1) Provisions for disaster resilient construction as laid down in the bye-laws, NBC and other relevant documents,

(2) Mandate flood assessment, tsunami assessment, landslide assessment, rock-fall assessment and soil liquefaction studies before the construction of a critical building or infrastructure, and

(3) Customize building regulations in urban and rural areas according to the likelihood and consequences of earthquake hazard events, namely the low risk areas, moderate risk areas, and high-risk areas.

(3) Review, revise and update the ***Town and Country Planning Act*** and ***Land-use and Zoning Regulations,*** for ensuring compliance of disaster-resistant design and construction practices in all new constructions;

(4) Review and revise ***development control regulations*** to:

(a) Review (on priority) the master plans of its urban, rurban and rural areas, and their compliance, to reflect the outcomes of hazard assessment and risk analysis **(see Chapter 2);**

(b) Exclude regions with high hazard for use in future. This should be done once every year, preferably in the first month of the financial year;

(c) Prevent blocking and encroaching of waterways; and

(d) Prohibit reclamation, conservation and restoration of existing wetlands and depressions; and

(e) Prohibit unplanned and unregulated developmental activities in: (i) flood plains of the rivers and encroachments into the waterways that lead to increase in flood losses as well as flood risk, (ii) landslide prone areas, and (iii) liquefaction prone areas.

(5) Review and revise the rural and urban ***building bye-laws*** of the state or UT based on the national Model Building Bye-Laws 2017 (or the latest version) to:

(a) Outlaw unsafe typologies of constructions of all types of structures,

(b) Mandate the essential minimum mandatory disaster-resistant features in them,

(c) Adopt the international good practices and improve the Building Bye-Laws,

(d) Incorporate appropriate sections of the National Building Code (and other relevant documents developed by national bodies [like BIS] for safety and compliance) relevant to disaster-resistant construction of buildings and structures in focus, especially every revision of the relevant national codes and documents,

(e) Include provisions of Energy Conservation Building Code,

(f) Lay special emphasis on the design of all critical and lifeline buildings and structures by seeking better performance though more rigorous procedures in design and high quality control & assurance procedures in construction,

(g) Include the requirements of peer review of structural design and construction supervision by statutory third part peer reviewers,

(h) Introduce the need to have periodic maintenance of all critical and lifeline buildings and structures, and

(i) Initiate preparation of draft Building Bye-Laws of the state or UT based on the above, and if required, prepare separate bye-laws for developments in the urban and rural areas.

(6) Encourage banks and other lending institutions (including government schemes) to have:

(a) Technical processes that ensure the physical assets created through their funding schemes to be disaster resilient;

(b) Make code compliance and adoption of disaster resilient features mandatory for sanctioning or disbursing loans for all new constructions and for all alterations or extensions proposed to existing constructions; and

(c) Encourage disaster resilient construction through suitable incentives like subsidies in loan interest and tax.

(7) Engage with insurance companies to consider having insurance schemes with incentives on premiums for the elements of built environment (especially housing) with disaster resilience embedded in them.

Responsibilities

Department of Atomic Energy
Atomic Energy Regulatory Board (AERB)
Ministry/Department of Commerce
Bureau of Indian Standards
Ministry/Department of Housing and Urban Affairs
Building Materials and Technology Promotion Council (BMTPC)
Housing and Urban Development Corporation (HUDCO)
Ministry/Department of Railways
Research Designs and Standards Organization
Ministry/Department of Road Transport and Highways
Indian Roads Congress
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of Disaster Management, Revenue, Rural** Development, Urban Development, Public Works, Housing, Panchayati Raj, and other departments having physical assets*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of Disaster Management, Revenue,** Rural Development, Urban Development, Public Works, Housing, Panchayati Raj, and other departments having physical assets*

Commissioners of ULBs
Secretaries of PRIs

Special efforts are required to protect natural environs. Needed changes should be brought in by enforcement of suitable laws, norms, regulations and guidelines to implement sustainable integrated water resource management at the level of reservoirs. The state or UT should:

(1) Implement land-use regulation for low lying areas as per flood control norms;

(2) Regulate inhabitation in low-lying areas along the rivers, nallas and drains;

(3) Implement flood management action plan;

(4) Review and modify operation manuals for all major dams/ reservoirs;

(5) Support and cooperate with central agencies;

(6) Sponsor state-specific efforts;

(7) Support local efforts;

(8) Cooperate with central efforts; and

(9) Prevent and remove encroachment into waterways and natural drainage systems.

These are part of the SDMP, which is prepared in line with the NDMA Guidelines on Management of Floods and on Management of Urban Flooding. The state or UT should examine the SDMP and see if the matter of floods is addressed holistically as per the said the NDMA Guidelines; else, the SDMP should be revised to ensure the same.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Water Resources, and Irrigation & Command Area Development

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Water Resources, and Irrigation & Command Area Development

Commissioners of ULBs
Secretaries of PRIs

(c) Licensing of Engineers

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C2.4.3 and C3.4.3)

Engineers are the backbone of the team involved in the development of the built environment; they deal with the safety of the built environment and of the people functioning or living in them. Thus, mere qualification (of having received a degree does not make them capable to design and construct structures. Therefore, all in-service engineers, including those working in the departments of the State Governments and UT Administrations, dealing with construction are trained through a capacity development process, and only the competent ones among them are licensed through an examination process.

In this regard, the state or UT should:

(1) Establish legal and institutional mechanisms to issue licenses to engineers involved in constructions and buildings, after a due competence verification process.

(2) Design capacity development programs to enhance technical capacity of the following with respect to structural safety:
   (a) Design Engineers, Architects, Planners, Construction Engineers, Overseers and Supervisors; and
   (b) Developers, Builders and Contractors.

(3) Train local construction workers (artisans) in their respective trades, and certify them after a due competence verification process

(4) Incorporate provisions in the local Building Bye Laws and DCRs, which require that only licensed engineers shall be permitted to undertake the structural design and construction of buildings and structures, and only certified artisans shall be employed to undertake the skilled work.

(5) Permit engagement only of Licensed Engineers and Certified Artisans in the State

(6) Incorporate provisions and rules to fix accountability of Licensed Engineers to empower the ULBs and PRIs to take appropriate legal actions (such as blacklisting, debarring from services, cancellation of license etc.) for any violation by the Licensed Engineers.

(7) Review the institutional mechanisms and revise if required.

(8) Establish a regulatory regime that will empower the ULBs and PRIs to guide the development of the built environment only by the registered and licensed professionals.

(a) Evolve an appropriate techno-legal system for making licensing of engineers mandatory, and take steps to table the State Engineers' Bill in the Legislative Assembly of the state or UT; and

(b) Develop mechanisms to renew periodically the license of engineers after their proficiency in safety standards and codes is confirmed by a written and oral examination.

Responsibilities

National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Law, Panchayati Raj, Housing, Skill Development, Employment Generation Schemes, Health, Public Works (Roads and Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, Irrigation, and other departments having physical assets*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Law, Panchayati Raj, Housing, Skill Development, Employment Generation Schemes, Health, Public Works (Roads and Buildings), Municipal Administration, Panchayati Raj, Water Supply & Sanitation, Irrigation, and other departments having physical assets*

Commissioners of ULBs
Secretaries of PRIs

R&D Organizations
S&T Institutes & Universities

(d) Certification of Artisans

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B8.4 and Matrix C Item C3.4.3)

The up-gradation of the skills of artisans is a crucial component of the capacity development process. In particular, paramedics, social workers, plumbers, sanitary fitters and safety auditors, play an important role in community-based DM. The States or UT should:

(1) Promote proactively this activity by strengthening ongoing Skill Development Programs underway in the state or UTs to incorporate DM related skills;

(2) Organize new training programs for employed, self-employed or free-lance workers towards periodic up-gradation of needed DM skills; and

(3) Create a state–level database of certified artisans, which is accessible to all agencies looking for such certified artisans, and seek their engagement in future construction projects, as and when needed.

These groups should be provided training through suitable programs. And, these artisans should be given preference in government-funded or government-driven construction projects.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *and Skill Development*
Heads of employment generation schemes of the Government

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

R&D Organizations
S&T Institutes & Universities

(e) Implementation of Projects

To accomplish the activities listed in Section 3.2.1(a)-(d), the state or UT should:

(1) Constitute a standing committee with the following Terms of Reference to:

(a) Bring together subject specialists and agencies to integrate DM measures into the process of development of the built environment;

(b) Share experiences, best practices and advocacy actions for furthering the cause;

(c) Function as an advisory group on the norms, rules and policies, with the assistance of members from institutes for architecture and engineering;

(d) Guide and ensure appropriate retrofitting programs are undertaken;

(e) Guide and ensure that departments incorporate disaster resistant features in all new projects;

(f) Guide and ensure that PRIs and ULBs undertake design peer review of all new lifeline structures and buildings, including empanelling professional peer reviewers; and

(g) Guide and ensure that PRIs and ULBs undertake maintenance of structures.

The Standing Committee can constitute Technical Groups for undertaking specific technical activities, including regular and periodic updating of Building Bye-Laws and Development Control Regulations.

Responsibilities

Ministry/Department of Commerce
Bureau of Indian Standards
Ministry/Department of Road Transport and Highways
Indian Roads Congress
Ministry/Department of Railways
Research Designs and Standards Organization
Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets*
Commissioners of ULBs
Secretaries of PRIs

R&D Organizations
S&T Institutes & Universities

4.2.2 Enforcement of Techno-Legal Regime

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B4.5 and B4.6, and Matrix C Items C2.2.3, C2.3.1, C2.3.2, C2.3.3, C2.4.2 and C4.3.3)

DM involves many activities, which affect the environment. These activities include the use of products that affect the environment and construction practices that disturb the environment. The golden rule of environmental sensitivity is to disturb the natural environment only minimally. Two golden rules for protecting the environment are:

(1) Understand nature closely, especially that which affects cascading losses: For example, keeping the natural waterways intact is essential. If waterways are encroached, the continued flow and the flash floods along these waterways are detrimental to the built environment hindering its natural flow. For instance, during the 2018 flash floods of Kerala, the Kochi Airport and its surroundings were submerged, and caused temporary closure of the airport at a critical juncture when relief measures were to be provided.

(2) Replenish nature consciously, especially that which can be replenished: For example, if wooden houses are known to perform well in earthquakes, wood farming should be practiced to regularly plant equal if not more than the number of trees cut. Also, local native vegetation on the topsoil protects the erosion of soil. Thus, keeping such top soils intact is part of the environmental sensitivity.

Established good practices lack legal sanctity, even though it is environmentally sensitive to adopt them without fail. For instance, even if the Flood Plain Zoning Regulation (circulated by the Government of India in 1975) does not have legal standing, it is only prudent to adopt them without fail, and thereby protecting the community from establishing human settlements below HFL. Similarly, it is acceptable to not permit construction of habitat along the coast at locations that are below HFL. This is in keeping with the definition of the Coastal Regulation Zone in the Environmental Protection Act, 1986, updated in 1991. Further, the natural environment poses contrasting challenges. For instance, the wind effect on a house requires the house to be massive and anchored to the ground, but earthquake effects require the house to be as light as possible. At a location where both wind and earthquakes are prevalent, it is necessary to enforce norms for ensuring **multi-disaster resistance** in the built environment. Therefore, a compliance review of new buildings and infrastructure should examine the following aspects: (a) Structural Safety, (b) Fire Safety, (c) Health Safety, (d) Personal Life Safety, (e) Public Safety, (f) Electrical Safety, and (g) Energy Efficiency Features. This guide talks of the first of these, even though the others are equally critical.

(a) Structural Safety Audit

Regulating good construction practices requires establishment of a techno-legal system, namely Structural Safety Audit. Here, the municipal body (to which the structural design calculations and drawings are submitted for

approval) examines the documents and confirms compliance with the prevalent national standards. The audit is performed by Structural Safety Peer Reviewers. Two structural safety peer reviewers are needed, namely: (1) structural safety peer reviewers for the structural design, and (2) ***structural safety*** peer reviewers for the ***construction quality.***

Only legally licensed engineers should be commissioned to carry out these peer reviews. Currently, there is no legal system in the country of Licensing of Engineers. Until a system is in place to license engineers, available engineers of repute should be trained to carry out these audits.

When Structural Design Peer Review and Construction Peer Review pertaining to design or to construction are performed by licensed engineers under the aegis of a **statutory body,** it is called the ***third party*** Structural Safety Audit. The SDMP emphasizes the importance of this Structural Safety Audit in DM. Structural Safety Audit of the designs should be done ideally by a statutory body for each new structure before construction and each existing construction after the specified durations of time specified in the Bye-Laws.

In line with the SDMP, the state or UT should:

(1) Engage a technical team to:

- (a) Review the enforcement capacities in urban local bodies, urban development authorities, etc., to integrate disaster-resistant features in the built environment;
- (b) Interact with all stakeholders (builders, architects, engineers, planners, policy makers, etc.) to understand drawbacks, if any, in the current approval processes;
- (c) Recommend revisions in building regulations and implementation mechanisms;
- (d) Identify the capacity development needs in urban local bodies, urban development authorities, etc., to strengthen compliance of the techno-legal regime; and
- (e) Ensure enough clarity when laying down the Building Bye-Laws, to avoid misinterpretations unintentionally or intentionally.

(2) Create additional positions for technical experts as identified through the Building Regulatory Capacity Assessment process for enforcing the Building Bye-Laws

(3) Update at least every five years the Building bye-laws to bring them in line with the latest National Building Code 2016 and other statutory documents, and place the same in the public domain.

(4) Introduce necessary legal instruments for **licensing of engineers,** who can be commissioned to undertake the **mandatory** third-party structural safety audit, through:

- (a) Structural Design Peer Review to examine structural safety of all new constructions and retrofit of existing constructions; and
- (b) Construction Quality Peer Review to examine construction quality of all new constructions and retrofit of existing constructions.

(5) Launch the process of **Licensing of Engineers;**

(6) Finalize methods to assess the **designs** for structural safety of:

- (a) **Existing** buildings and structures, especially critical and lifeline buildings and structures; and
- (b) **New** buildings and structures, especially critical and lifeline buildings and structures.

These are procedures that ensure that the proposed designs comply with the relevant prevalent national standards and state-specific bye-laws. In particular, ensure that:

(i) Design checklists are developed for examining designs and drawings to ensure safety, stability and resilience in compliance with the latest codes and standards; and

(ii) Academic institutes are not to be charged with this responsibility of doing the routine Peer Review work. On the other hand, the services of select Faculty Members with competence and experience should be used only for undertaking forensic and comparative studies.

(7) Finalize methods to assess **construction** from the standpoint of structural safety of:

(a) **Existing** buildings and structures, especially critical and lifeline buildings and structures; and

(b) **New** buildings and structures, especially critical and lifeline buildings and structures.

In particular, ensure that:

(i) Procedures are developed for site inspection of construction during different stages of construction of new lifeline buildings and structures, called Third Party Inspection & Monitoring (TPIM). These are procedures that ensure that the proposed designs comply with the relevant prevalent national and state standards;

(ii) Site inspection checklists are developed for different stages of construction to ensure the design drawings are converted faithfully at site along with the specifications for materials used, process adopted and skills employed, mentioned therein;

(iii) Technical teams of qualified accredited agencies and professionals are empanelled through the key departments of the state for conducting TPIM of the new lifeline buildings;

(iv) Mechanisms are evolved for TPIM of projects for construction of lifeline buildings to keep track of physical and financial progress of projects throughout the project life cycle;

(v) Standardization and consistency are embedded in the process, functioning and scope of activities of external TPIM Agencies engaged for monitoring;

(vi) TPIM is undertaken for all new lifeline buildings and structures by competent empanelled professionals and agencies for ensuring compliance with the techno-legal regime and confirming that disaster resistance is incorporated as required by code provisions;

(vii) Process of TPIM is documented; and

(viii) Academic institutes are not to be charged with this responsibility of doing the routine Construction Peer Review work; the services of select Faculty Members with competence and experience should be used only for undertaking forensic and comparative studies.

(8) Develop mechanisms to conduct post-occupancy audits (structural and fire safety) that can be carried out periodically after issue of the Occupancy Certificates for residential and commercial buildings.

(9) Engage only:

(a) **Licensed structural engineers** to undertake Structural Design Peer Review (until the licensing of structural engineers is in place, experienced structural engineers of repute may be considered),

(b) **Licensed civil engineers** to undertake Construction Quality Peer Review (until the licensing of civil engineers is in place, experienced civil engineers of repute may be considered), and

(c) **Licensed artisans** to construct projects.

(10) Re-examine the designs and specifications of every new house being constructed under any government welfare and development scheme, to ensure disaster resilience;

(11) Launch a formal program to undertake structural safety audits of all ***critical and lifeline buildings*** in a prioritized manner. Considering that the country is just beginning this effort, the state or UT should undertake structural safety audit of small select set of buildings and structures, namely of:

(a) All **new** critical and lifeline buildings and structures to ensure that they are made disaster resistant the first time itself; and

(b) All **existing** critical and lifeline buildings and structures to assess their present condition of disaster resistance.

(12) Identify officers, who will be responsible for implementing disaster resistance, and who will be accountable for any lapses/violations of the associated established acts, laws and rules.

(13) Develop and adopt in the building regulation process an Online Automated Building Approval Application System (OABAAS) with the following features:

(a) It should be hosted on dedicated servers at a ULB, PRI or by a governmental body.

(b) Host digitized land maps (on a GIS platform) of scale of 1:10,000 or better, and link all features of land, including coordinates, plot area and physical characteristics, with the permit approval automation software OABAAS, for 24×7 monitoring.

(c) Upgrade regularly and maintain the OABAAS.

(14) Develop legal provisions for undertaking periodic maintenance of all critical and lifeline buildings and structures as per prevalent national standards and bye-laws, by:

(a) Establishing policies and plans for regular maintenance;

(b) Facilitating implementation and enforcement of relevant standards for disaster-resistant design and construction, through appropriate incentives and disincentives coupled with independent third party compliance reviews;

(c) Involving pertinent stakeholders in the development, maintenance, review and/or approval of the regulatory provisions;

(d) Having records of all maintenance works undertaken as part of the OABAAS.

(15) Encourage voluntary structural maintenance and periodic post-construction safety evaluations of **all** buildings and structures, which are carried out by licensed engineers, who are competent geotechnical, structural and civil engineers empanelled by the PRIs and ULBs; and

(16) Develop suitable financial or in-kind incentives (such as enhancement of FSI, reduction in power and water tariffs, property tax, and speedier approval) in the building regulation system after reviewing good practices of other states and UTs.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets

Commissioners of ULBs
Secretaries of PRIs

(b) Retrofit of Existing Critical & Lifeline Buildings and Structures

Currently, there are over 32 Crores of houses and buildings across the country. Many of them are unreinforced masonry and in areas with moderate to severe seismic threat. Clearly, they need to be retrofitted. In this backdrop, the state or UT should:

(1) Adopt the strategies and processes given in the NDMA Guidelines on Seismic Retrofitting of Deficient Buildings and Structures;

(2) Develop suitable retrofitting designs and cost estimates for typical deficient buildings;

(3) Conduct meetings with departments concerned regarding decisions on retrofitting or replacement of existing lifeline buildings;

(4) Carry out detailed assessments of deficient buildings select for retrofitting, by the telescopic method mentioned in **Chapter 2,** and arrive at details of retrofitting to be undertaken (namely type, location and level of retrofitting), and

(5) Launch a program for prioritized retrofitting of critical and lifeline buildings and structures to begin with, and then the other structures in the order of priority mentioned in the said NDMA guideline.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets*

Commissioners of ULBs
Secretaries of PRIs

(c) Government Housing Schemes

The Government of India, State Governments and UT Administrations are engaged in housing schemes as part of their social welfare and development programs. Two sets of housing schemes are implemented by the governments, namely:

(1) Housing for the poor, implemented by both the Central and the State Governments or UT Administrations, and

(2) Housing for the in-service staff of the departments of the state government or UT administration.

The central and state governments or UT administrations are investing large amounts annually in these housing schemes. Therefore, it is the responsibility of the State governments and UT administrations, to ensure disaster-resistance in the housing schemes.

The state or UT should:

(1) Review and map all ongoing housing schemes, policies and programs run by central and state government or UT administration to ensure that DM measures are incorporated in them, by:
   (a) Reviewing all existing housing programs, schemes and policies, run by the central and state governments and UT administrations;
   (b) Making it mandatory for the beneficiaries and construction agencies (if any) to comply with the prevalent codes and standards in the design and construction of houses under the government schemes;
   (c) Establishing mechanisms to:
      (1) Monitor the housing schemes being implemented by the government to comply with disaster-resistant features;
      (2) Tag financial compensation for damaged houses constructed under government housing schemes contingent on compliance with disaster-resistant features.
   (d) Assisting masons and beneficiaries to incorporate disaster-resistant features in all housing schemes, through preparation of manuals with pictorial representation of disaster-resistant features in the design and construction of the houses;
   (e) Identifying and empowering legally the department that will undertake post-disaster damage assessment of the houses constructed under housing schemes;
   (f) Developing long-term program to continually monitor the houses constructed under the various government welfare and development schemes, and suitably modifying to improve the designs and specifications for new constructions; and
   (g) Revising suitably the building bye-laws and other laws to facilitate integrating disaster-resistant features based on the local context in the design, specifications and construction of the houses, based on national and international good practices.

(2) Train the local artisans, builders, engineers and other construction personnel to sensitize them on the importance of disaster resistance, and develop capacity in them to implement the codes in force;

(3) Establish mechanisms for beneficiaries and construction agencies (if any) engaged in the housing schemes to ensure enforcement and compliance by:

(a) Incentivizing them, when the rules and regulations in force are complied with; and

(b) Penalizing them, when violating the rules and regulations in force; and

(4) Make rainwater harvesting and storage as mandatory features in housing schemes to enhance their sustainability, through inclusion of the same in the Detailed Project Report (seeking the creation of rainwater harvesting and storage structures, and distribution system).

(5) Ensure that the structural designs of type-design houses incorporate disaster resilient features, meet local needs and support earning livelihoods of the community, using locally available materials.

Responsibilities

Ministry/Department of Commerce
Bureau of Indian Standards
Ministry of Jal Shakti
Central Water Commission (CWC)
Ministry Housing and Urban Affairs
Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Disaster Management, Revenue, *Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets*
District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Disaster Management, Revenue, *Housing, Irrigation, Rural Development, Urban Development, Public Works, Town & Country Planning, Panchayati Raj, Housing, Roads & Buildings, other departments having physical assets*
Commissioners of ULBs
Secretaries of PRIs

4.3 Financial Arrangements

The scope of the financial arrangements for DM is laid down in DM Act, 2005. The financial aspects of disaster management entail various stages ranging from prevention to rehabilitation and reconstruction. A firm commitment is made by the government regarding funds for DM as recommended by the Finance Commission (FC) and as a part of budgetary allocations. The FC makes recommendations regarding financing of DM also amongst other subjects. The 2nd FC made a provision for **margin money** for meeting such contingencies. Subsequent FCs have reviewed various aspects of funding DM in the country in consultation with various stakeholders, and expanded the scope of financing DM activities. Based on their recommendations, various funds have been maintained by the Government of India and Governments of States and Administrations of UTs to fund the various activities of DM.

The DM Act, 2005, mandated clearly the government of India to ensure that the funds are provided by the ministries and departments within their budgetary allocations for the purpose of DM. It stressed upon the need for mainstreaming of the DM by way of making definite budgetary arrangements for the purpose by the respective ministries and departments within their overall agenda.

4.3.1 Recommendations of 15th Finance Commission

The salient recommendations of the 15th Finance Commission (15FC) are presented hereunder, which pertain to DM.

(a) National Disaster Risk Management Fund (NDRMF)

The 15FC recommended that the allocation for the National Disaster Risk Management Fund (NDRMF) should be based on expenditure in previous years, assuming an annual increase of 5%. Further, it recommended that the NDRMF should be in two baskets, namely the National Disaster Response Fund (NDR Fund) and National Disaster Mitigation Fund (NDM Fund), to together address DM needs Further, it recommended that the NDR Fund should get 80% of the NDRMF and the NDM Fund 20%. The recommended utilization of NDR Fund is shown in **Figure 4.1.** If required, the Ministry of Home Affairs may examine the need for amending the DM Act, 2005, to create three sub-windows within the NDR Fund. While the funding window of NDR Fund and NDM Fund should be maintained, there could be flexibility for re-allocation within these sub-windows. The recommendation of the 15FC for allocation to NDRMF for the period 2021-26 is depicted in **Table 4.1,** along with the share of the sub-categories.

Table 4.1: Recommendation of 15FC for National Disaster Risk Management Fund (NDRMF) for the period 2021-26

	Share	Recommended Allocation (Rs. Crores)
National Dis aster Mitigation Fund	**20%**	**13,693**
National Disaster Response Fund	**80%**	**54,770**
(a) Rescue and Relief	40%	27,385
(b) Rehabilitation	30%	20,539
(c) Preparedness & Capacity Building	10%	6,846
Total	**100%**	**68,463**

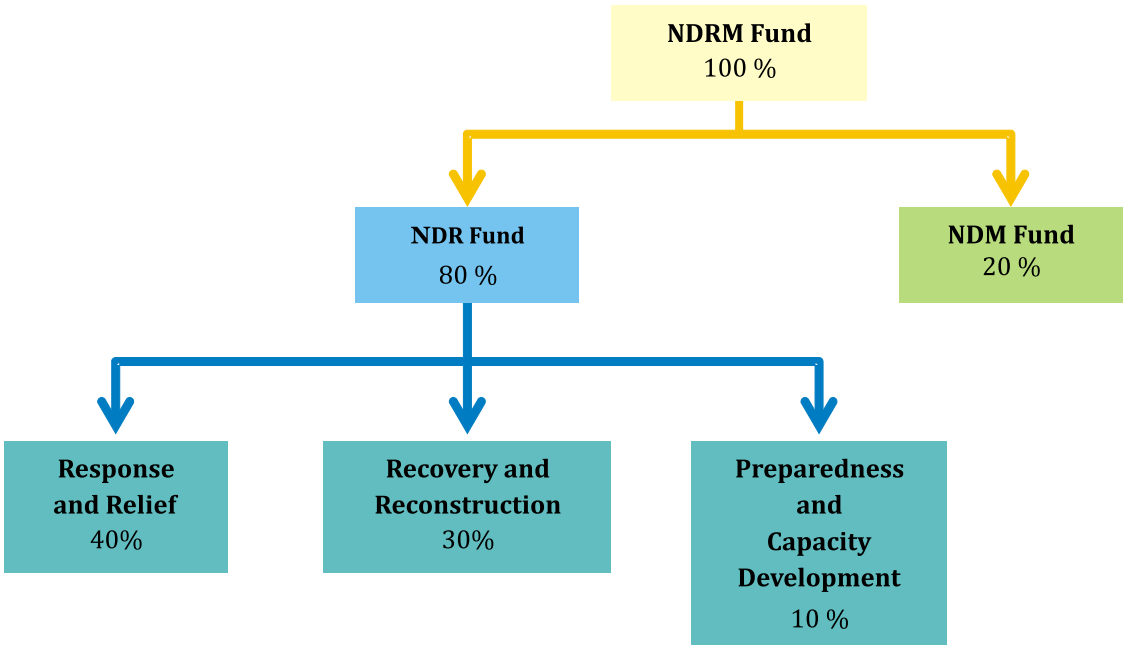


Figure 4.1: Proposed utilization of the allocation to the government of India

With the NDR Fund, the State Government or UT administration is responsible primarily for undertaking rescue, relief and rehabilitation measures in the event of a disaster. At times, its efforts need to be strengthened and supplemented with central assistance. Providing assistance for disaster preparedness, restoration, reconstruction and mitigation in the event of a natural disaster are not part of NDR Fund's mandate. In the event of a calamity of a severe nature, where the requirement of funds for relief operations is beyond the funds available in the SDR Fund account, additional central assistance will be provided from NDR Fund, after following the laid down procedure. The 15FC recommended that all government of India (GoI) assistance through the NDR Fund and NDM Fund should be provided on a graded cost-sharing basis. The states or UTs should contribute 10% for assistance up to Rs.250 Crores, 20% for assistance up to Rs.500 Crores, and 25% for all assistance exceeding Rs.500 Crores.

(b) State Disaster Risk Management Fund

As in the NDRMF, the allocation to each state or UT, referred to as State Disaster Risk Management Fund (SDRMF), also should be in two baskets, namely the State Disaster Response Fund (SDR Fund) and State Disaster Mitigation Fund (SDM Fund), to address DM needs, namely: (a) response and relief, rehabilitation, preparedness and capacity-building, and (b) mitigation and reconstruction, respectively. A further utilization was proposed by 15FC of the SDR Fund and SDM Fund; **Figure 4.2** shows the same. Reallocation within the three sub windows of SDR Fund is permitted. The funding under the windows SDR Fund and SDM Fund are not interchangeable, even though there could be flexibility for re-allocation within the three sub-windows of SDRF.

Regarding grants for DM, the 15FC adopted an inclusive methodology, replacing the expenditure-driven methodology. The 15FC recommended that allocation of DM to State Disaster Risk Management Funds (SDRMFs) should be based on factors of past expenditure, area, population, and disaster risk index (which reflect the institutional capacity, risk exposure, hazard and vulnerability of the state or UT). The 15FC recommended continuation of the existing cost sharing ratio between the central and state governments, of 90:10 for North-East and Himalayan states and of 75:25 for the rest of the states and UTs. The recommendation of the 15FC for allocation to SDRM Fund for the period 2021-26 is depicted in **Table 4.2,** along with the share of the sub-categories. Assuming an annual increase of 5%, the 15FC recommended a total corpus of Rs. 1,60,153 Crores for states and UTs for DM for the period 2021-26, of which the share is Rs. 1,22,601 Crores of the Government of India and Rs. 37,552 Crores of the states and UTs.

State Disaster Mitigation Fund –

The SDM Fund made available for *mitigation* activities through the recommendation of the 15FC is sufficient to train the government system in the state or UT to focus on mitigation. Once systems and procedures are in place, more funds can be sought. The current split of funds is 20:80 in favor of response activities. As *mitigation* efforts begin to succeed, the allocation for *response* related activities will reduce.

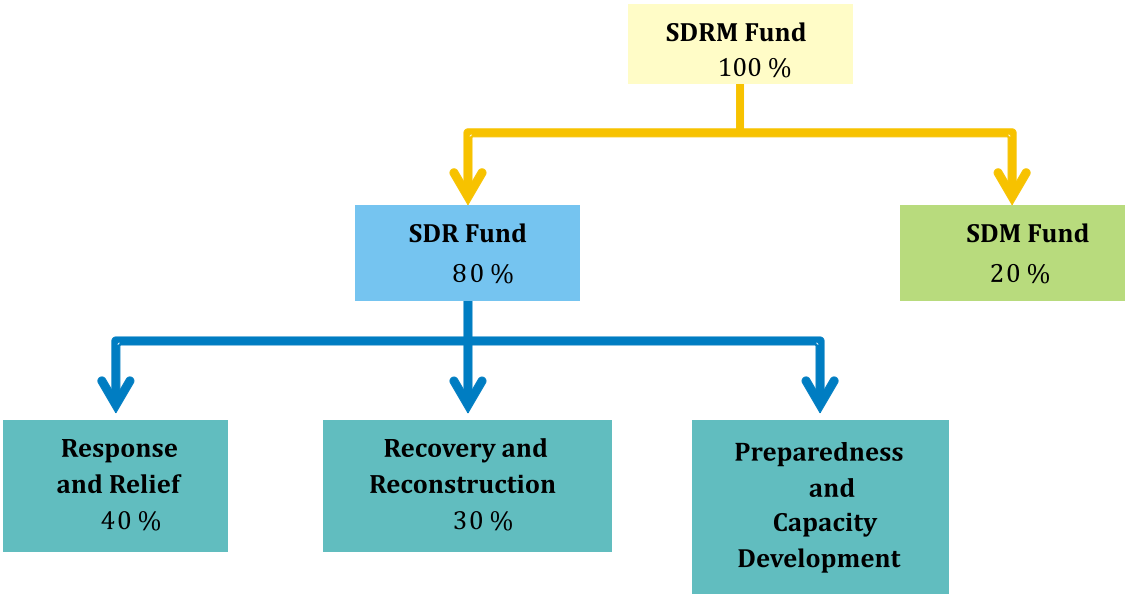


Figure 4.2: Proposed utilization of the allocation to the state or UT

Table 4.2: Recommendation of 15FC for State Disaster Risk Management Fund (SDRMF) for the period 2021-26

	Share	Recommended Allocation (Rs. Crores)
State Disaster Mitigation Fund	**20%**	**32,031**
State Disaster Response Fund	**80%**	**1,28,122**
(a) Rescue and Relief	40%	64,061
(b) Rehabilitation	30%	48,046
(c) Preparedness & Capacity Building	10%	16,015
Total	**100%**	**1,60,153**

State Disaster Response Fund –

As per the NDMP 2019, the SDR Fund should be used only for meeting the expenditure for providing immediate relief to the victims of cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst, pest attack, frost and cold wave. The state-specific disasters within the local context in the state or UT, which are not included in the notified list of disasters eligible for assistance from SDRF and NDRF, can be met from SDR Fund within the limit of 10% of the annual funds allocation of the SDR Fund. Also, it is the primary responsibility of the state or UT to undertake rescue, relief and rehabilitation measures in the event of a disaster. At times, the efforts of the states and UTs need to be supplemented with central assistance. For instance, in the event of a calamity of a severe nature, where the requirements of funds for relief operations is beyond the funds available in the SDR Fund account, additional central assistance is provided from NDR Fund, after following the laid down procedure.

4.3.2 Statutory Provisions

The national documents (the DM Act, 2005, the NPDM 2009 and the NDMP 2019) have discussed financial matters. A brief of the same is presented here.

(a) Financing Prevention, Mitigation and Preparedness

The provisions relating to funding for prevention, mitigation and preparedness as per DM Act, 2005, are shown in **Table 4.3.** And, some of the statutory provisions in the DM Act, 2005, for mainstreaming DM and financing thereof are presented in **Table 4.4.**

Table 4.3: Broad financial provisions in DM Act, 2005

S.No.	Section of DM Act, 2005	Authority responsible	Financing Activities
1	6 (g)	NDMA	Mitigation
2	18 (2) (f)	SDMA	Mitigation & Preparedness
3	35 (2) (c)	Government of India (GoI)	Prevention, Mitigation, Capacity Building and Preparedness
4	36 (e)	Ministries and Departments of GoI	
5	38 (2) (d)	State Government or UT Administration	
6	39 (c)	Departments of State Governments or UT Administrations	

(b) Allocation by Ministries and Departments

In Section 49, the DM Act, 2005, provides for allocation of funds by Ministries and Departments of the government of India. It states that:

(1) Section 49: Every ministry or department of the government of India shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programs set out in its disaster management plan.

(2) Section 49 (1): The provision shall, mutatis, mutandis, apply to departments of the government of states and administrations of UTs.

4.3.3 Financial Aspects in Implementation of DM

The three important mechanisms for funding the DM related schemes and projects in India are:

(1) Public Funded Schemes,

(2) Flexi funds as part of Centrally Sponsored Schemes (CSSs), and

(3) Externally Aided Projects.

Table 4.4: Financial provisions in DM Act, 2005, to mainstream DM

S.No.	Section of DM Act, 2005	Authority responsible
1	6 (2) (i)	NDMA
2	18 (2) (g)	SDMA
3	22(2) (b)	SEC
4	23 (4) (b)	SDMA
5	23 (4) (c)	SDMA
6	23 (4) (d)	SDMA
7	30 (2) (iv)	DDMA
8	30 (2) (xiii)	DDMA
9	30 (2) (xiv)	DDMA
10	31 (3) (b)	DDMA
11	32 (a)	DDMA
12	35 (2) (b)	Government of India (GoI)
13	37 (1) (a)	Ministries and Departments of GoI
14	38 (2) (e)	State Government or UT Administration
15	38 (2) (f)	State Government or UT Administration
16	39 (b)	Departments of State Government
17	40 (1) (a) (ii)	All departments of State Government or UT Administration

(a) Public Funded Schemes

The primary mechanism for funding DM related schemes and projects in India are through public funded schemes at national, state and UT levels. Nodal ministries of the government of India play a key role in DM as far as specific disasters are concerned. These nodal ministries and other ministries and departments have dedicated schemes, aimed at disaster *prevention, mitigation,* preparedness and reconstruction within their particular domain. Examples include the schemes of:

(1) The MHA for strengthening of fire and emergency service, and financial assistance to ATIs, SIRDs and other Training Institutions for DM,

(2) Integrated coastal zone management program of MoEFCC,

(3) Flood management and flood forecasting programs of MoJS,

(4) Disaster management support program of *Department of Space* (DoS),

(5) A project on tsunami and storm surge warning system of MoES, and

(6) World Bank funded national cyclone risk mitigation project of NDMA, which encompasses cyclone forecasting tracking and warning systems, capacity building and structural measures.

(b) Flexi-funds as part of Centrally Sponsored Schemes (CSSs)

As per the 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 17 August 2016). As per paragraph 6 of the said OM, flexi-funds available in each CSS has been revised to 25% of the overall annual allocation under each scheme for states and 30% for UTs. The flexi-fund component within the CSS can be used to:

(1) Provide flexibility to states to meet local needs and requirements within the overall objective of any scheme at the sub-head level;

(2) Pilot innovation to improve efficiency within the overall objective of any given scheme at the sub-head level; and

(3) Undertake mitigation and restoration activities in case of natural calamities, or to satisfy local requirements in areas affected by internal security disturbances.

The utilization of flexi-funds for mitigation or restoration activities in the event of natural calamity must be in accordance with the broad objectives of the CSS. It is possible to combine flexi-fund component across schemes within the same sector, but the flexi-funds of a CSS in a particular sector, cannot be diverted to fund activities and schemes in another sector.

(c) Externally Aided Projects

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

4.3.4 Utilization of State Disaster Management Funds

(MHA-UNDP Report: Annexure II (page 259) Matrix A Items A2.1 & A2.7, and Matrix B Item B2.2)

Even 10% of the budget is an opportunity for each state to begin DM activities, by:

(a) Putting in place systems and processes towards ensuring mitigation and preparedness activities;

(b) Training its personnel to internalize initiatives needed for DM in ongoing activities; and

(c) Developing long-term mitigation and preparedness plans for DM.

But, based on a landmark recommendation of the 15th Finance Commission, the Government of India set-up mitigation funds at both national and state levels in the form of a *National Disaster Mitigation Fund (NDMF)* and State Disaster Mitigation Funds (SDMFs) [15FC, 2020]. This new methodology combines capacity (through past expenditure), risk exposure (through Area and Population) and proneness to hazard and vulnerability (through Disaster Risk Index). For the Financial Year 2020-21, the Rs.5,797 Crore for NDMF in the States' Corpus, especially for launching Mitigation activities. This precious fund needs a judicious expenditure plan. It should be used primarily for the Vital Measures. Only in the extreme case, when funds are available in a year after meeting the Vital Measures, should the fund be used for the Essential Measures. But, in general, the grants available from the Centrally Sponsored Schemes should be considered for implementing the Essential and Desirable Measures.

Besides, most departments/ministries of the government of India and the departments of states and UTs should be made to set a priority to undertake DM activities before those that do not have DM implications. For instance, the *ministry of Environment and Forests* can take up afforestation projects at such locations that will help mitigate disasters, say in such flood plains where the velocity of raging waters can be dampened, or in coastal areas where the speeds of the winds can be lowered with suitable tree shields. Similar compliance can be mandated in respect of important ministries and departments of the government of India and the states/UTS such as water resources, energy, surface transport, health, housing, Science and Technology, and Earth Sciences, (in respect of the government of India alone).

(a) State Disaster Mitigation Fund

The state or UT should:

(1) Create *SDM Fund* to meet the requirement arising from:
   (a) Mitigation activities spelt out in the State DM Plan, and
   (b) Likely additional requirements during the current year on account of anticipated disasters.

Each department should earmark for the amount (plan and non-plan) required for the measures spelt out in the SDMP.

(2) Prepare the fund requirement of each department/departments concerned, and submit to the Principal Secretary, Secretary or In-charge of Disaster Management, who will first place it before SDMA for prioritization and addition/alterations.

(3) Examine and revise, if required, the proposal from SDMA by discussion between the Secretary (Revenue), Secretary (Planning) and Secretary (Finance), and submit the finalized proposal to the Chief Secretary.

(4) Do due diligence, submit the final proposal to the state government or UT administration through the Principal Secretary, Secretary or In-charge of Disaster Management, get it approved by the Chief Minister or Lt. Governor for inclusion in the state budget, and place it before the state cabinet for approval.

(5) Prepare the incremental proposals of each Department/ Departments concerned for annual additional requirements under SDM Fund, and submit to the Commissioner (DM)/Secretary (Revenue), who will first place it before SDMA for prioritization and addition/alterations.

(6) Examine and revise, if required, the proposal from SDMA by discussion between the Secretary (Revenue), Secretary (Planning) and Secretary (Finance), and submit the finalized proposal to the Chief Secretary.

(7) Do due diligence, submit the final proposal to the State government through the Principal Secretary, Secretary or In-charge of Disaster Management, get it approved by the Chief Minister for inclusion in the state budget, and place it before the State Cabinet for approval.

(8) Allocate separate annual provision for DM activities, for each department, in the State Budget. It should be a frozen section not susceptible to the process of reallocation of balance funds at time of preparing the revised budget estimates. Adjustments should not be permitted within and across Major, Minor and Sub-Heads of budget allocation, to any allocation made to DM activities, which are done normally.

(9) All financial allocation made to DM activities should have overriding importance, i.e., implying that:
   (a) The said allocation should be compulsorily spent (and fully) in each department and also in the overall budget; and
   (b) Fund release should be made only if past projects have incorporated all requirements of Disaster Resilience in *existing structures* and *new constructions.*

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Planning, and Finance

(b) State Disaster Response Fund

The state or UT should:

(1) Create *SDR Fund* to meet the requirement arising from:

(a) *Response activities* spelt out in the State DM Plan, and

(b) Likely *additional* requirements during the current year on account of anticipated disasters.

Each department should earmark for the amount *(plan and non-plan)* required for the measures spelt out in the SDMP.

(2) Prepare the fund requirement of each department/departments concerned, and submit to the *Principal Secretary, Secretary or In-charge of Disaster Management,* who will first place it before SDMA for prioritization and addition/alterations.

(3) Examine and revise, if required, the proposal from *SDMA* by discussion between the *Secretary (Revenue), Secretary (Planning)* and *Secretary (Finance),* and submit the finalized proposal to the *Chief Secretary.*

(4) Do due diligence, submit the final proposal to the state government or UT administration through the *Principal Secretary, Secretary or In-charge of Disaster Management,* get it approved by the *Chief Minister* or *Lt. Governor* for inclusion in the *state budget,* and place it before the *state cabinet* for approval.

(5) Prepare the incremental proposals of each Department/ Departments concerned for annual additional requirements under *SDR Fund,* and submit to the *Commissioner (DM)/Secretary (Revenue),* who will first place it before SDMA for prioritization and addition/alterations.

(6) Examine and revise, if required, the proposal from *SDMA* by discussion between the *Secretary (Revenue), Secretary (Planning)* and *Secretary (Finance),* and submit the finalized proposal to the *Chief Secretary.*

(7) Do due diligence, submit the final proposal to the *State government* through the *Principal Secretary, Secretary* or *In-charge of Disaster Management,* get it approved by the *Chief Minister* for inclusion in the *state budget,* and place it before the *State Cabinet* for approval.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Planning and Finance

4.3.5 Risk Transfer and Insurance

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B2.3 and Matrix C Item 4.4.3)

As of now, the Government of India is acting as a self-insurer for the purpose of maintaining relief funds, namely the NDR Fund and SDR Fund. The funds are monitored by MHA in consultation with the Ministry of Finance. The amount committed for SDR Fund is invested by the government of India in securities. MHA has issued guidelines in consultation with the Ministry of Finance for the maintenance and encashment of the securities as and when required. Also, the need for projects or risk transfer instruments by private agencies is acknowledged by the government. The corresponding policy changes and fund requirement needs to be deliberated in detail in consultation with the IRDA, insurance sector and other stakeholders. A culture of buying insurance should be brought in. There is a need to develop appropriate risk transfer instruments in collaboration with insurance companies and financial institutions.

For example, a model for developing insurance scheme in case of earthquake disaster could be to:

(1) Prepare a plan to popularize earthquake risk insurance;

(2) Promote insurance as a step towards providing adequate compensation for loss of property caused by disasters;

(3) Conduct awareness programs among general public about housing insurance and life insurance;

(4) Introduce new government insurance scheme for property;

(5) Devise suitable incentives, like low premiums for disaster resistant housing and life insurance for those living in them;

(6) Build awareness among public about insuring homes & properties, and encourage them to buy such insurance; and

(7) Review and revise the plans as needed.

And, a model for developing insurance scheme in case of drought disasters could be to:

(1) Ensure credit to farmers on easy terms in drought affected areas;

(2) Improve access to banking and financial services to farmers on priority basis in drought prone areas;

(3) Ensure credit to farmers on easy terms in drought affected areas;

(4) Support FPO formation in drought affected areas for better financial access;

(5) Inculcate the habit of using insurance as a drought mitigation measure;

(6) Provide marketing and price support in drought affected areas; and

(7) Ensure subsidized inputs for drought affected farmers.

4.3.6 Other Fund

The Corporate Social Responsibility Funds (CSR Funds) are another source for funding DM activities in the state or UT. Point viii, Schedule VII, Section 135 (1) of the Company Act, 2013, admits expenditure towards contribution to the:

(1) The Prime Minister's National Relief Fund, and

(2) Any other fund set up by the government of India for socio-economic development and relief and welfare of the scheduled castes, the scheduled tribes, other backward classes, minorities and women.

The states and UTs can consider receiving grants as part of item (2) above, and use them towards strengthening DM initiatives in the state or UT.

4.3.7 Mitigation Projects

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items 2.2, 3.3, 3.4 and 3.5, and Matrix C Item C4.4.4)

Comprehensively ensuring the structural safety of the built environment is yet unattended to. Two actions are needed in this regard, namely: (a) Ensuring that all new structures are disaster-resilient, and (b) Beginning to retrofit the existing deficient constructions, especially the critical and lifelines structures to begin with. Systems and processes are needed to be established towards this end; local governments need to prepare renewed building permit systems in villages and towns. The flagship program of the Government of India, namely the National Cyclone Risk Mitigation Project, has demonstrated the gains of taking such long-term mitigation initiatives.

As per the Census of 2011, India has ~30.5 Crore houses [BMTPC, 2017]. Of this ~29.4 Crore are made of masonry (largely non-engineered and self-built) and 1.1 crore are made of reinforced concrete (RC, which are claimed to be engineered). The hazard resistance of these houses needs to be ensured. For instance, with ~78% of India living in seismic zones III, IV and V, and ~80% of these houses under the threat earthquake shaking, the safety is in the question of ~100 Crore people of India, because both masonry and RC structures did not perform well in the past earthquakes in India. Relevant methodologies need to be developed for hazard safety assessments and techniques for strengthening of these houses. But, this is resource and time intensive. Overall, these are critical inputs to any rational assessment of the risk to which the people of India are put to.

Similarly, schools hold the next generation of the community, and hospitals and civic infrastructure (transportation, telecommunication, water, food, etc.) are needed to be functional when disasters strike. These structures should be robust enough to have no distress to remain functional after disasters. Considering the

general plight of the disaster resistance of the built environment across the country, these structures should be assessed and retrofitted as the topmost priority of the nation.

Many measures that prevent disasters (especially from the standpoint of loss of life) usually lack economic or political appeal. Still, the DM should embrace such an agenda boldly. For instance:

(a) Constructing cyclone refuge structures may not appeal either to those looking for returns or to those short-sighted seeking quick political mileage, but these do save lives;

(b) Undertaking peer review of structural safety of new structures proposed to be built may seem to be difficult a task for municipal offices, and therefore draw little political traction. Nevertheless, to save people's lives, this is a must-take elective;

(c) Constructing balancing reservoirs, which will help: (i) move the extra precipitation from certain catchments areas to these balancing reservoirs, (ii) reduce large discharge arising from the opening of the gates when HFL is reached in the said catchments, and thereby (iii) mitigate the flood disasters; and

(d) Prioritizing the maintenance of old existing structures vis-à-vis the construction of new structures. States have a fixed amount each year. In the anxiety to showcase development (motivated by prospective political mileage), new constructions have been winning the favor over maintaining and/or retrofitting the existing assets. For example, re-laying the concrete lining of canals, de-silting of tanks and dams, and earthquake retrofitting of buildings (especially those related to critical and lifeline services) go a long way in reducing future disasters, over-promoting new constructions with the available fixed annual grants.

The SDMP and NDMA Guidelines on various disasters form the basis for the *formulation of plans for mitigation projects* at the state and district levels. Hence, the state or UT should:

(1) Identify mitigation projects for implementation;

(2) Undertake *prioritization of built environment, hazard assessment, exposure assessment* and risk assessment as suggested in Chapter 2;

(3) Plan the retrofit projects in a phased manner:

  (a) Prepare a time-bound action plan for carrying out the required retrofit of the top priority and *high risk* structures identified in Chapter 2;

  (b) Use the Mitigation Funds to implement the above, as suggested above.

(4) Estimate the funds required and get the funds sanctioned for the *specific assets* and *infrastructure* that are likely to be affected and needed after the disaster (e.g., roads, drainages, bridges and water tanks).

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Planning, *Finance and other concerned departments*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Planning, *Finance and other concerned departments*

Commissioners of ULBs
Secretaries of PRIs

(a) Critical Social and Economic Infrastructure

It is of utmost importance that critical infrastructure is monitored continually for safety standards in consonance with worldwide safety benchmarks and strengthened, where deficient. The standards for construction of critical

infrastructure that ensure their post-disaster safety, should be adopted by the departments and statutory bodies concerned. Ensuring disaster resilience of critical infrastructure is part of the DpDMPs.

Hence, the state or UT should seek to monitor maintenance of the existing infrastructure (related to energy, power, water resources (like Dams), roads, railways, airports, waterways, telecommunications, and health services) in coordination with NDMA and the respective national department or ministry concerned, namely the Ministry of New Renewable Energy, Ministry of Power, Ministry of Jal Shakti, Ministry of Railways, Airports Authority of India, Ministry of Road Transport and Highways, Ministry of Ports, Shipping and Waterways, Ministry of Electronics and IT, Ministry of Health and Family Welfare, and other facilities of central government establishments.

Responsibilities

Representatives of NDMA and of Departments concerned/ministries of GoI

Principal Secretary, Secretary or In-charge of Disaster Management
Secretaries of departments of Energy, *Road Development, Water Resources, and other concerned departments*

(b) Environmentally Sustainable Development and Climate Change Adaptation

Environmental considerations in developmental efforts are essential for ensuring sustainability. This is part of the SDMP. Towards this end, the state or UT should:

(1) Convene a meeting of the following:

(a) Chair : Chief Secretary
(b) Secretary : Secretary, SDMA
(c) Members : Commissioner (DM) &/or Secretary (Rev.)
Secretaries of Environment and
Departments concerned, including Rural Development, Water Resource Department,
Representatives of NDMA (GoI),
Representative of MoEFCC (GoI)

(2) Monitor the implementation of the State DM Plan with regard to Environmentally Sustainable Development and Climate Change.

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

Also, the state or UT should:

(1) Study impact of climate change impacts on natural resources, and share outcomes of the studies,

(2) Build capacities of departments involved in water and soil conservation, and

(3) Incorporate climate change impacts in water and soil conservation programs.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Agriculture, Animal Husbandry, Forests, Irrigation & CAD, Panchayati Raj and Rural Development*

State Agriculture University

4.4 Operational Arrangements

The success of DM operations lies in the people involved therein. The involvement of the stakeholders should be total and committed *from well before, during* and *after* the negative fall out, when a *hazard* is realized.

4.4.1 Mainstreaming Disaster Management

Mainstreaming will happen only when all stakeholders are engaged in thought, speech and action in DM activities, including *decision makers, administrators, key officials, subject specialists, generalists,* and *communities.* And, the SDMP and the DDMPs bind them all into the one thought of DM. Significant experience exists in some states (like Bihar, Gujarat and Odisha) in this subject; the same may be referred to.

(a) State DM Plans

The NDMA *Guidelines on Preparation of State DM Plans,* the NPDM and the *State DM Policy* (if available) provide guiding principles and essentials of DM. If the state or UT has the SDMP, then the same should be adopted in the coordination, operational, technical, financial and legal aspects at various levels of the process of DM. And, if the SDMP is not in place or if it is not comprehensive enough, then it is time to prepare one based on the guidance provided in the NDMA *Guidelines on Preparation of State DM Plans,* and in the DM Act, 2005, the DPDM and the NDMP.

(b) District DM Plans

The DDMPs are the granular versions of SDMP at the district level. They have fine details, which form the basis for decision-making at the implementation level. Hence, DM Plans should be prepared for each of the *districts, municipal corporations,* municipalities and panchayats. The process of preparation of these DM Plans requires the personal involvement of all the key stakeholders, and the process of review of these DM Plans requires the personal attention of all stakeholders in the jurisdiction of the district, municipal corporation, municipality or panchayat for which the document is being prepared. This human engagement is crucial in the mainstreaming of DM. Some states have prepared DDMPs (like DDMP of West Champaran and Madhubani Districts in Bihar), which can provide valuable inputs.

4.4.2 Participatory Approach

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items B3.8, B3.11 and B3.17, and Matrix C Items C1.5.6, C1.5.7, C2.5.6, C2.5.7, C3.5.6, C3.5.7, C4.5.4, C7.4, C7.5 and C7.6)

DM is a positive movement by stakeholders in an organized and efficient manner, which adapts dynamically to the changing realities at the field level – from both the demand and capacity standpoints. The primary steps to build this multi-stakeholder multi-level movement are presented hereunder.

(a) Communities

This is part of the State DM Plan, the relevant section of which is in line with NDMA Guidelines on the subject. Community participation should be adopted in the planning and implementation of DM plans, and during response, rescue and relief operations after disasters. While at it, it should be borne in mind that 'Community' is a set of habitats, livelihoods and social constructs.

The state or UT should:

(1) Formulate a strategy for communities to manage and cope with disaster events;

(2) Develop a template for preparation of community-based DM plans;

(3) Impart training in lines with the DM template to NGOs, self-help groups, CBOs, youth organizations, women's groups, volunteer agencies, Civil Defence, Home Guards, etc., who volunteer their services for preparing DM Plans;

(4) Work with these agencies to understand and plan their roles during the DM cycle;

(5) Conduct village level meetings for DM Plan preparation;

(6) Carry out response and relief activities through community volunteers;

(7) Organize preparedness drills for testing of DM plans;

(8) Update earthquake DM plans based on the learning from preparedness drills; and

(9) Review and revise the strategy as needed.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of departments of *Education, Fire & Emergency Services, Police, Public Works (R&B), Electricity, Water Supply, Irrigation, Municipal Administration and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Education, Fire & Emergency Services, Police, Public Works (R&B), Electricity, Water Supply, Irrigation, Municipal Administration and Panchayati Raj*
State Administrative Training Institute

Private Agencies
Individuals

(b) Elected Representatives and Political Parties

Sensitization of Elected Representatives and Political Parties, with a suitable message, is vital step in DM. In this regard, the state or UT should:

(1) Prepare message to be communicated to sensitize the elected representatives and workers of political parties, on:
   (a) The potential likely losses in disasters through graphical projection of Disaster Scenarios;
   (b) The advantages of Mitigation and Preparedness activities, especially the importance of ensuring all new developments of the built environment are disaster resilient; and
   (c) The need to formulate and implement DM Plans at all levels in the State.

(2) Get the material vetted at the highest level of the Government by the Chief Secretary to the Government.

(3) Communicate the DM-related message prepared above to the Elected Representatives and Political Parties:
   (a) Chief Secretary should address the State level leaders, and
   (b) District Collector, District Magistrate or Deputy Commissioner (Revenue) should address the District level leaders.

(4) Involve the elected representatives and political leaders in the DM planning process and include them in the DM committees.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(c) Women, marginalized, transgenders and persons with disabilities

In all aspects of DM at the State, District and Local levels, it is critical to empower women, marginalized and persons with disabilities. Therefore, *inclusiveness* and *accessibility* should be adopted of the State DM Plan, which is prepared based on an equitable and gender sensitive approach.

The state or UT should:

(1) Develop a gender-sensitive plan for capacity development on DM aspects;
(2) Build and upgrade training facilities that are disability- and gender-sensitive;
(3) Conduct resource mapping and understand the gaps in inclusive response and risks for persons with disabilities;
(4) Ensure compulsory equitable representation of all vulnerable groups in all participatory process of DM planning, by including specific needs of women, marginalized, transgenders and differently-abled persons;
(5) Train women, marginalized, transgenders and persons with disabilities to address their vulnerabilities;
(6) Impart training on DM to all categories of persons with inclusive approach;
(7) Make emergency information and early warning systems accessible to people with hearing and visual impairments;
(8) Understand the barriers of *Persons with Disabilities* and gender-based needs, when designing evacuation homes or temporary shelters;
(9) Encourage Insurance companies to provide coverage for assets or loss of disability devices and fast track its replacement;
(10) Enhance public awareness of all post-earthquake construction, in accordance with accessibility needs of or addressing the needs of physically handicapped and mentally challenged people, women and the elderly;
(11) Establish an inclusive grievance redressal mechanism;
(12) Develop training modules for persons with disabilities and for Institutions catering to them;
(13) Design for officers engaged in DM capacity development programs on Disability and Gender inclusive DM; and
(14) Review and revise the strategies as needed.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Education, Social Justice and Empowerment, Women and Child Development, Fire & Emergency Services, Police, Public Works (R&B), Electricity, Director, SDRF*
Water Supply and Irrigation

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Education, Social Justice and Empowerment, Women and Child Development, Fire & Emergency Services, Police, Public Works (R&B), Electricity, Water Supply and Irrigation*

State Administrative Training Institute

(d) PRIs and ULBs

The Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs) together regulate the DM activities in the state or UT. Thus, their role in DM is critical.

The state or UT should:

(1) Seek PRIs and ULBs to prepare their road map for sustainable development of the built environment, and thereby for DM in the state or UT,

(2) Empower PRIs and ULBs with statutory power to regulate the built environment (including levying penalties on violators),

(3) Ensure that PRIs and ULBs update the Land Use Zoning Maps, Development Control Regulations, and Building Bye-Laws, and

(4) Engage with PRIs and ULBs in the process of Licensing of Engineers and Certification of Artisans in the state or UT, and

(5) Provide feedback to the government departments of the state or UT and the private stakeholders on good practices of design and construction of buildings and structures.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Urban Development and Panchayti Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(e) Non-Government Organizations

Each NGO comes with a certain competence or specialization. And, DM requires a spectrum of competences. Therefore, it is in the interest of the state or UT to have a dialog with NGOs who have been engaged in the past with the state or UT, and potential NGOs who are interested in serving the cause of DM in the state or UT.

The state or UT should:

(1) Prepare a directory of the NGOs interested in participating in DM in the state or UT, along with their competence,

(2) Dialog with each NGO and understand their strengths and limitations,

(3) Group together NGOs with similar competence, and identify their roles without any conflict,

(4) Establish a NGO Coordination Center to build synergy between the activities of the various NGOs before, during and after the negative fallout of a hazard, and

(5) Enable the NGOs to effectively undertake the intended and planned activities.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(f) Community-based Organizations

CBOs are the backbone of effective DM. They have been engaged in a number of areas (like building construction, water resource creation, panchayat raj initiatives, capacity building activities, poverty elevation, and DM). They plan and rehearse preparedness activities, mobilize community engagement in DM, and implement response activities in the immediate aftermath of disasters. Their role is crucial.

The state or UT should:

(1) Provide them the needed assistance to organize themselves to undertake various DM activities,

(2) Identify the various groups and their domains of work,

(3) Arrange training of these groups on the finer aspects of their engagement in DM, especially recovery.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(g) Grievance Redress Mechanism

A sound grievance redress mechanism is necessary in all departments and agencies involved in DM, to take positive suggestions and constructive feedback from the stakeholders. It will provide opportunities to the aggrieved persons to share their negative experiences towards improving the SDMP.

The state or UT should:

(1) Maintain ready reference data on disasters and compensations paid during the past 5 years in the state or UT,

(2) Develop a data bank on grievances filed,

(3) Review and improve the grievance redressal system,

(4) Initiate a control room for grievances, and

(5) Establish monitoring and transparency mechanisms.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(h) Recognition of Contributions of People and Organizations

Encouragements and enticements for the heroes involved in DM are critical to increasing the participants in the DM continuum. DM Awards at District and State Levels are one way of recognizing the contributors to DM in the state or UT.

The state or UT should recognize proactive efforts at the district and state levels of individuals and organizations within the government and non-government sectors in the following domains:

(a) Mitigation : Development of Built Environment
(b) Preparedness : Community Engagement and IEC
(c) Response : DM Communications and Service
(d) Prevention : Neighborhood Watch

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

4.4.3 Capacity Development

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items B3.8, B3.11, B3.14, B3.16, B3.17, B8.4, B8.7 and B8.8, and Matrix C Items C1.5.1, C1.5.2, C1.5.3, C1.5.6, C1.5.7, C2.5.1, C2.5.2, C2.5.3, C2.5.6, C2.5.7, C3.5.1, C3.5.2, C3.5.3, C3.5.5, C3.5.6, C3.5.7, C4.5.1, C4.5.2, C4.5.3, C4.5.4, C7.4, C7.5 and C7.6)

Competent human beings are the need of the hour in DM in India. And, competence in human beings arises out of a complex combination of their positive attitude, useful skills and sufficient knowledge. Currently, the nation has very few persons in each subject (either in each hazard or in each cross-cutting theme), who are available for DM with a sense of service to the nation. Protecting 132 Crores of people in various themes cannot happen with such limited human resources; no extra outlay of financial resources and availability of time can make up for this acute shortage. Grooming more persons, who have the requisite competence in the various facets of DM, is the only *(and one-way*) street for India today···

Mobilizing the manpower to undertake all DM activities is a massive human resource mobilization and development effort. Generally, the performance of an organization is as good as its **technical** *competence* (including regular levels of training and hands-on experience) of the people who drive the process of achieving the objectives for which it is intended. The primacy of the role played by human resource development in the management of disasters at various levels in the country can be hardly over-emphasized. The resourcefulness of

individuals is the best resource India can have! For instance, the technical subject specialists need to clarify that there is no flood-resistant construction (any construction below high water level cannot save lives), and the administrators need to follow up by ensuring that no dwelling, industry, or critical or lifeline structure is built in flood plains.

Having said this, it is necessary also to ensure that a pool of **administrative-**cum-legal-cum-financial expertise fuels the engine of DM apparatuses at various levels – with subject matter specialists bringing in specialized skills in niche areas and generalists (including the civil administrations, local self-government bodies, and community-based organizations), adding the value of their experience and wisdom to the efforts entrusted to the DM authorities. Needless to say that such expertise can be either in the domain of public administration or from the corporate sector, apart from that available with scientific and technical and academic institutions. In this context, authorities at all levels should be wary of *biting off more than they can chew or chewing more than what they can swallow.*

The state or UT should:

(1) Follow the guiding principles and essentials of DM given in the *NDMA Guidelines on Preparation of SDMPs,* the *NPDM* and the *State DM Policy* (where available) for the coordination of operational, technical, financial and legal aspects at various levels of the process of DM;

(2) Engage with the best technical institutes across the country to build technical competence in the state or UT, and address the technical matters that the state or UT is faced with; and

(3) Establish a *State Institute of DM (SIDM)* at the state or UT, in line with NIDM at the national level, which has the ability and freedom to access the market and source non-technical talent; and

(4) Ensure diligently the flow of human resources needed in the DM activities through SIDM, through the conduit of *SDMA-SIDM-Department Nodal Officer;* the Department Nodal Officer may be enabled with some skeletal staff support to keep the human resource pipeline active.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of all Departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(a) Curriculum Development

Inclusion of formal DM curriculum of school and college education will inculcate *skill-based training*, *psychological resilience* and *leadership qualities* in the citizens. The role of *Bharat Scouts & Guides* and *NCC* is critical in this regard. Hence, the state or UT should:

(1) Introduce the elements of DM in all schools of the state or UT, at the appropriate level as being done by CBSE on the matter.

(2) Introduce the elements of DM in all Universities of the state or UT, which are appropriately designed for the profession as part of compulsory education, even if they are of non-credit option, in accordance with the NDMP.

(a) **Essential content** integrated in the primary curriculum for competence development in Medical, Engineering and Architecture degree programs,

(b) **Common minimum contents** as audit courses for general awareness in all other degree programs (including Accountancy, Agriculture, Animal Husbandry, Diary, Fisheries, Horticulture, and Law),

(3) Introduce the elements of DM in all induction, basic and in-service capacity development and training programs conducted by all Departments using government funds.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of Departments of School Education

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

Technical Training Institutes

DM related aspects should be embedded in the undergraduate curriculum of all **bachelor degree programs** in the state or UT. This will promote general education and awareness related to DM. In this regard, the *state* or *UT* should:

(1) Prepare a plan to introduce DM as an optional subject in the undergraduate degree programs in universities and colleges of the state or UT;

(2) Constitute *State Level Committee* for *Curriculum Development;*

(3) Design the syllabus providing *holistic understanding of DM* and inculcating skill-based training, psychological resilience, and qualities of leadership;

(4) Offer short courses in *teacher development programs* to train teachers from colleges and universities identified to teach the DM course;

(5) Introduce DM as subject in *undergraduate degree programs* in State universities and colleges;

(6) Encourage measures (like DM clubs) in colleges to promote volunteerism among students for humanitarian response, and to prepare DM plans at local level; and

(7) Review and revise the strategy for introducing DM in *undergraduate degree programs.*

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)
National Institute of Disaster Management (NIDM)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Education, and Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Education, and Health*

State Administrative Training Institute
State Council for Education, Research and Training
Technical Universities and Institutes engaged in teaching DM subjects

Further, subject specialists are needed at the all levels (and of different types of competence) in each Hazard (floods, cyclones, earthquakes, landslides, etc.) and in each cross-cutting theme (health, education, search & rescue, GIS, etc.). Technical Institutes (such as Architecture Colleges and National Institutes Technology) should include disaster resistant technologies as a mandatory undergraduate curriculum. Only when this is done, the graduates from these Colleges and Institutes will be internalize Disaster Resistant Technologies. The seriousness of the mattes is more pointed in earthquake safety, where only 7 government engineering colleges of Gujarat of the over 3,000 colleges of Civil Engineering and 470 of Architecture had earthquake-resistant design as mandatory part of the curriculum. Unfortunately, even this was discontinued in 2016, and today no college teaches the subject as part of the mandatory curriculum. Also, the subject of DM is interdisciplinary and non-traditional, because it involves a significant focus on operational and practical aspects of leaning while doing, besides using analytical tools and undertaking planning exercises. This would require suitable encouragement for cooperation between subject specialists of different disciplines; this does in no way seek the same person to acquire knowledge in diverse fields. In this regard, the state or UT should:

(1) Review the academic curriculum of ***engineering, architecture and earth science degree programs,*** and incorporate disaster safety aspects; especially upgrade curricula of courses to include resilient construction technologies and practices:

   (a) Constitute a Committee of technical experts with representation from reputed national institutes (like IITs, NITs, and SPAs), leading universities and training institutions, together with the academicians from architecture and engineering colleges in the state or UT; and

   (b) Review the present curriculum for architecture and engineering courses – UG and PG level with respect to disaster-resistant designs and construction practices;

(2) Identify resource persons as Master Trainers for Faculty Members of teaching and other institutions, and impart the training of ToT Programs;

(3) Design the new modules including the multi-faceted aspects of FM covering the pre- and post-disaster situations, the inculcation of a culture of prevention, mitigation and preparedness as well as effective and prompt response, relief, rehabilitation and recovery and case histories – merged with existing courses, as new modules in existing courses, or as stand-alone new course(s) for promoting disaster resilient design and construction;

(4) Prepare and implement a plan for curriculum revision of the degree programs;

(5) Develop high-quality education materials, textbooks to impart theoretical training and field trainings to teachers on the newly introduced modules of FM and disaster resilient practices;

(6) Assess the effectiveness of education modules on students of the newly imparted design and construction skills through internships;

(7) Prepare a plan for and undertake periodic review and revision of the academic curricula every three years;

(8) Review and continually strengthen the capacity of the Faculty Members, who are teaching the subjects related to disaster resistant design and construction practices, especially both theory and practice in line with the newly introduced modules of landslide resistant design and construction practices; and

(9) Assess the effectiveness of education modules on students of the newly introduced design and construction skills through internships.

Responsibilities

Ministry of Home Affairs
- *National Disaster Management Authority (NDMA)*
- *National Institute of Disaster Management (NIDM)*

Ministry of Education
- *All India Council for Technical Education (AICTE)*
- *Council of Architecture (CoA)*

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Higher Education, Technical Education, and Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Higher Education, Technical Education, and Health*

While trauma is part of the current medical and nursing degree programs, select aspects of DM, namely the basics of disaster management, medical preparedness, mass casualty and psycho-social trauma, should be included in the undergraduate curriculum of all **medical and nursing degree programs** in the *state* or *UT*. This will prepare the medical graduates with the needed sensibilities and skills to face disasters effectively. In this regard, the state or UT should:

(1) Review curriculum of **professional medical courses** and integrate DM (including medical preparedness) to address hazards that the state or UT is faced with, into the curriculum of professional health workers.

(2) Devise a plan for including medical preparedness, mass casualty and psycho-social trauma as part of curriculum of medical and nursing degree programs, through training of Faculty Members and relevant hospital management staff;

(3) Development of training modules for comprehensive training of doctors and nurses on matters related to disasters (which includes aspects such as trauma care, epidemic control, emergency medical care by paramedics and emergency medical technicians, and telemedicine) and for comprehensive training of professionals to address sudden surge of patients during disasters;

(4) Implement the training of trainers and develop guidelines for medical emergency preparedness;

(5) Seek approval of the new curriculum from the DM authorities and the *Medical Council of India,* and of the process of testing and certification of trainees;

(6) Utilize the support of these trained professionals for preparing and updating the medical preparedness plans of major health facilities of the state or UT;

(7) Introduce a 5-year cycle for updating the curriculum, and quality improvement program for teachers and professionals engaged in teaching the subjects related to DM; and

(8) Review and revise the strategy as needed for effective implementation of DM aspects in medical and nursing degree programs.

Responsibilities

Ministry of Home Affairs
- *National Disaster Management Authority (NDMA)*
- *National Institute of Disaster Management (NIDM)*

Ministry of Education
- *All India Council for Technical Education (AICTE)*
- *Council of Architecture (CoA)*

Ministry of Health and Family Planning
- *Medical Council of India (MCI)*

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Higher Education, and Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Higher Education, and Health*

Introducing DM in the **veterinary and agriculture degree programs** is essential. In this regard, the state or UT should:

(1) Review the curriculum of *veterinary* and *agriculture* degree programs, and incorporate aspects related to preparedness and medical attention needed to be given to animals during disasters, including those arising from droughts;

(2) Build capacities in graduates through DM-sensitive curriculum and training; and

(3) Develop DM interest groups and networks across *veterinary* and *agriculture* educational institutions.

Further, there is a large number of technical persons in different departments of the State or UT. Curriculum development should be undertaken for the training modules on development of infrastructure. This should be the basis for the induction, basic and in-service capacity development programs being conducted by all departments through their own training institutes for which governments provide funds.

Responsibilities

Ministry of Home Affairs
- *National Disaster Management Authority (NDMA)*
- *National Disaster Response Force (NDRF)*
- *National Institute of Disaster Management (NIDM)*

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Agriculture, Animal Husbandry, Education, Health, Urban Development, Panchayati Raj and Rural Development*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Agriculture, Animal Husbandry, Education, Health, Urban Development, Panchayati Raj and Rural Development*

State Agriculture Universities
State Veterinary Colleges
State Administrative Training Institute
State Council for Education, Research and Training

Private Agencies

(b) Training of Personnel of Government, PRIs and ULBs, and of Staff of Private Institutions and Organizations

Generalists are required to skillfully and efficiently maneuver through and juggle with the limited resources (people, time and money) to conduct the various DM activities. This pool of subject specialists and generalists need to occupy the DM spaces in:

(a) Communities, cities and towns DM offices to work with municipalities and departments,

(b) DDMAs to work with district departments,

(c) SDMAs to work with state departments, and

(d) NDMA to work with, ministries and departments.

Also, an even larger number of competent persons are required in various private and government industries and businesses.

The state or UT should:

(1) Train all officers and staff of the SDMA and DDMAs on the six pillars of DM, namely *Prevention, Mitigation, Preparedness, Response, Rehabilitation* and *Reconstruction,* for developing a culture of proactive and prompt action before, during and after disasters, especially by:

   (a) *Identifying Departments,* PRIs and ULBs that need technical human resources to steer development of disaster resistant built environment, e.g., departments of *water supply, irrigation, fire services, public works (roads and buildings), electricity, police, municipal administration, and Panchayati Raj;*

   (b) *Identifying subject domains* in which the Departments need to build both *Technical* and *Non-Technical* Human Resources of required level of competence and number;

   (c) *Preparing an annual training schedule* and detail the existing *Technical* and Non-Technical Human Resources for training in the pointed subjects;

   (d) Deputing existing human resources for training and capacity development in the pointed subjects at the reputed national institutes, which can provide the training to develop *Technical* and *Non-Technical* competence *(i.e., positive attitude, required skills and sufficient knowledge);* and

   (e) *Undertaking Training of Trainers of the government staff* at the above Institutes towards continually training its existing non-technical human resources within the state or UT;

(2) Build competence in SDRFs to handle *Search and Rescue (SAR) Operations in the State (in line with the NDRF at the national level), especially by:*

   (a) Liaising with NDMA to seek assistance of NDRF to provide training to existing human resources of SDRF, which are established at the state or UT and district levels, parallel to the NDRF at the national level, with similar terms of reference and composition, but with competencies specific to the needs of the state or UT, and which have SAR as one of the tasks;

   (b) Creating annual calendars for Familiarization Exercises (FAMEX) to be conducted by SDRF across the state or UT;

(c) Conducting FAMEX across state or UT as per a calendar;

(d) Preparing a list of the competencies needed to undertake as SAR, e.g., basics of structural analysis, structural design & construction, and methods of identifying and accessing persons under the fallen debris of buildings and structures; and

(e) Identifying the Departments that will engage in the SAR, like Fire & Emergency Services; Public Works (Roads and Buildings), Electricity, Water Supply, Irrigation, Police, Municipal Administration, and Panchayati Raj.

(3) Sensitize all stakeholders and key government officials with simulations of likely impending disasters through preparation of disaster scenarios, to help them understand the magnitude of the possible disaster;

(4) Organize periodically preparedness drills or mock disaster exercises to test the effectiveness of the DM Plan on ground and the evacuation plan:

(a) Prepare an SOP and an annual calendar for conducting Disaster Preparedness Drills at the State level,

(b) Identify an agency or NGO with experience in DM to support activities in various sectors

(c) Interact with the key stakeholder departments to understand their present capacities to handle a disaster, existing emergency resources and personnel,

(d) Prepare a disaster scenario and present it to the key government officials during the mock drill,

(e) Test the effectiveness of DM plans of each department to handle the improvised situation,

(f) Examine the Medical plan for handling mass casualties, sufficiency of health workers, hospital beds, evacuation centers, triage, uninterrupted water and power, to keep the hospital functional during a disaster,

(g) Debrief experiences for improved planning and preparedness during future disasters,

(h) Prepare annual calendar for disaster preparedness of all departments,

(i) Execute mock drills periodically as per the plan, and

(j) Review and revise the SOP and the annual mock drills calendar, as needed.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of all departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments

Commissioners of ULBs
Secretaries of PRIs
State Administrative Training Institute

The above training of government staff is best achieved by undertaking national level flagship programs of the Government of India. Fortunately, the NIDM has conceived such a national training program of all officers and staff of governments of states and administrations of UTs on **non-technical aspects** (under the banner of *NIDM Outreach Program*) with the intent to:

(1) Build capacities in states and UTs by hosting a spectrum of training programs, and

(2) Create a bridge for training between the states and UTs with NIDM, to meet the continued needs of training and capacity building.

It is hoped that similar national level flagship programs will be hosted by the Government of India, in the **technical aspects** related to development of disasters-resistant buildings and structures in the built environment. The technical person in various departments and bodies of the government can benefit immensely from such a program.

In this regard, the state or UT should:

(1) Establish the *State Institute of Disaster Management (SIDM)*, in line with the NIDM at the national level;

(2) Nominate appropriate officers to attend the national level training and capacity building programs organized by NIDM;

(3) Host at SIDM all trainings at state or UT level on various *non-technica*l and *technical* subjects with support from NIDM, especially on the content and resource materials for the training programs;

(4) Customize training contents of the NDIM programs, to meet the needs of the state or UT, and organize training programs through SIDM on various non-technical subjects, including veterinary professionals and farmers;

(5) Train local communities;

(6) Maintain and upgrade the standards of training, by:
   (a) Adopting standards for training established by NIDM,
   (b) Employing only competent and certified trainers in all training organized by SIDM; and
   (c) Ensuring that the said trainers impart the training as per the plan laid down by the state or UT; and
   (d) Upgrade the capacities of local institutions and bodies;

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of all departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments

Commissioners of ULBs
Secretaries of PRIs
State Administrative Training Institute

NGOs and CBOs

(c) Awareness generation of the public institutions and of institutions outside the purview of government

Awareness generation is one of the critical steps to be undertaken from the early days of DM, and it should be repeated periodically. Through awareness generation, the stakeholders are made aware of the risks they are faced with and of the actions to be taken by each of them at different instances. This is a nuanced subject. The messaging to different stakeholders should be graded, because each stakeholder group is sensitive and critical to only certain aspect of DM.

The state or UT should:

(1) Undertake disaster-specific *mass media campaigns* customized to the sensibilities of the region to sensitize all stakeholders to prevalent disaster risks educate about their roles, and train them to participate in disaster preparedness and mitigation efforts, by:

(a) Developing a strategy for organize *mass media awareness* campaigns (including through social media) on *mitigation, preparedness* and *response* using visual and print media;

(b) Preparing handbooks on disaster safety for the general public highlighting the *personal safety* and *preparedness* (when indoors, outdoors, or while driving), *structural safety* and *protection of architectural elements, utilities and contents of buildings,* using booklets, short films, radio-based awareness programs and jingles, TV shows, and other IEC means (like display on electronic boards, handouts, and exhibitions on different disaster themes);

(c) Customize all *information, education and communication (IEC)* material to meet the local needs and translate into local language for greater outreach; the services of the ATIs of the state or UT may be used for preparing these IEC materials;

(d) Preparing short *films and radio jingles* (utilizing services of NGOs) for general public to better understand the hazard, vulnerability and risk, and the preparedness and mitigation measures;

(e) Preparing the DM plans of the PRIs and ULBs with the support of NGOs, volunteer groups and ATIs;

(f) Focusing the campaign to enhance community preparedness through family preparedness;

(g) Organizing mock drills and rehearsals;

(h) Undertaking disaster preparedness drives aimed at specific target groups, like school children, medical fraternity, coastal community, differently-abled and other vulnerable sections of the society of the state;

(i) Creating annual plans for campaigns commemorating past disasters of the state or UT, especially on special days such as *International Day for DM* every year on 13 October;

(j) Engaging mass media for one-way and two-way communications, rumour control, seeking donations and volunteer management; and

(k) Reviewing the strategy for *Mass Media Awareness campaigns* and revise, if required;

(l) Organize radio and TV shows, skill-based competition programs in schools and public gatherings, group discussion and quizzes related to disaster awareness (involving live participation and interaction of the target audience group);

(m) Create public awareness on the need to keep safety and emergency kits containing medicines, torch, identity cards, ration card, important documents and non-perishable eatables (such as dry fruits, roasted nuts) ready before commencement of monsoon so that, they can carry the same with them, before evacuation.

(n) Relay TV shows during the primetime, having a sequence of episodes, depicting a story on disaster awareness and intersperse with a few bravery stories, related to disaster mitigation and response;

(o) Motivate media companies to expand and launch awareness generation programs as a part of their CSR;

(p) Undertake disaster safety drives aimed at specific target groups (like schoolchildren, medical fraternity, coastal community, differently-abled and other such vulnerable sections of society specific to each state).

(2) Promote a *culture of DM, mitigation* and *preparedness,* by:

(a) Sensitizing the community on the importance of adopting earthquake resistant features in the construction of residential buildings;

(b) Preparing a plan to promote culture of DM, mitigation and preparedness;

(c) Preparing and publishing a disaster safety manual emphasizing disaster-resistant techniques required in new buildings;

(d) Utilizing the services of knowledge institutes (like IITs and NITs) for endorsing the importance of prevention and mitigation measures;

(e) Seeking the support of NGOs, volunteer groups and ATIs to prepare the DM Plans of local bodies;

(f) Using print and electronic media to promote widely the mass awareness campaigns on earthquake disaster mitigation;

(g) Collaborating with professional bodies of engineers, architects and urban planners, and organizing programs to sensitize their members on the importance of undertaking disaster-resistant design and construction practices;

(h) Addressing the disaster safety of critical and lifeline buildings (like hospitals and schools);

(i) Improving emergency medical preparedness and emergency medical response as per the *NDMA Guidelines* on the subject;

(j) Creating demonstrative videos of fastening non-structural falling hazards, such as shelves, cupboards and water tanks;

(k) Formulating medical preparedness plan for all hazards with focus on likely injuries, likely impacts of the health delivery system;

(l) Advertising notices and documents related to preparedness against all hazards and hazard alerts to publish in government / SDMA website;

(m) Developing acceptance among the public on the new construction techniques and structural measures for enhanced safety through practical demonstration campaigns and interactions with artisans including masons, bar benders, carpenters, plumbers and electricians; and

(n) Reviewing strategies and revise, as needed.

(3) Seek attitudinal change in people through awareness campaigns by utilizing the *print, electronic and social media* to propagate in communities the importance of disaster mitigation and preparedness measures, by:

(a) Preparing a strategy to promote positive attitude and behavior change through awareness campaigns and IEC;

(b) Highlighting the roles and responsibilities of communities and all stakeholders to mitigate risk;

(c) Organizing awareness programs for specific target groups of stakeholders on various aspects of disaster management, including elected representatives, civil servants, department officials, local administration authorities, members of management boards of educational institutions and hospitals, corporate sector, and media;

(d) Involving students and youth to campaign for adopting non-structural safety measures (like prevention of falling hazards at home and schools);

(e) Preparing evacuations plans and emergency kits, and display in public places;

(f) Conducting preparedness drills/ table-top exercises in hospital to assess disaster preparedness and for better planning;

(g) Propagating disaster resistant design and construction to be important for all new construction - buildings and apartments;

(h) Reviewing strategy to promote positive attitude and behavior change, and revise, as needed, to cater to changing circumstances that influence attitudes; and

(i) Reviewing strategy to promote positive attitude and behavior change, and revise, as needed.

(4) Use *Community Radio* as an effective means to send the messages of DM and public safety, by:

(a) Preparing a strategy to use Community Radio as a means for promoting DM aspects in rural areas;

(b) Preparing short and informative audio for stakeholders – family, local authority, medical staff and construction community, informing the importance of disaster preparedness;

(c) Inviting DM experts to share with the listeners in local language their experiences in facing disasters;

(d) Conducting talk shows involving students and school authorities about DM plans they prepared at their schools;

(e) Commemorating special days to promote disaster safety measures for disaster mitigation;

(f) Creating radio jingles highlighting the importance of disaster risk management (especially mitigation measures), family preparedness and housing insurance;

(g) Propagating the importance of DM through radio skits and plays;

(h) Conducting radio interviews with field experts to share their learning with focus disaster-resistant infrastructure, good construction practices and optimum use of local resources; and

(i) Reviewing the strategy and revise, as needed.

(5) Engage with *civil society organizations* involved in DM awareness generation, by:

(a) Coordinating and networking with the agencies, like CBOs, NGOs and Government Department;

(b) Preparing a plan to develop and strengthen a civil society network to improve awareness generation on landslide DM;

(c) Creating a network of stakeholders to enable appropriate awareness campaigns, and seek their support to create awareness generation at Local, District and state or UT levels, where the stakeholders may include governments, academics, scientific and technical institutions, elected representatives, government officials, media professionals, town/urban planners in hilly regions, infrastructure development companies, engineers, architects, and builders, NGOs, private volunteers, ATIs, social activists, social scientists, school teachers, school children, and other CBOs;

(d) Holding monthly coordination meetings with the civil society organization;

(e) Scheduling special meetings prior to rainy seasons and other seasonal times, when other disasters are likely to occur;

(f) Focusing the campaign to enhance community preparedness through family preparedness and utilization of improvised disaster rescue devices with household articles;

(g) Seeking the support this network to organize jointly awareness campaigns, update DMPs, etc.;

(h) Disseminating any relevant information or disaster alerts to the network groups, which are to play a key role in information dissemination and awareness generation;

(i) Collaborating with professional bodies of engineers, architects and urban planners, initiate programs to sensitize their members on the importance of undertaking disaster-resistant design and construction practices;

(j) Rehearse manpower, equipment and money needs with the stakeholders;

(k) Generating awareness on the need for strengthening techno-legal network among all stakeholders;

(l) Undertake documentation to cover all aspects of early warning, communication, design and maintenance, successful actions/ failures and the results thereof, covering search and rescue, evacuation, management of flood shelters, food and water supply, restoration of essential services, public health issues, management of traffic and all other activities;

(m) Recalling lessons learnt from post-disaster reconnaissance surveys conducted by experts and officials from concerned scientific, technical, administrative departments, NGOs;

(n) Analyzing of experiences of DM to discuss the success and failure stories or shortcomings to enable better planning and preparedness for future events;

(o) Creating a pool of key persons from this network to take leadership role in case of a landslide disaster; and

(p) Reviewing strategies and revise them, as needed.

Responsibilities

Ministry/Department of Earth Sciences
India Meteorological Department
Ministry/Department of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)
National Institute of Disaster Management (NIDM)
Ministry/Department of Information and Broadcasting
Ministry/Department of Jal Shakti
Central Water Commission

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of all departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments

Commissioners of ULBs
Secretaries of PRIs
State Administrative Training Institute

Civil Defence
NGOs and CBOs
Press Clubs, and Electronic Media
Amateur Radio Operators

(d) Vocational Training and Skill Development

The up-gradation of the skills of artisans is another crucial part of the capacity building process. The state or UT should:

(1) Review the ongoing skill development programs, and understand the level of skill development being achieved and the scale of the operations; and

(2) Strengthen the existing skill development programs of the state or UT to incorporate DM related skills

Also, there are other professional groups, such as paramedics, social workers, plumbers, sanitary fitters and safety auditors, who play an important role in community-based DM. The state or UT should:

(1) Device suitable training programs to skill these professional groups; and

(2) Organize *Continuing Education Programs* for employed, self-employed or free-lance workers towards periodic upgrade of needed DM skills.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Skill Development*
Heads of Government Employment Generation Schemes

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Skill Development*
State Administrative Training Institute

(e) Documentation

Documentation remains a glaring weakness in the extant DM system at all levels in the country. It is granted that the visits undertaken too close to the occurrence of a disaster would amount to interference with the rescue and relief operations. But, those visits that happen much later will fail to connect with the reality on account of the efflux of time having erased most of the perishable (or erasable) evidence at the grassroots level.

Post-disaster reconnaissance surveys (PDRS) are valuable in documenting perishable lessons from each disaster. The post-disaster reconnaissance survey teams (PDRTs) should consist of multi-institutional and multi-disciplinary teams for carrying out post-disaster field investigations, document the lessons learnt and disseminate the same. Countries with advanced DM practices have been capitalizing on the inputs received from professionally experienced and competent teams of subject specialists that conducted such surveys. The lessons spread over issues of governance, community engagement, and the built environment. In this PDCA cycle, this exercise takes the center space of "CHECK" and becomes the input to ACT. India should embrace this process and strengthen the DM Policy, Plan, Guidelines, and Implementation.

Timing is crucial in deploying the survey teams to the field – too early can hinder the emergency activities underway, and too late will mean losing the perishable lessons. In today's times, technology should be leveraged effectively. For example, use of Helicopters & UAVs for broad-brush surveys over large areas and of Drones for focused documentation of details in local areas have proved to be effective strategies in many countries.

The state or UT should:

(1) Encourage disaster resilient constructions based on documentation of lessons learnt from disasters, by:
   (a) Constituting PDRTs related to each disaster with competent professionals in appropriate subject domains;
   (b) Developing standardized methodologies for PDRS with the engagement of for documenting different aspects post-disaster scenarios;
   (c) Training members of the PDRTs on the documentation process;
   (d) Involving the multidisciplinary PDRTs for conducting field investigations after disasters and documenting perishable lessons learnt from them;
   (e) Reviewing the methodology for vulnerability assessment of the built environment based on lessons learnt from different disasters, and assist in preparing suitable and new technologies, as required;
   (f) Engage the trained PDRTs to conduct field visits in disaster-prone areas before the events, assess vulnerability qualitatively of the built environment (as per established procedures and forms), and suggesting mitigation measures and activities;
   (g) Preparing safety manuals and other documents, towards inculcating disaster safety in various stakeholders, and providing guidance to local professionals and community on the preparatory measures for disaster mitigation; and
   (h) Training and disseminating the lessons from disasters.

(2) Utilize pre-trained PDRTs to impart training to new PDRTs on PDRS methodology, by:

(a) Creating multi-disciplinary teams in every district especially in disaster-prone areas;

(b) Constituting new PDRTs including technical staff of various institutions involved in vulnerability assessment of the built environment and disaster mitigation activities;

(c) Imparting hands-on training to new PDRTs on the methodology for assessing disasters and documenting perishable lessons based on field investigation after the events;

(d) Revising the PDRS methodology based on each field investigation after the events, as required; and

(e) Enhancing the expertise and capacities of knowledge centers in different institutions of the country for dependable and timely technical investigations; and for scientific, speedy and effective implementation of mitigation measures.

(3) Document as case studies lessons learnt from recent experiences of disasters, especially:

(a) Good practices to strengthen the resilience of communities; and

(b) Involvement of common man and communities in making disasters everyone's business; special campaign is necessary through newsletters and magazines.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of all departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments
Commissioners of ULBs
Secretaries of PRIs
State Administrative Training Institute

(f) Dissemination (IEC)

In the ladder of learning (namely reading, memorizing, thinking and lecturing), the efficiency of learning is most in the fourth phase, namely when we share the lessons learnt with others. Furthermore, sharing the lessons with others is most efficiently done through detailed documentation, in addition to orally sharing with others. Furthermore, of the lessons learnt, the ones learnt from failures have a lasting impact on human minds. Hence, those should be shared particularly with stakeholders engaged in DM.

Clearly, the authorities at various levels from the national to the local will need to be equipped with books of instructions/manuals in which what is needed from them is clearly stated. Dissemination should be bullish, continuous, and from all levels. There are various forms in which the dissemination can happen. Some of these are:

(1) Websites of NDMA, SDMAs, DDMAs and City DMAs, on which all documents are uploaded systematically with search engines and filters to assist;

(2) Annual Conferences on DM organized in a staggered way at the City, District, State and eventually at the National level; and

(3) Video documentation of advantages of undertaking Mitigation measures, e.g., retrofitting of the built environment for earthquake safety.

The state or UT should prepare IEC material for disaster preparedness and mitigation measures through ATIs and knowledge institutions in the state or UT. In particular, the state or UT should:

(1) Prepare a Standard Operating Procedure for documenting and disseminating lessons from past disasters;

(2) Create a knowledge sharing portal for documenting past experiences of disasters, lessons learnt and other relevant data;

(3) Publish available disaster guidelines in relevant government websites (such as NDMA, SDMAs and DDMAs) in English and local language;

(4) Promote a section of website of SDMAs for knowledge sharing documentation on DM and create a data repository for state or UT specific disaster risk information;

(5) Engage with the Civil Society network to reach out to public;

(6) Develop mobile applications and games for awareness generation as part of IEC;

(7) Utilize social media to promote disaster awareness linking to the knowledge sharing portal;

(8) Update the knowledge sharing portal, which is a repository and a clearing house of all DM information regularly;

(9) Introduce disaster-specific 'Safety Weeks,' like earthquake, flood, road, fire, cyclone, and landslides Safety Weeks to reach out to masses through PRIs, ULBs, CSOs, schools, colleges, etc.; and

(10) Review and revise the SOP, as needed.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of all departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments

Civil Defence
State Administrative Training Institute

4.4.4 Partnerships

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items B3.8, B3.12 and B3.13, and Matrix C Items C1.4.4, C2.4.4, C3.4.4 and C6.18)

DM is a major effort where the entire population of the country needs to be engaged. Such a gigantic task will require every individual, entity, body, organization or company to strengthen the DM effort. The role in the DM process of at least a few agencies should be formalized, and engagements of the governments with them should begin well before the disasters strike.

(a) Public-Private Partnership and Corporate Social Responsibility

The SDMP articulates the need for SDMA to network with the corporate entities to strengthen and formalize their role in the DM process for ensuring safety of the communities. These entities should be given the opportunity to participate in any one of the six verticals of the DM cycle. In this regard, the state or UT should:

(1) Provide a space for private sector companies, NGOs and CBOs to play a formal role in DM, such that the

government benefits from the operational flexibility and financial freedom of the private sector, thereby ensuring therein DM in the state or UT, by:

(a) Constituting a forum for frequent interactions between the government and the private sector companies;

(b) Encouraging public and private companies to undertake *model projects* on DM at the local, district or state levels;

(c) Develop appropriate mechanism to receive and optimally utilize assistance from public and private companies,

(d) Maintain, update, strengthen and continue information database (from different central and state government ministries, departments, agencies and organizations) of companies that can be engaged during emergencies in the event of any disaster, and update regularly the designated officials of those companies;

(e) Involving the corporate sector to be an essential part of the DM plan of all ULBs and PRIs during the immediate **aftermath of disasters,** like:

  (1) Make available services and resources to the government;

  (2) Provide hospitals, power and telecommunication, as available;

  (3) Mobilize relief supplies, search and rescue equipment, transport and logistics for movement of relief supplies to the extent possible; and

  (4) Provide technical services for restoration and reconstruction of damaged infrastructure.

(f) Involving the corporate sector to be an essential part of the DM plan of all PRIs and ULBs during the immediate **before events,** like:

  (1) Develop a comprehensive inventory of resources for emergency response to document all available resources, e.g., India Disaster Response Network (IDRN), initially developed and supported by private sector and later enhanced and maintained by NIC; and

  (2) Develop capacity to conduct disaster safety evaluation and strengthening of existing privately owned structures;

(g) Organizing public events, and involving relevant government, private and community organizations in the planning of large critical projects;

(h) Mapping and enlisting the potential private agencies and stakeholders, who can support the government in the disaster resilient constructions;

(i) Posing targets and timeframes, and establishing indicators and monitoring mechanisms to facilitate consolidation of efforts across sectors to enhance disaster resilience;

(j) Facilitating the involvement of private sector in DM and disaster safety aspects by:

  (1) Ensuring technical support (where needed),

  (2) Make efforts to encourage all stakeholders to manage risk to their own assets, and

  (3) Risk-informed investment in development initiatives;

(k) Providing support to private agencies to develop their capacity to conduct disaster safety evaluation and strengthening of existing privately-owned structures;

(l) Promoting mechanisms and incentives necessary to ensure high levels of compliance with the safety-enhancing retrofitting measures, through sectoral laws and regulations (including those addressing land use, urban planning, building codes, environment, resource management, health and safety standards), and updating them, where needed, for improved DM;

(m) Providing incentives and disincentives to PRIs and ULBs with respect to the central assistance when implementing building rules and regulations effectively in the state or UT; and

(n) Introducing policy incentives for the private sector to share mitigation and recovery costs.

(2) Establish inter-agency coordination and mechanisms to ensure involvement of private agencies, communities and individuals in the complete DM cycle, by:

(1) Establishing and strengthening government coordination forums composed of both government and private stakeholders at the state, district and local levels; and

(2) Utilizing these forums for DM planning and overseeing mitigation and preparedness efforts.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Law

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Law
Commissioners of ULBs
Secretaries of PRIs

NGOs
Private agencies and institutions

(b) Media Partnership

The media plays a critical role in information and knowledge dissemination in all phases of DM. The versatile potential of both electronic and print media should be utilized. Effective partnership with the media should be worked out in the field of community awareness, early warning and dissemination, and education regarding various disasters. The SDMP provides guidance in this regard, and the same should be followed. Also, the NDMA Guidelines on *National Disaster Management Information and Communication System* may be referred to for finer details.

The state or UT should:

(1) Appoint a *Nodal Officer* for disseminating information about an actual or potential disaster to media and public, by:

(a) Preparing a media management strategy for transparent and authentic information dissemination;

(b) Identifying a senior government official from the department related to the potential or actual disaster event as Nodal Officer for interacting with media on behalf of the Government;

(c) Collecting, processing and disseminating information on the disaster situation to all stakeholders so as to facilitate response and relief operation;

(d) Updating information on the disaster and disaster victims;

(e) Maintaining contacts with mass media to publish correct information in an authorized public forum or press conference;

(f) Informing public regarding the impact of the disaster, its extent and the measures taken for the welfare of the affected people;

(g) Voluntarily disclosing data and information to help prevent the media houses from inventing their own data and news stories;

(h) Deciding on a user friendly and simple online platform to capture and collate real time data and implement the same through experienced developer team (a mobile app may be created for this purpose); and

(i) Reviewing and revising the media strategy based on the latest technology developments in mass communication;

(2) Develop and follow ethical guidelines for disaster coverage by media as per accepted global standards, by:

(a) Developing guidelines on the modalities of information sharing to the public;

(b) Base on global standards the coverage by media of any disaster or likely event;

(c) Respecting the dignity and privacy of the affected communities and individuals;

(d) Working with media to adopt the guidelines through self-regulation as well as oversight by relevant regulatory institutions;

(e) Establishing mechanisms for broadcasting warnings, do's and don'ts to media and public *before* (if applicable), *during* and *after* the disasters;

(f) Provide authentic and updated information on behalf of the Government, through the Nodal Officer;

(g) Publishing the information shared with the media by the Nodal Officer in public domain in the websites of the related department, SDMA and State Government or UT Administration;

(h) Regulating the use of social media for sharing warnings, and alerts to the public; and

(i) Reviewing and revising the media guidelines as required.

(3) Establish a periodicity for media interaction and information release, by:

(a) Fixing a proper schedule for media briefing (once, twice or thrice daily depending on the severity of the disaster) by the Nodal Officer;

(b) Addressing questions from media on behalf of the Government;

(c) Documenting media interactions to be done and stored;

(d) Using media as a means of public awareness to share *Information-Education-Communication* contents and make disasters everyone's business, especially through popular magazines and newsletters;

(e) Developing an online repository of released information for official documentation and enabling the tracking of the event after many years;

(f) Sharing lessons learnt from past experiences to enrich the knowledge of future generations; and

(g) Incorporating latest technologies in media management for scheduling and information sharing with the public.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Information and Public Relations, and other relevant departments*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Information and Public Relations, and other relevant departments*
District Emergency Operations Centers (DEOC)

4.4.5 Cross-Cutting Themes

(MHA-UNDP Report: Annexure II (page 259) Matrix A Item A2.10, Matrix B Item B3.6 and Matrix C Items C3.3.2, C3.3.3, C6.7, C6.8 and C6.16)

There are numerous cross-cutting themes in DM, which are relevant to many disasters. The MHA-UNDP report refers to select few of them; the same are discussed here.

(a) Medical Preparedness and Mass Casualty Management

This is part of the State DM Plan, the relevant section of which is in line with NDMA Guidelines on Medical Preparedness and Mass Casualty Management.

(b) Minimum Standards of Relief

The NDMA Guidelines on Minimum Standards of Relief provide guidance to establish the minimum standards of relief. The state or UT should:

(1) Adopt the NDMA Guidelines on the subject;

(2) Propose Draft Guidelines for the state or UT based on the NDMA Guidelines with appropriate modifications to suit the conditions existing in the State; and

(3) Accord approval of revised guidelines.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

(c) Communications

Communications and IT support is part of the SDMP, especially the part related to the establishment and functioning of the State EOC. The SDMP especially emphasizes the establishment and functioning of the State EOC.

The state or UT should:

(1) Develop fail-safe telecommunication plan at state, district and local levels for smooth and timely warning, by:

- (a) Weeding out outdated telecommunication facilities, procuring & functionalizing new facilities, and guaranteeing sources of power supply for the same;
- (b) Developing resource inventory of telecommunication equipment available at district and local levels, and place them on disaster resource network;
- (c) Estimating the requirement of supervision, maintenance, replacement, repair and transportation needed for the maintenance of telecommunication facilities;
- (d) Designing for networking of inter-organization telecommunications facilities of the Police, SDRF, Armed Forces, and Irrigation Department, etc.;
- (e) Establishing new telecommunication facilities, wherever needed especially for disaster response;
- (f) Arranging a mobile van with complete telecommunication equipment and appropriate personnel for immediate deployment near the affected areas, if required; and
- (g) Installing and using an effective telecommunication system at the EOC, along with the web-based online Decision Support System (DSS), and connecting the same with district, sub-division, tehsil and block level IRTs for support.

(2) Develop a comprehensive telecommunication systems preparedness plan to smoothly coordinate DM, especially response, at various levels, by:

(a) Working closely with the Logistics Section of the State Incident Response System (SIRS) to ensure telecommunication system is in place;

(b) Developing Incident Communication Plan (ICP);

(c) Assigning the role of Communication Leader to work under the direction of logistics section in post-disaster situation;

(d) Maintaining records of all telecommunications equipment deployed in the field;

(e) Preparing alternative communication plan for execution in case of possible failure of the normal telecommunications network; this alternative communications network may have to be wireless, satellite phones, cell phones, HAM radios, etc.;

(f) Establishing telecommunication facilities in the required locations, i.e., staging area, relief camps, shelters, warehousing areas, destination points, and incident base;

(g) Developing a mechanism to constantly review the Communication Plan to meet the changing requirements of the situation;

(h) Assessing the requirement and plan for dedicated back-up sources to operate various telecommunication facilities;

(i) Pre-agreeing with local vendors and suppliers for ensuring alternate power sources (e.g., batteries, generators and fuel) for telecommunication equipment at short notice; and

(j) Designating one station as an emergency public communication system; locate it in an hazard-resistant building, and provide robust emergency power backup and adequate fuel and supplies; and

(3) Streamline existing telecommunications network to meet requirements of emergencies, by:

(a) Designing suitable interoperable and compatible network between various agencies; this network is vital for integrating strengths of agencies like NDRF and Armed Forces;

(b) Signing a Memorandum of Understanding (MoU) with the central agencies and telecommunication service providers to restore the communication facilities in case of failure;

(c) Preparing a plan for integration of the telecommunications set up of the central teams (NDRF, Armed Forces) with the local telecommunications set up for the management of large scale disasters;

(d) Planning for quick and easy linking of existing independent networks of all the different line departments of the State Governments; and

(e) Working closely with the electricity department to avoid interruption to telecommunication facilities in case of power failure.

(4) Ensuring the needed communications are in place to provide Eartly Warning (when available) to all stakeholders.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority
National Disaster Response Force
Ministry of Telecommunications

State Executive Committee (SEC)
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of all departments
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of all departments
District Emergency Operations Centers (DEOC)

(d) Information Technology

Today, the information technology is all pervasive. One needs to take advantage of this facility, in improving accuracy of decision-making and pacing up implementation of DM activities. One instance of capitalizing on IT is mentioned hereunder.

The state or UT should:

(1) Collect and process the *information* in predefined formats to ensure *uniformity in reporting,* extract *knowledge,* bring contextual clarity in *decision-making,* and improve monitoring and evaluation towards overall improvement in DM activities, by:

(a) Designing dedicated formats for data collection, *e.g.,* assignment of tasks list, communication plan, medical plan, unit logs, and check list of emergency supplies;

(b) Maintaining proper records of all the essential services needed for rescue, response and relief phases as required by the State Government or UT Administration, and the government of India;

(c) Establishing a sound reporting mechanism to meet the information needs of both the state government or UT administration, and the government of India about the disaster response;

(d) Creating an office at the district level (preferably as part of *District Emergency Operations Center (DEOC))* as a place with dedicated resources to collect/update data on all essential services (as per the template given in the *NDMA Guidelines on Incident Response System*);

(e) Imparting training to the various teams on the survey and data recording formats in the respective sections (like planning and logistics);

(f) Collecting and collating information in standard forms, and deriving useful information from it using suitable evaluation tools;

(g) Presenting the information derived using simple charts, tables or even pictures to enable easier understanding by decision-makers;

(h) Developing a centralized DM portal integrating the functions of all the sections of the IRS through a user-friendly dashboard; and

(i) Imparting training to the staff of the key departments, who are coordinating the IRS activities, to login into this portal and populate the data and information of their department; and

(2) Disseminate information on the response mechanism and future alerts towards improving preparedness and saving lives & resources, by:

(a) Engaging a representative of SDMA to work with the planning section of the state or UT for making of *Incident Action Plan (IAP)* and disseminating information; and

(b) Creating an office at the district level (preferably as part of *DEOC*) and place dedicated resources to collect/ update data on all essential services (as per the template given in the IRS guidelines)

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** all relevant departments*
State Emergency Operations Center (SEOC)
Bureau of Economics & Statistics

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** all relevant departments*
District Emergency Operations Centers (DEOC)

(e) New Temporary Shelters

In the current approach of DM, the government compensates for the collapsed or damaged houses. So, after most disasters, the government is faced with the construction of adequate number (which is a large number) of houses. Here, identifying the suitable locations for the construction of these houses is a big task. But, often, shelters are created before these houses are built, and are called as *temporary shelters.* But, seldom are they *temporary;* they are never demolished. Also, even though, the temporary are constructed after the negative fall-out of one hazard, they should be made resistant to the effects of the other hazards also, to which the shelters in that specific site are likely to be subjected to.

The State or UT should:

(1) Pre-design of shelters and preidentification of their their locations, by:
  (a) Identifying department(s) to steer the design and construction of these disaster-resistant shelters;
  (b) Identify locations where these shelters can be constructed;
  (c) Identifying an agency that will steer evolution of customized designs for different regions;
  (d) Planning and designing shelters in consultation with the communities considering:
    (1) Functional needs of the communities,
    (2) Climatic conditions a the site,
    (3) Materials available locally,
    (4) Minimum health and hygiene standards to be ensured,
    (5) Gender, age, caste and disability factors of potential residents,
    (6) Disability-friendly constructions, and
    (7) Hazards to which that site is under the threat of;
  (e) Planning and designing basic amenities (such as drinking water, sanitation, vector control, solid waste disposal, electrical power, roads, community halls, and health facility) at or adjoining the proposed shelters at the identified locations;
  (f) Developing typical site plans for temporary shelters constructed in-situ or at re-location sites considering the following:
    (1) Internal social structure and support system are maintained;
    (2) Spaces are needed for undertaking livelihood restoration activities near temporary shelters; and
    (3) Basic civic needs, social, health and economic infrastructure, and essential services are accessible easily;
  (g) Designing typical temporary shelters considering spatial requirements, selection of materials, construction technology, and execution of shelter construction as follows:

(1) Consider local climatic conditions,

(2) Endorse existing local practices, lifestyles and cultures of the affected families, making maximum possible use of local resources to enable owner-driven process;

(3) Design in-situ temporary shelters on the owners' land in such a manner that they can be upgraded to comply with the technical norms of safe permanent housing, wherever possible; and

(4) Plan for temporary shelters of three types namely: (i) *Assemble at site-type shelter,* (ii) Construct at site-type, and (iii) Rental-type;

(h) Developing IEC material to apprise engineers, contractors, masons and house owners on appropriate standards and norms for disaster-resistant temporary shelters for use during emergency and intermediate phase before the permanent shelters are available;

(i) Preparing a shortlist of appropriate design and technology from available options for shelter construction, as per local needs, preference and resources in different regions of the state or UT; and

(j) Demonstrating and disseminating the design and technology options, in accordance with the technical guidelines set by the state or UT, to the affected communities after the disaster.

(2) Procure and provide tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials depending on the different typologies, by:

(a) Developing material banks/depots for distribution and identify local vendors;

(b) Stockpile tents, shelter kits, tarpaulins, bamboo and temporary shelter material in regional warehouses, stores and ERCs, and have tie-ups with forest depots for bamboo, timber, etc.;

(c) Procuring tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials catering to the needs of the responders;

(d) Pre-positioning and stockpiling adequate number of shelter kits at strategic locations in the state or UT for immediate distribution after disaster incident;

(e) Ensuring storage and stockpiling of tents in a dry and ventilated environment, to protect from sun, rain and vermin; this may lead to rotting of the canvas;

(f) Erecting a local team and them to receive the temporary shelter supplies;

(g) Developing coordination mechanism to seek support from relevant Central Ministry to make sure that the tents/shelters reach the site on time, depending upon the requirements;

(h) Coordinating with Indian Railways, the airline companies and other means of transport to provide effective services to the field level;

(i) Protecting warehouses and stockpile tents, shelter kits, tarpaulins, bamboo and temporary shelter materials in them, and have tie-ups with forest depots for bamboo, timber, etc.;

(j) Pre-agreeing with manufacturers and suppliers to provide tents, shelter kits, prefabricated shelters and materials (such as tarpaulins, CGI sheets, bamboo, and starting) within 24 hours of placement of order and help in transporting them;

(k) Developing Standard Operating Procedures for stockpiling materials, procurement, distribution, deployment, and assignment of roles and responsibilities considering multi-hazard and/or concurrent hazards scenarios; and

(l) Developing long-term plan for the maintenance of the shelters through community efforts;

(3) Develop appropriate and reasonable mechanisms to monitor shelter logistics, supplies and equipments for better preparedness and planning to meet the required needs, by:

(a) Developing a team for monitoring of shelter logistics manually and / or online;

(b) Maintaining logs of all material movements and details of distribution to required locations;

(c) Monitoring any undue increase in the prices of essential items or hoarding of the same that may subsequently have an adverse impact on people's shelter recovery; and

(d) Establishing material banks/depots for distribution and identify local vendors;

(e) Develop a local team involving community, local leaders, local authorities and volunteers etc. for operation and maintenance of the shelters;

(f) Compile and maintain a consolidated database of trained construction artisans such as masons, plumbers, electricians, etc. from government/private vocational training institutes, NGOs and CSR organizations;

(g) Compile and maintain a consolidated database of trained building professionals such as engineers and architects as well as building contractors from professional associations;

(h) Develop dashboard/web-portal at the state or UT level to monitor logistics facilities to keep stocks of temporary shelters, tents and other non-food items;

(i) Adopt and implement technical guidelines issued by centre;

(j) Enable the community to undertake repairs, maintenance and / or modifications on their own as and when necessary; and

(k) Develop long-term plan for the maintenance of the shelters through community efforts to make the system self-reliant.

(4) Develop local capacity in people at the local level to be able to construct hazard-resistant temporary shelters or tents of sufficient number and with basic amenities in the aftermath of disaster, based on the basic *ABCD principle,* namely:

(a) *A for Anchorage:* The shelter should be anchored well to the ground.

(b) *B for Bracing:* The walls and roof of the shelter should be diagonally braced.

(c) *C for Connections:* All connections and joineries of various building components must be tied well with each other, and be strong enough to resist natural forces.

(d) *D for Diaphragm:* Roof should act as a single plane diaphragm, and not as separately moving elements;

(5) Ensure convergence of *MGNREGA, Swachh Bharat Abhiyan* and other such schemes for constructing shelters;

(6) Prepare and implement a capacity building plan for the government personnel, engineers, contractors and masons, on development of temporary shelters; and

(7) Develop a shelter management team involving community, local leaders, authorities, volunteers, *etc.,* for operation and maintenance of the shelters.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority
Ministry of Skill Development and Entrepreneurship

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Public Works (R&B), Town & Country Planning, Urban Development, Social Welfare Skill Development, and other relevant departments*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Public Works (R&B), Town & Country Planning, Urban Development, Social Welfare Skill Development, and other relevant departments*
District Emergency Operations Centers (DEOC)

(f) Existing Structures as Temporary Shelters

Often, structures built for a specific purpose (e.g., community hall, school, anganwadi or skill development centers) are used as temporary shelters. But, delays in development of permanent shelters result in these facilities being discontinued for the community. This situation is best avoided.

The state or UT should:

(1) Identify structures that can serve as temporary shelters post-landslide, as well as will assessment the structural conditions of the existing shelters, by:

- (a) Identifying and preparing an inventory of the existing structures and buildings (schools, community halls, anganwadis, places of worship, etc.) that are disaster-resistant and can be used as temporary shelters;
- (b) Make responsible a department that will carry out the assessment of these existing structures that can be used as temporary shelters through determination of their structural safety;
- (c) Inspecting the shelters and ensure the basic amenities (such as drinking water, sanitation, medical facilities and other essential supplies), if not already present in the identified shelters;
- (d) Maintaining and confirming that the structure can be used as a temporary shelter;
- (e) Disseminating the information on a number of existing structures available with the district and local level authorities, which can be used as temporary shelters; and
- (f) Undertaking the above tasks to identify, inspect and confirm availability of shelters to protect animals, and feed them during and aftermath of a disaster event, through a community effort, to the extent possible.

Responsibilities

Department of Science and Technology
Ministry of Home Affairs
National Disaster Management Authority
Ministry of Commerce
Bureau of Indian Standards (BIS)
Ministry of Skill Development and Entrepreneurship
Ministry of Defence
Border Roads Organization (BRO)
Ministry of Housing and Urban Affairs
Building Materials and Technology Promotion Council (BMTPC)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Public Works (R&B), Town & Country Planning, Urban Development, Social Welfare Skill Development, and other relevant departments*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Public Works (R&B), Town & Country Planning, Urban Development, Social Welfare Skill Development, and other relevant departments*
District Emergency Operations Centers (DEOC)

Commissioners of ULBs
Secretaries of PRIs

(g) Cultural Heritage Sites and Precincts

The safety of heritage structures is an integral part of the SDMP. The *National Disaster Management Guidelines for Cultural Heritage Sites and Precincts* emphasizes that places of cultural significance should be safe and secure for the people that engage with them and that the heritage values they embody are conserved for future generations. It integrates the specific needs of cultural heritage in DM.

The state or UT should:

(1) Prepare a directory of competent subject specialists in the state or UT and the country, who can be resource persons to address pre- and post-disaster work related to heritage structures;

(2) Prepare a list of heritage structures of different categories in the hazard-prone areas, which are looked after by State Government or UT Administration, and included in the SDMP,

(3) Involve engineers, architects and subject specialists from *Archaeological Survey of India (ASI), Indian National Trust for Arts and Cultural Heritage (INTACH), National Center for Safety of Heritage Structures (NCSHS, IIT Madras),* department of archeology of the State Government or UT Administration, and academic and R&D institutes, to conduct studies on vulnerability assessment of the heritage structures;

(4) Prioritize the heritage structures based on the criticality of requiring interventions for hazard mitigation;

(5) Collaborate with international organizations *(like International Centre for the Study of the Preservation and Restoration of Cultural Property),* national organizations *(like National Center for Safety of Heritage Structures)* and such institutions working to promote structural safety assessment, structural strengthening and conservation of all forms of cultural heritage, to undertake training, information, research, cooperation and advocacy;

(6) Develop a road map to protect heritage structures in the state or UT;

(7) Integrate the process of addressing vulnerable heritage structures and remedial measures for them in the revised development control regulations in consultation with department of archeology of the State Government or UT Administration;

(8) Undertake survey of unprotected heritage structures to understand risks which they are posed with, and prepare a roster of training activities and drills towards building capacity at the institutional level;

(9) Streamline heritage concerns within DDMPs and build capacity at the district level;

(10) Enforce and monitor the implementation of State Archaeological Acts governing the cultural heritage sites and precincts; and

(11) Conduct environmental impact assessment (EIA) as well as heritage impact assessment (HIA) prior to the start of any infrastructure or development project.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Archaeology, Art and Culture*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of department of** Archaeology (or equivalent), Art and Culture*
District Emergency Operations Centers (DEOC)

Commissioners of ULBs
Secretaries of PRIs

NGOs allied Heritage Structures
National Center for Safety of Heritage Structures (NCSHS), IIT Madras
R&D Institutions
Universities and Institutes engaged in the study of Heritage Structures

4.5 Responsibilities

The responsibilities of the key functionaries in the State Government or UT Administration pertaining to *Risk Analysis* are presented in **Table 4.5.**

4.6 Timelines

The timeline of activities pertaining to Risk Analysis within which they need to be completed are presented in **Table 4.6.**

Table 4.5: Responsibilities of key functionaries and units of State Government or UT Administration pertaining to DM Systems and Processes

Section	Activity	Key functionaries and units of the state government or UT administration								
		CMM	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO/ S(DDMA), C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
4.1	**ADMINISTRATIVE ARRANGEMENTS**									
4.1.1	State Government	✓	✓	✓	✓	✓	✓	✓		
4.1.2	Departments of State Government		✓	✓	✓	✓				
4.1.3	State Executive Committee		✓	✓	✓	✓	✓	✓		
4.1.4	SDMA		✓	✓	✓	✓		✓		
4.1.5	DDMAs		✓	✓		✓	✓	✓		
4.1.6	SDRFs			✓	✓	✓				✓
4.1.7	Civil Defence and Home Guards		✓	✓		✓				
4.1.8	State Police Forces and Fire Services		✓	✓		✓				
4.2	**LEGAL ARRANGEMENTS**									
4.2.1	Techno-Legal Regime		✓	✓	✓	✓	✓	✓	✓	✓
4.2.2	Enforcement			✓	✓	✓		✓	✓	
4.3	**FINANCIAL ARRANGEMENTS**									
4.3.1	Recommendations of 15 FC		✓	✓	✓	✓				
4.3.2	Statutory Provisions									
4.3.3	Financial Aspects in Implementation of DM									

Section	Activity	Key functionaries and units of the state government or UT administration								
		CMM	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO/ S(DDMA), C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
4.3.4	Utilization of SDM Funds		✓	✓	✓	✓				
4.3.5	Risk Transfer and Insurance									
4.3.6	Other Funds									
4.3.7	Mitigation Projects		✓	✓	✓	✓				✓
4.4	**OPERATIONAL ARRANGEMENTS**									
4.4.1	Mainstream DM									
4.4.2	Participatory Approach			✓	✓	✓	✓	✓		
4.4.3	Capacity Development			✓	✓	✓	✓	✓	✓	✓
4.4.4	Partnerships			✓	✓	✓		✓	✓	✓
4.4.5	Cross-Cutting Themes			✓	✓	✓		✓	✓	✓

Legend:

CM	:	Chief Minister
M	:	Minister (Revenue) or Minister (DM)
CS	:	Chief Secretary
C(DM)	:	Principal Secretary, Secretary or In-charge of Disaster Management
Ss	:	Secretaries of departments
DGP	:	Director General of Police
DGF	:	Director General of Fire Services
AG	:	Advocate General of the State
S(SDMA)	:	Secretary, SDMA
M(SDMA)	:	Member, SDMA
VC(SDMA)	:	Vice-Chairman, SDMA
DG(SDRF)	:	Director, SDRF
DC	:	District Collector, District Magistrate or Deputy Commissioner
DDMO / S(DDMA)	:	District Disaster Management Officer / Secretary ex officio, DDMA
C(DDMA)	:	Chairman, DDMA
C(ULBs)	:	Commissioners of Urban Local Bodies
S(PRIs)	:	Secretaries of Panchayati Raj Institutions
SRSAC	:	State Remote Sensing Applications Center
SS&T	:	State S&T Bodies
SR&D	:	State R&D Bodies
SAU	:	State Agriculture University

SPTC	:	State Police Training College
SATI	:	State Administrative Training Institute
SCERT	:	State Council for Education, Research and Training
SIDM	:	State Institute of Disaster Management
SEOC	:	State Emergency Operations Center

Note:
In a Union Territory, the Equivalent Officer/Office may be considered.

Table 4.6: Timelines for completion of activities pertaining to DM Systems and Processes

Section	Activity	Timeline		
		Short-term	Medium -term	Long-term
4.1	**ADMINISTRATIVE ARRANGEMENTS**			
4.1.1	State Government	✓		
4.1.2	Departments of State Government	✓		
4.1.3	State Executive Committee	✓		
4.1.4	SDMA	✓		
4.1.5	DDMAs	✓		
4.1.6	SDRFs	✓		
4.1.7	Civil Defence & Home Guards	✓		
4.1.8	State Police Forces and Fire Services	✓		
4.2	**LEGAL ARRANGEMENTS**			
4.2.1	Techno -Legal Regime	✓		
4.2.2	Enforcement	✓		
4.3	**FINANCIAL ARRANGEMENTS**			
4.3.1	Recommendat ions of 15 FC	✓		
4.3.2	Statutory Provisions			
4.3.3	Financial Aspects in Implementation of DM			
4.3.4	Utilization of SDM Funds	✓		
4.3.5	Risk Transfer and Insurance			✓
4.3.6	Other Funds	✓		
4.3.7	Mitigation Projects	✓	✓	✓
4.4	**OPERATIONAL AR RANGEMENTS**			
4.4.1	Main -streaming DM	✓	✓	✓
4.4.2	Participatory Approach	✓	✓	✓
4.4.3	Capacity Development	✓	✓	✓
4.4.4	Partnerships	✓		
4.4.5	Cross -Cutting Themes	✓		

Note:

(1) The precise timelines will depend on the dimension and complexity of the activities as well as geographical and demographical features of the state or UT. In general,

(a) Short-term involves vital activities towards DM, which are of immediate nature, for which the funds should be allocated immediately;

(b) Medium-term involves essential activities towards DM, which are of urgent nature, for which the funds should be made available without fail; and

(c) Long-term involves the remaining necessary activities towards DM, which are important, for which the funds should be made available eventually.

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PART - 5
Technology

Technology

Technology development has 3 phases, namely:

(1) *Research* Phase, where an *idea* is converted to *laboratory specimen,*

(2) *Development* Phase, where a *laboratory specimen* is converted into a *prototype model,* and

(3) *Product* Phase, where a *prototype model* is processed to make an acceptable *technology product,* especially by building confidence in the users through experimental studies on full-scale specimens of the actual structures or their sub-assemblages.

For any **proposal** to be qualified as a ***technology,*** it should pass through **all** these three phases. In the past, the *product* phase was skipped, especially for the want of experimental facilities in India to conduct full-scale tests. This has led to a large stock of buildings and structures, whose disaster resistance is not necessarily verified.

Also, in particular, the earthquake safety of the structures built so far is not assured. This is because the subjects of earthquake resistant design and construction are NOT taught at the undergraduate level in any college as a mandatory part of the bachelor program. Hence, most architects and engineers are self-taught on the subject. Thus, their interpretation of the prevalent earthquake design standards is not necessarily accurate, and their internalization is less than desirable.

In light of the above two observations and others not listed here, there is an acute shortage of *technology competent* engineers, who can design and construct the various buildings and structures of the built environment.

5.1 Prevention

The most visible and exciting activities in DM is Prevention. Here, normally, *prevention* refers to the prevention of large negative fall out as a consequence of the occurrence of an event, but not to the occurrence of the event. For instance, the use of early warning in case of cyclones and floods can result in saving lives, as demonstrated by the significant drop in fatalities over the last two decades in India owing to the use of improved cyclone forecasting, but the cyclone itself cannot be prevented. But, clearly, prevention is not a viable option in earthquakes. The only route available in DM related to earthquakes is undertaking strong measures of *Earthquake Disaster Mitigation and Earthquake Preparedness.*

In specific cases, like the man-made hazard of blast, intelligence can be employed to diffuse the situation before the events are triggered. And, in the man-made event of *fire,* sensitization, regular inspection of the necessary preparedness measures to contain the event and use of materials with large fire rating, are some of the measures to prevent

5.1.1 Monitoring

(MHA-UNDP Report: Annexure II (page 259) Matrix C Items C1.1.1, C1.2.3, C1.1.7, C2.1.1 and C4.2.3)

Monitoring the onset, footfall and negative fall out of the disasters is possible efficiently with the judicious use of sensors in networks, which acquire data and feed to Information Systems which process the same to provide vital guidance for corrective actions in DM. Monitoring is most crucial for earthquakes, because they are rare events (but most damaging) and do not give warning for evasive actions. Here, only a better estimate of the earthquake hazard will bring improved results towards earthquake safety. Thus, in this **Section 5.1.1,** monitoring of earthquakes is presented. The other hazards provide sufficient forewarning, offer another advantage of being able to provide sufficient warning to take evasive action to reduce loss of life. These are discussed in **Section 5.1.2.**

With regard to earthquakes, the state or UT should:

(1) Build systems and processes to record earthquakes, and document, synthesize and share information on them with all stakeholders on the hazard prevalent in the state or UT, by:

(a) Establishing links with seismic monitoring agencies (like *India Meteorological Department (IMD), National Geophysical Research Institute (NGRI), and National Center for Seismology (NCS));*

(b) Preparing a road map for Seismic Monitoring;

(c) Identifying a national agency to monitor earthquake activity, with the assistance of *National Disaster Management Authority (NDMA);*

(d) Working with the identified national agency to:

(1) Deploy of appropriate instruments at specific locations,

(2) Undertake field investigations to study aftershocks, swarms, micro-tremors, site-response studies, etc., and

(3) Derive clear directions from the study of earthquakes and local events.

(e) Archiving earthquake data generated and historical data collected by various agencies nationwide;

(f) Developing a website clearing house of the seismic monitoring data, actively collect resources, and share the same with the end-users;

(g) Synthesizing periodically the ground motions database and derive earthquake characteristics (frequencies, intensities, magnitudes, epicenters, depths, etc., of earthquakes that can affect the state or UT); and

(h) Sharing seismic ground shaking information with relevant stakeholders.

(2) Seek assistance of a central agency (with expertise in the subject) to install, operate, extract data, process data, and update seismological network in the state or UT, and share information to other states and UTs and the *national seismological network* proactively, by:

(a) Engaging with NGRI or NCS to build the State component of the National Network consisting of all agencies in the State engaged in seismological observations and studies;

(b) Sharing information with the Network on seismic activities recorded in the State, including earthquakes that can trigger landslides, rock-falls, avalanches and glacial lake outburst flood (GLOFs) in hilly regions;

(c) Sharing seismic data recorded with scientific, academic and R&D institutes of the state and those at the national level, with clear expectations from those agencies articulated through the MoUs; and

(d) Working with NCS and INCOIS to issue messages, alerts and warnings related to earthquakes and tsunamis.

(3) Undertake real-time monitoring of seismicity and provide state-specific seismic hazard information online to all principal stakeholders, by:

(a) Creating a live dashboard at the *State Emergency Operations Centers (EOCs)* and other offices of the State Government or UT Administration relevant to DM, which will display (within a few minutes) occurrence of earthquakes in and around the state or UT;

(b) Working with national agencies (like NCS and INCOIS) to display data of other relevant events, which could include time of occurrence, epicenter, magnitude, focal depth of the events, and variation in intensity of earthquake ground shaking across the state or UT, and/or tsunamis;

(c) Establish technical, administrative and operational systems, to enhance capacity of the agencies of the state or UT to liaise with national level agencies; and

(d) Monitor seismic activity on a 24×7 basis in association with NCS and INCOIS and provide live feedback to the State Government departments (namely SDMA, DDMAs, District Collectors, and other principal stakeholders engaged in DM).

Responsibilities

Ministry of Earth Sciences
:: National Center for Seismology (NCS)
:: Indian National Center for Ocean Information Systems
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)
Department of Space
:: National Remote Sensing Agency (NRSA)
Department of Scientific and Industrial Research
:: National Geophysical Research Institute (NGRI)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** that have earthquake monitoring stations*

State Remote Sensing Applications Center (SRSAC)
National R&D Laboratories and Universities & Institutes engaged in earth science and earthquake engineering of built environment

5.1.2 Forecasting and Early Warning Systems

(MHA-UNDP Report: Annexure II (page 259) Matrix C Items C1.1.1, C1.1.6, C3.1.4, C3.1.5, C3.2.3, C4.2.3 and C6.1)

When hazards provide fore-warning and pointers ahead of the onset of its realization (e.g., cyclones and floods), the same should be capitalized on. Technology can be leveraged upon to help provide an early warning to the stakeholders. There are many ways in which technology can be used. Some of these are discussed hereunder.

(a) Instrumentation

The backbone of technology to predict the likely negative fallout of hazards is instrumentation to capture the parameters characterizing the geophysical, hydrological, meteorological, climatological and biological hazards. The critical with respect to instrumentation is maintenance of the same to be is working order.

The state or UT should:

(1) Engage with respective national agencies and prepare a master plan (including the type, location, number and specifications) of instruments needed to be deployed to capture the salient parameters related to each hazard;

(2) Estimate the cost of deploying the instruments and maintaining them as per the master plan;

(3) Allocate annual budget in a phased manner to accomplish the task of instrumentation in the state or UT as per the master plan;

(4) Commission national specialist government agencies to procure, commission, extract the data, interpret the data, and maintain the data.

Responsibilities

Ministry of Earth Sciences
:: National Center for Seismology (NCS)
:: Indian National Center for Ocean Information Systems
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)

Department of Space
:: National Remote Sensing Agency (NRSA)
Department of Scientific and Industrial Research
:: National Geophysical Research Institute (NGRI)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Planning, Finance, and those associated with the hazards prominent in the state*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Planning, Finance, and those associated with the hazards prominent in the state*
Commissioners of ULBs
Secretaries of PRIs

(b) Early Warning Systems

Early warning from Earthquakes has limited utility, only to take **automated instrument-based actions** that involve no human intervention. This is because the time between the occurrence of an earthquake at a fault system and its propagation to far distances is only up to 10s of seconds, because communications waves in air or through Optical Fiber Cables travel faster than the physical waves on the surface of the earth. But, this small duration is insufficient to evacuate a large number of persons from their places of work and stay. Also, the reaction time at night is even larger. Thus, only two options are available in case of earthquakes, namely:

(1) Make the buildings and structures safe to resist the expected shaking induced by earthquakes in the neighbourhood. This is part of *earthquake disaster mitigation* **(See Section 5.2)** and

(2) Use effectively warning of 10s of seconds from earthquakes to take evasive action to mitigate the losses in engineered systems *industrial and transportation* systems. Safely shutting down industrial plants and slowing down (or even stopping) trains are some of these limited case of utility of an earthquake warning system.

On the other hand, early warning is possible with some other hazards like *floods, cyclones* and *droughts.* It is here that the early warning can bring large gains. It is in this context that the discussion of early warning is presented hereunder.

The state or UT should:

(1) Develop *Early Warning System (EWS)* for hazards like *floods, cyclones* and *droughts,* with the last mile connectivity to protect people, by:
   (a) Establishing links and agreeing on a mechanism with central agencies (GSI, MHA, NDMA, MoES, IMD, INCOIS, CWC, NRSA, etc.) to develop a EWS;
   (b) Preparing an *action* plan to monitor real-time and forecast various hazards, and issue real-time warning and alerts to various stakeholders in the state or UT;
   (c) Procure, maintain and upgrade the devices used in monitoring different hazards;
   (d) Connecting the devices through telemetry (through different networks, like VSAT and VPN) to a central monitoring station (namely in the *Emergency Operation Centre* (EOC)) to download the data at regular time intervals for continuous monitoring of different hazard parameters;
   (e) Maintaining and monitoring them, collecting observational data, and employ database management systems at identified locations;
   (f) Constructing a history of the hazard at selected locations across the state or UT;

(g) Ensuring signals are transmitted and alarm signals sent to relevant authority regarding the impending danger and probable time of occurrence of an event;

(h) Developing short-term plans to access to high-quality data on the magnitude, duration, location, and timing of hazard events to be able to extract information on hazard frequency and severity from observational data sets. This requires:

(1) Continuous, systematic and consistent observation of the parameters related to the hazard;

(2) Proper arrangements for data storage;

(3) Capacities to locate and retrieve the required data and freely disseminate the same to public users; and

(4) Sufficient dedicated resources to support these activities;

(i) Developing a *mechanism* to address *false* or *misleading* information that may cause widespread panic;

(j) Creating a live dashboard at the *State Emergency Operation Centers (SEOCs)* and *District EOCs (DEOCs) for DM,* which display real-time information on situation across the state or UT;

(k) Developing a EWS integrating ground level inputs with modeling to generate improved early warnings in terms of *intensity, location and time;*

(l) Encouraging projects to develop appropriate technologies as well as to effectively utilize the available state-of-the-art technologies to facilitate quality monitoring in a cost-effective manner, aiming at real-time early warning;

(m) Using remote sensing tools like *Doppler Radar and Infrared Satellite Sensing (DrISS)* that can provide information on spatial and temporal resolution that is potentially useful for near real-time hazard assessment and warning;

(n) Deploying remote sensing, GPS, and GIS tools including high-resolution satellite imagery, and LiDAR;

(o) Using *high resolution imagery* and topographic mapping that can lead to an improved understanding of mechanics and hazard prediction; and

(p) Planning to deploy Radar for monitoring movement, detection of crevasses in geological formations, measuring the thickness of snow on roads to facilitate snow clearance operations, and aiding the search for victims.

(2) Display to various end-users the early warning pictorially as maps prepared using *satellite data,* by:

(a) Coordinating with *NICNET, POLNET* and *ISRO DMS* Network for satellite-based communication across the state or UT;

(b) Connecting the state and district EOCs to satellite communication networks through appropriate routers and gateways;

(c) Working closely with NIDM to develop *State Disaster Management Information System (SDMIS)* on *Geographic Information System* (GIS) Platform;

(d) Using SDMIS and collect, store, retrieve, map and analyze geographic, demographic, topographic, infrastructure and socio-economic data;

(e) Developing competent human resources with background in remote sensing techniques, high resolution satellite data on GIS platform, GPS, UAV, etc., through quality and periodic training;

(f) Deploying remote sensing application tools and prepare *high resolution images* for mapping topography, landscape, land use, hazard prediction, etc.

(g) Coordinating with the central agencies for remote sensing of rainfall using *Doppler Radar and Infrared Satellite Sensing (DrISS),* which can provide rainfall information with spatial & temporal resolutions for near real-time hazard assessment and warning; and

(h) Developing an *action plan* to use satellite-based advanced technologies and GPS enabled GIS to facilitate stakeholders in implementing knowledge-based information for holistic DM.

(3) Establish mechanisms to disseminate real-time key observations to stakeholders, departments and public inferred from the data collected using technology, by:

(a) Obtaining real-time *hydrological, geophysical and meteorological* data collected by MoES, IMD, CWC, FMOs, NRSA and ISRO;

(b) Seeking engagement of *research institutes* and state agencies to forecast the situation using the data;

(c) Working with national agencies to display live the temporal variation of geophysical, hydro-meteorological and other data collected;

(d) Developing protocols and responsibilities of the State officers for coordinating with central agencies and various service providers to disseminate and forecast warnings;

(e) Using satellite images of the disaster affected areas on GIS platform for DM and provide functionally rich, visually pleasing GUI-based screens with ease-of-use features to maximize the utility of the data provided;

(f) Building capacity in the personnel of the State departments and agencies interpreting scientific data;

(g) Developing a system to verify that the data sets received from data providers is as per predefined formats;

(h) Developing software to verify the data received;

(i) Generating thematic maps by compiling and collating observations on geology, geomorphology, meteorology, hydrology, land use, land cover, etc.;

(j) Using local records, interpret aerial photographs and prepare high resolution images;

(k) Accessing high-quality data on the *intensity, duration, location,* and *timing* of hazard events to extract information on likely severity from observational data sets, which requires:

  (1) Continuous, systematic and consistent observation of the parameters related to the hazard,

  (2) Proper arrangements for data storage,

  (3) Capacities to locate and retrieve the required data and disseminate to public, and

  (4) Sufficient dedicated resources;

(l) Archiving multi-hazard and historical data generated by the national agencies nationwide;

(m) Developing a website clearing house for hazard data, collect resources actively, and share with the end-users;

(n) Establishing *technical, administrative* and *operational systems,* to enhance capacity of State agencies by liaising with national level agencies;

(o) Monitoring geophysical, hydro-meteorological activity on a 24×7 basis in association with NCS and INCIOS and provide live feedback to the principal stakeholders engaged in DM in the state or UT; and

(p) Maintaining historical records of hazard events to infer the approximate return period and other parameters of various hazards, which influence hazard assessment.

Dissemination and communication mechanisms, as far *as early warning systems* are concerned, must be operational, robust, and available round the clock. These should be designed to meet the needs of a wide range of different threats and different user communities. In particular:

(1) Map the technological infrastructure requirement of different locations including the remotest areas to ensure timely dissemination of information;

(2) Develop clear protocols and procedures of communication;

(3) Establish prior agreement with various players including private sector and civil defense sector for early warning activities to cover all the relevant locations;

(4) Plan for monitoring of hazards by selecting specific locations, monitoring methods, processing data and methods of presenting the results;

(5) Establish effective chain of command in advance to manage warning issuance and dissemination, to ensure that information provided can be understood by those who need it and it reaches all the affected locations in the state and UT;

(6) Channelize warnings from technical and scientific sources though government decision makers and the media to multiple receivers who may also function as onward disseminators. Such users include emergency

services, security agencies, operators of utilities, information and communication services, other economic service providers, NGOs, voluntary agencies, and vulnerable communities;

(7) Develop mechanisms to address the issues of false and misleading information that may cause widespread rumors;

(8) Issue warning and alert messages in the local language, in a format which is simple and easily understandable by the administrators and common people as well. Use radio, television, mobile phones, internet and social media, etc.;

(9) Involve the district administration, the local panchayats, community based organizations, youth associations, village headmen and others in the EWS;

(10) Adopt many innovative tools such as beating of drums, waving of flags, announcements from religious places, community halls etc. to disseminate information;

(11) Establish multilingual call centers at local district, and state and levels for smooth warning systems;

(12) Carry out periodic observations of the hazard parameters;

(13) Develop correlations between hazard parameters;

(14) Follow the color code categorization *(red, orange and yellow)* developed by MHA for triggering appropriate alerts within the government machinery;

(15) Create a live dashboard at the *State Emergency Operation Centers (EOCs)* and district EOCs of the state government or UT administration relevant to DM, which will display real-time information on various hazards;

(16) Archive multi-hazard data generated by the national agencies along with the historical data generated by various agencies nationwide;

(17) Develop a website clearing house of the hazard monitoring data, actively collect resources, and share the same with the end-users;

(18) Establish technical, administrative and operational systems, to enhance capacity of the agencies of the state or UT to liaise with national level agencies;

(19) Monitor geophysical and hydro-meteorological activity on a 24×7 basis in association with NCS and ISRO and provide live feedback to the State Government departments (namely SDMA, DDMAs, DMs and other principal stakeholders engaged in DM); and

(20) Develop real-time monitoring mechanisms for hazards through remote sensing, including High Resolution Satellite Imagery, LiDAR, Synthetic Aperture Radar (SAR), Persistent Scatterer (PS), and differential interferometry techniques.

Thus, the state or UT should:

(1) Disseminate warnings to all stakeholders *(to the last mile)* in remote, rural and/or urban areas, as provided in the SDMP, by:

   (a) Developing a robust SOP for *End-to-End EWS;*

   (b) Issuing warning and alert messages in local language and in a format, which is clear and easily understandable by administrators and common people, through print and electronic media (radio, television, mobile phones, internet, social media, etc.);

   (c) Involving *district administrations,* panchayats, CBOs, youth associations and village headmen, in the EWS;

   (d) Adopting effective methods (such as beating of drums, waving of flags, and announcements from religious places and community halls) to disseminate information;

   (e) Establishing multi-lingual call centers at district and state levels, for smooth warning systems; and

   (f) Developing and finalizing plan for developing an automated multi-hazard EWS, for monitoring and forecasting of hazards with the integral involvement of central agencies for technical support;

   (g) Upgrading the EWS and *Decision Support System (DSS)* at local and state levels;

   (h) Procuring wireless communication, telephone, telex, fax, VSAT and Internet facilities to disseminate warnings and develop a fail-safe communication plan;

(i) Ensuring that state and district EOCs are equipped with the wireless communication systems with good working conditions 24×7 on all days through regular testing;

(j) Working with national agencies to issue warnings to administrative and engineering authorities of the State and UT with guidance for protection measures and DM by special messenger, telegram, wireless, telephone, fax, eMail, etc.;

(k) Issuing warnings in the local language, in a format that is simple and easily understandable by the administrators and common people as well. Use radio, television, mobile phones, internet, social media, etc.;

(l) Involving the district administration, the local panchayats, community-based organizations, youth associations, village headmen and others in the EWS;

(m) Adopting innovative tools such as beating of drums, waving of flags, announcements from religious places, and community halls, to disseminate information;

(n) Creating a live dashboard at the *State Emergency Operation Center* and other offices of the State Government relevant to *Disaster Management*, which display real-time information on hazard;

(o) Working with national agencies to display data, related to hazard forecast at various points/particular stations at a specific time;

(p) Developing and finalize plan for EWS and DSS for monitoring and forecasting in technical support with national agencies;

(q) Developing a robust *Standard Operating Procedure (SOP)* for end-to-end EWS; and

(r) Establishing an Early Warning Centre (EWC) to be housed in the state EOC to acquire data on hazards on real time basis, where possible, and disseminate it widely;

(2) Establish systems at various levels, for coordination between central government ministries and departments, other State Governments, District Administrations, PRIs, ULBs and other stakeholders for effective forecasting and monitoring of hazards, by:

(a) Establishing technical, administrative and operational systems, to enhance capacity of the agencies of the State to liaise with national level agencies;

(b) Developing protocols and responsibilities for coordinating with central agencies and various service providers to disseminate and forecast warnings.

(c) Sharing hydro-meteorological data recorded with scientific, academic and R&D institutes of the state or UT and those at the national level, with clear expectations from those agencies articulated through the MoUs;

(d) Establishing mechanism such that the representatives from CWC, IMD, NRSA, INCOIS, NDMA and State Government or UT Administration work together, exchange data on a real-time basis, and prepare forecasts and warnings, which are more reliable and understandable by the forecasters, administrators and the general public, and disseminate the same;

(e) Coordinating with central agencies in the compilation, for refining forecast accuracy for the state or UT, and analysis of all the hydro-meteorological related data;

(f) Developing institutional mechanism and triggering actions with joint partnership at the state and district levels involving all the departments concerned and agencies, armed forces, police, SDRF, PRIs, ULBs, Civil Society Organizations (NGOs and CBOs), etc; and

(g) Engaging with national agencies to build the state or UT component of the Hazard Forecasting Network consisting of all agencies concerned in the State and UT engaged in monitoring and forecasting the hazards;

(h) Broadcast DM measures;

(i) Issue health advisories;

(j) Disseminate information about animal rescue camps; and

(k) Issue crop advisories.

Responsibilities

Ministry of Jal Shakti
:: Central Water Commission (CWC)
Ministry of Defence
:: Snow Avalanche Study Establishment (SASE)
:: Border Roads Organization (BRO)
Ministry of Earth Sciences
:: Indian National Center for Ocean Information Systems
:: India Meteorological Department (IMD)
Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)
:: National Disaster Response Force (NDRF)
Ministry of Mines
:: Geological Survey of India (GSI)
Department of Space
:: National Remote Sensing Agency (NRSA)
:: Indian Space Research Organization (ISRO)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of departments of that have monitoring stations, including Public Works (R&B), and Panchayati Raj
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Planning, Finance, and those associated with the hazards prominent in the state
District Emergency Operations Center (DEOC)
Commissioners of ULBs
Secretaries of PRIs

CBOs and Youth Associations
State Remote Sensing Applications Center (SRSAC)
National R&D Laboratories and Universities & Institutes engaged in remote sensing and communication technologies, and architecture and civil engineering of built environment

5.2 Mitigation

Mitigation is constructing the built environment to be disaster-resistant in the correct way, the first time around itself. *Mitigation* is the soul of DM; it is felt, but not seen. It is a deeply technical activity, involving fine details – philosophies, methods, processes and decisions. And, these details are meticulously implemented during the development of the built environment by the entire chain of hands involved therein. There are five virtues of the built environment – *safety, functionality, sustainability, aesthetics* and *economy.* The State Governments and UT Administrations should have systems and process to verify that safety is guaranteed always in all development works, else lives and properties are at stake, and the entire effort towards DM will be jeopardized.

The entire stock of the building and structures in the development is seen in two parts, namely the ***existing*** and the ***new.*** It is *relatively* easy to design and construct the ***new*** building and structures to be disaster-resistant. This requires robust design and construction standards, which are disaster-sensitive and regulate only desirable performance when the hazard expected at the site is realized. On the other hand, it is challenging to retrofit the

existing building and structures to make them disaster-resistant. Thus, **do it right the first time itself** is the strategy for the built environment.

In the recent times, a "new" expectation on buildings and structures is their **multi-hazard resistance.** This is not new though! Structural designers have been complying with this requirement in the design and construction of buildings and structures. Design standards require simultaneous consideration of all loads arising from the applicable hazards at the site of the building or structure.

Another mandatory feature expected from new buildings and structures is rainwater harvesting and storage, especially in *social housing schemes,* to enhance sustainability. Towards this end, when designing these structures, the following needs to be examined:

(1) Different roof types for catchment possibilities;

(2) Incorporate favourable roof type in building design;

(3) An efficient roof finish;

(4) Locations for groundwater recharge pits in the open areas of housing scheme;

(5) Water storage structure in building design;

(6) *Detailed Project Reports to create:* (a) water harvesting structures, (b) storage structures and (c) distribution scheme.

5.2.1 Hazard Resistant New Constructions

(MHA-UNDP Report: Annexure II (page 259) Matrix C Items C1.3.2, C1.3.3, C1.3.7, C2.3.1, C2.3.3, C3.3.1, C3.3.2, C3.3.3, C3.4.1, C4.3.3 and C6.8)

A number of design and construction structural schemes are proposed by clients, architects, structural designers, developers and contractors. Today, in India, not all of these construction schemes proposed by the interest groups are regulated through the prevalent standards, and not all of them are disaster-resistant. For instance, past earthquakes worldwide have shown that *buildings with flat slabs* and *buildings with post-tensioned flat slabs* are not capable of resisting strong earthquake ground shaking. Also, there are no standards in India permitting the use of *precast concrete buildings* and *pre-engineered buildings* in areas with severe seismic hazard. But, notwithstanding the above, such schemes are being built in large numbers across the country. This unregulated development with such structural schemes is adding to the stock of unsafe constructions that are likely to fail in the event of severe earthquake ground shaking. Thus, only those schemes should be considered as accepted for implementation, which pass through rigorous R&D and verification, especially through full-scale testing of prototype structures, hereinafter called as *technologies.*

Therefore, the State Governments and UT Administrations should exercise extreme care to admit only:

(1) *Established technologies* that are admitted by the prevalent national standards; and

(2) New technologies that are demonstrated to be safe and meeting the requirements laid down in national standards for established technologies, through rigorous R&D (analytical study and experimental full-scale prototype testing undertaken by a government R&D facility in India).

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets
District Emergency Operations Center (DEOC)
Commissioners of ULBs
Secretaries of PRIs

Structural Engineering Laboratory, IIT Kanpur
National Earthquake Testing Facility, MNIT Jaipur
National R&D Laboratories
Universities & Institutes engaged in architecture and civil engineering of built environment

(a) Housing Schemes

Housing schemes funded by the government have been and still being built in large numbers. In many cases, type designs are being replicated. Any deficiency in the type designs will be amplified; this is avoidable fully. For example, precast houses have done poorly, in general, in many earthquakes worldwide. The primary reason for this is poor connections. If the same designs are built in India, the result will be same. In India, a full-scale R&D testing program should be undertaken of various precast construction schemes. In that full-scale testing program, the connections are tested in their original size with original sized members. Only when the precast housing **schemes** pass this test, they will be termed *Precast Housing Technologies.* Without such rigorous testing, it is premature to start building structures with these schemes proposed by vendors.

To build confidence, it is necessary to gather evidence from *Full-Scale Experimental Testing.* In India, housing technologies that come from abroad should be admitted carefully. There are countries where earthquakes are not a concern, and hence precast may be considered successful in those countries. But, in India, earthquakes are a concern; and, precast constructions have done poorly in the 1993 Killari and 2001 Bhuj earthquakes. Hence, the proposals should be examined carefully before admitting the international constructions schemes. And, there is no bigger truth than to do conduct a series of full-scale tests in India and be convinced that the proposal can be admitted as a *technology.*

Thus, ensuring disaster-safety of the government-funded housing schemes is the responsibility of the State Government or UT Administration. Fortunately,

(a) This need to ensure disaster-resistance in these housing schemes is articulated in the SDMP, and

(b) Experimental test facilities have been established at two national institutes of importance in the country (namely, the *Structural Engineering Laboratory, IIT Kanpur, and the National Earthquake Test Facility, MNIT, Jaipur)* to conduct tests on prototype (full-scale) structure specimen of houses. It is possible to experimentally verify their behaviour by simulating the loads likely to appear on the structure when the design hazard is realized, and examining their performance.

The state or UT should:

(1) Launch an experimental R&D program in association with the national R&D institutes, which have full-scale experimental testing facilities that can evaluate the disaster-resistance of prototypes of the houses under the expected levels of loads imposed on them; and

(2) Approve for construction the use of designs of houses **only if they qualify** through the experimental R&D program mentioned in item (1) above.

The expenditure incurred in this experimental R&D program is estimated to be much less than 1% of the outlay of each state on housing schemes.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Public Works (R&B), Town & Country Planning, and other departments that have physical assets*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Public Works (R&B), Town & Country Planning, and other departments that have physical assets*
District Emergency Operations Center (DEOC)
Commissioners of ULBs
Secretaries of PRIs

Structural Engineering Laboratory, IIT Kanpur
National Earthquake Testing Safety, MNIT Jaipur

(b) Standards, Commentaries, Manuals and Handbooks

The architects and structural designers, who are engaged in steering the development of the various structures of built environment, play a critical role towards establishing the disaster-resistance in these buildings and structures. Their technical capacity should be developed with state-of-the-art *knowledge* and *skills.* Also, they should be empowered with:

(1) *Commentarie*s explaining the basis,

(2) *Manuals* explaining the correct use, and

(3) *Handbooks* supporting faster design calculations in the implementation,

of the provisions and specifications given in the design and construction standards.

The state or UT should:

(1) Commission the Bureau of Indian Standards (BIS) and other standards making bodies in India, to provide the said *Commentaries, Manuals and Handbooks;*

(2) Organize continuing education programs periodically for architects and engineers of the government and private organizations to learn the proper use of the *Standards, Commentaries, Manuals and Handbooks.*

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets

Commissioners of ULBs
Secretaries of PRIs

National R&D Laboratories
Universities & Institutes engaged in architecture and civil engineering of built environment

(c) Temporary Shelters

Temporary Shelters are facilities to take shelter (by those who lost their houses) in the *emergency* and *intermediate phases* of the post-disaster situation. This subject is mandated in the SDMP in lines with the recruitments laid down in the NDMA Guidelines. Temporary shelters are built in *large numbers,* based on type-designs developed for the purpose. There is no scope for error in these shelters, because the error will get repeated in large number of shelters. Therefore, it is essential to ensure that the proposed type designs, based on engineering calculations, are verified to be structurally safe through experimental studies conducted on full-scale test specimen. The state or UT should engage with laboratories across the country which can undertake such works, and get their type-designs verified and build confidence in their use.

The state or UT should:

(1) Pre-design shelters and their locations, with basic amenities (like drinking water, sanitation, medical treatment, cooking, tents and lighting) for the people to take shelter in the aftermath of disasters, by:

   (a) Identifying departments that will carry out the assessment of existing structures that can be used (as an emergency measure) as temporary shelters, after determining structural safety and resilience to hazards of these structures;

   (b) Collecting data on locally available materials, minimum health and hygiene standards that need to be ensured in such temporary shelters;

   (c) Identifying appropriate locations for constructing *new* temporary shelters taking into account the geological and climatic conditions and functional needs of the affected communities in addition to availability of basic amenities such as drinking water, sanitation, medical facilities and other essential supplies. In particular, these shelters should not be built in flood plains;

   (d) Developing site plan for temporary shelters on existing or relocation sites taking into account the following aspects:

      (1) Internal social structure and support system is not disrupted,

      (2) Plan for ancillary functions in the temporary shelters,

      (3) Opportunities for restoring livelihoods,

      (4) Access to social, health and economic infrastructure and services,

      (5) Adequate access to basic civic needs,

      (6) Consider disability-friendly shelters,

      (7) Consider fire and other threats, and

      (8) Ensure adequate *Water-Sanitation-Hygiene (WASH)* facilities.

   (e) Evolving region-specific *functional design of* temporary shelters considering the gender, age, caste, disability, social factors, spatial requirements, selection of materials, construction technology, and execution of shelter construction:

      (1) Considering local climatic conditions;

      (2) Endorsing existing local practices, lifestyles and cultures of the affected families, making maximum possible use of local resources to enable owner-driven process;

      (3) Designing in-situ temporary shelters on the owners' own land in such a manner that they can be upgraded to comply with the technical norms of safe permanent housing, wherever possible; and

      (4) Planning temporary shelters based on three typologies namely: (i) Assembly based shelter, (ii) Construction-based shelter, and (iii) Rental accommodation;

(f) Evolving region-specific *structural designs* of temporary shelters to make them capable of resisting all hazards prevalent in the regions with the engagement of technically competent structural engineers, and deciding upon appropriate technology for shelter construction from available options, and considering the available resources;

(g) Developing appropriate IEC strategy and preparing suitable material to inform and educate engineers, contractors, masons and house owners on appropriate standards and norms for disaster-resistant temporary (emergency and intermediate) shelters;

(h) Demonstrating and disseminating appropriate design and technologies, in accordance with the technical guidelines set by the state and UT, to communities;

(i) Ensuring convergence of *MGNREGA, Swachh Bharat Abhiyan* and other such schemes of the government in the construction of shelters; and

(j) Planning, preparing and implementing capacity building plan for the government personnel, engineers, contractors and masons.

(2) Stockpile of materials, prepare erection teams, and procure and provide tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials depending on the different typologies, by:

(a) Developing material banks/depots for distribution and identify local vendors;

(b) Stockpiling tents, shelter kits, tarpaulins, bamboo and temporary shelter material in regional warehouses, stores and engineering resource centers, and have tie-ups with forest depots for bamboo, timber, etc.;

(c) Procuring and providing tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials catering to the needs of the responders;

(d) Pre-positioning and stockpiling adequate number of shelter kits at strategic locations for immediate distribution after disaster incident;

(e) Ensuring storage and stockpiling of tents in a dry and ventilated environment, to ensure protection from sun, rain and vermin, thereby avoiding rotting of the canvas;

(f) Erecting a local team and them to receive the temporary shelter supplies;

(g) Developing coordination mechanism to seek support from relevant central ministry to make sure that the tents and shelters reach the site on time, depending upon the requirements;

(h) Coordinating with railways, airlines and other means of transport to provide effective services to the field level;

(i) Protecting the warehouses and stockpile tents, shelter kits, tarpaulins, bamboo and temporary shelter materials in them, and have tie-ups with forest depots for bamboo, timber, etc.;

(j) Pre-arranging long-time tie-up with manufacturers to supply tents, shelter kits, prefabricated shelters and materials (such as tarpaulins, CGI sheets, bamboo) within 24 hours of placement of order and help in transporting them; and

(k) Developing *Standard Operating Procedures* for stockpiling materials, procurement, distribution, deployment, and assignment of roles and responsibilities considering hazards scenarios.

(3) Develop appropriate and reasonable mechanisms to monitor (manually and online) shelter logistics, supplies and equipment for better preparedness and planning to meet the required needs, by:

(a) Developing a team for manual and online monitoring of shelter logistics;

(b) Maintaining logs of material movements and details of distribution to required locations;

(c) Monitoring any undue increase in the prices of essential items or hoarding of the same that may subsequently have an adverse impact on people's shelter recovery;

(d) Establishing material banks and depots for distribution and identify local vendors;

(e) Developing a local team involving community, local leaders, local authorities, volunteers, etc., for operation and maintenance of shelters;

(f) Compiling and maintaining a consolidated database of trained construction artisans, such as masons, plumbers and electricians, from government and private vocational training institutes, NGOs and CSR organizations;

(g) Compiling and maintaining a consolidated database of trained building professionals such as engineers and architects as well as building contractors from professional associations;

(h) Developing dashboard and web-portal at state or UT level to monitor logistic facilities to keep stocks of temporary shelters, tents and other non-food items;

(i) Adopting and implementing technical guidelines issued by government of India;

(j) Enabling the community to undertake repairs, maintenance and modifications, on their own as and when necessary;

(k) Developing a shelter management team involving community, local leaders, local authorities and volunteers, etc., for operation and maintenance of the shelters; and

(l) Developing long-term plan for the maintenance of the shelters through community efforts to make the system self-reliant, including *vector control* by spraying of shelters with residual insecticides.

Responsibilities

Ministry of Home Affairs
:: National Disaster Management Authority (NDMA)
Ministry of Skill Development and Entrepreneurship

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Public Works (R&B), Skill Development, Social Welfare, Urban Development, Town & Country Planning, and other departments that have physical assets*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Public Works (R&B), Skill Development, Social Welfare, Urban Development, Town & Country Planning, and other departments that have physical assets*
Commissioners of ULBs
Secretaries of PRIs

State academic institutes and R&D agencies engaged in studying safety of built environment
National institutes and R&D agencies engaged in studying safety of built environment

5.2.2 Retrofit of Existing Constructions

(MHA-UNDP Report: Annexure II (page 259) Matrix C Items C2.3.2, C2.3.3 and C3.3.2)

Retrofit is a powerful proactive effort that builds resilience in communities by enhancing the capacity of the buildings and structures to resist the demand imposed on them when the expected hazard is realized. It is a resource intensive technical activity. Therefore, prioritization of buildings and structures in the state or UT is required, based on a formal Risk Assessment (described in **Chapter 3**). It is prudent to undertake retrofit as programs, each stretching over 5 years with mid-term strategic changes and technical improvements, extendable beyond 5 years with revised plan, until the entire stock of prioritized buildings and structures are retrofitted.

Also, there are two hazards, namely **floods** and **landslides,** for which *retrofit cannot be performed* with the structure continuing to be in its original place. A house in flood plains will be drowned during the high flood conditions, and even if the house structure is designed and constructed to resist the water pressure, the people and the contents inside the house cannot be saved. Similarly, a house on a hill slope vulnerable to landslide or at the toe

of the hill slope vulnerable to the landslide, the house structure cannot be designed to resist the onslaught of the large debris mass of earth dynamically impacting on it. Therefore, in these two cases, the structure should be relocated. For this reason, it is prudent to **not build** any dwelling, critical or lifeline buildings or structure in the flood plains or along the hazardous tracks of *vulnerable hill slopes.*

The state or UT should:

(1) Adopt the strategies and processes given in the NDMA Guidelines on *Seismic Retrofitting of Deficient Buildings and Structures;*

(2) Commission subject specialists along with the engineers of the relevant department of the state or UT, to develop technical methods of *retrofitting* the prioritized stock of **existing** *critical & lifeline buildings and structures,* which are important for ensuring no loss of life and property, governance continuity in the aftermath of the disaster, reduced downtime of places of work, and least disruption in business continuity to restore livelihoods of citizens. The telescopic method for each structure type involves vulnerability assessment at 4 levels, i.e., only when the building or structure is assessed to be deficient at a level, it is subjected to the next higher level. The said 4 levels are:

   (a) *Level 1:* Simplified QUALITATIVE Assessment (involving *rapid visual screening*) to capture qualitatively *overall deficiencies;*

   (b) *Level 2:* Detailed QUALITATIVE Assessment (involving *conceptual visual survey*) to capture qualitatively *detailed deficiencies;*

   (c) *Level 3:* Simplified QUANTATIVE Assessment (involving estimation of *horizontal shear force capacity*) to assess quantitatively *global deficiencies;* and

   (d) *Level 4:* Detailed QUANTATIVE Assessment (involving examining *complete structural safety*) to assess quantitatively member deficiencies; and

(3) Verify the proposed retrofit schemes through an experimental R&D program involving **prototype (full-scale) test specimens.** There are two such national test facilities that can handle large specimens, e.g., at IIT Kanpur and MNIT Jaipur.

(4) Develop a **pilot project** on seismic retrofit of a deficient lifeline structures.

(5) Prioritize the towns and cities based on the prevalent risk (which includes degree of seismic hazard, population size, level of vulnerability of structures, exposure of people to vulnerable structures, and importance of the structure), and the speed with which the states can undertake the retrofit initiatives.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works (R&B), Town & Country Planning, and other departments that have physical assets
Commissioners of ULBs
Secretaries of PRIs

National Structural Engineering R&D Laboratories
Universities & Institutes engaged in retrofit of built environment and full-scale testing (like IIT Kanpur and MNIT Jaipur)

(a) Competent Professionals

Retrofitting of existing structures is new subject in India. There are few competent persons who can assist the state or UT in handling the technical facets of this subject. It is in the interest of the state or UT to take a long-term view of retrofitting, and build the required number of competent architects, structural engineers and specialist contractors, and identify the vendors who can provide required tools and services.

One simple but efficient way of testing the waters in this subject (to understand the nuances and learn the process) of retrofitting existing buildings and structures is undertaking pilot retrofit projects. The early pilot projects should be small ones offering fewer challenges from the standpoint of technology to be applied, technical subject specialists required to be engaged, skilled artisans to be engaged, and tools needed to strengthen the existing structures.

(b) Standards, Commentaries, Manuals and Handbooks

Retrofitting of existing structures requires additional standards than those used for the design of new structures. It is best to engage with the Bureau of Indian Standards, the Indian Roads Congress, the Research Designs and Standards Organization (Ministry of railways), and other national bodies engaged in preparation of standards, to prepare retrofit standards, if they don't exist already.

5.2.3 Research and Development

Undertaking DM in India will need a three-pronged approach, namely:

(1) **Adopt** knowledge of international good practices in India,

(2) **Adapt** knowledge of international good practices by customizing them to Indian conditions, and

(3) **Create** new knowledge to resolve the outstanding India-specific aspects to implement DM effectively.

The state or UT should:

(1) Leverage the outcomes of ongoing R&D studies in Institutes and Universities across the country related to different disasters, by:
   (a) Seeking information from NDMA on the list of nodal ministries of the Government of India for various disasters in the country;
   (b) Discussing the ongoing research programs supported by the Nodal Ministry; and
   (c) Seeking the support of the Nodal Ministries to solve some of the challenges of the State with respect to needed R&D in specific areas;

(2) Undertake research and development in all aspects of DM (including real-time monitoring and early warning systems for cyclones, floods and landslides) with the assistance of the Institutes and Universities to address unanswered questions in the DM activities of the state or UT, by:
   (a) Seeking Institutes and Universities to build repository of resource material (e.g., books and journals) related to the six verticals of DM, namely *Prevention, Mitigation, Preparedness, Response, Rehabilitation* and *Reconstruction* related to disasters predominant in the State;
   (b) Promoting research interests in disaster safety and preparedness among students and Faculty Members of universities and institutes;
   (c) Identifying one nodal institute in the State to act as a hub for R&D related to each disaster;
   (d) Hosting a *web portal* to serve as an electronic repository of education and research related resources;
   (e) Collecting and documenting details of past disasters, impacts, outcomes, response and recovery mechanism and reconstruction to serve as learning tool;
   (f) Organizing fellowship programs through the nodal Institute in the State;
   (g) Earmarking grants for exchange programs and visits to international academic institutes for trainers and trained teachers; and
   (h) Reviewing and revising the strategy to promote DM research and development in architecture, engineering, earth science, medical and nursing degree programs.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Higher Education, Technical Education, and Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Higher Education, Technical Education, and Health*
Commissioners of ULBs
Secretaries of PRIs

State academic institutes and R&D agencies engaged in studying safety of built environment
National institutes and R&D agencies engaged in studying safety of built environment

5.3 PREPAREDNESS

For the steps to be taken towards preparing to face the hazards without any losses, quantitative inputs are required. These quantitative inputs are to be derived based on formal principles of earth science and earthquake engineering. Also, the stakeholders of DM (especially communities and decision makers) need to be convinced that changes need to be made to prevent the future events from becoming disasters. In fact, these two aspects are intertwined. Scenario building simulations and mock exercises & drills are two complementary activities that reveal the likely negative fallout of future events. Fortunately, it is possible to appreciate quantitatively the likely impact of mitigation and preparedness measures, if undertaken.

5.3.1 Scenario Building Simulations

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.9)

It is possible to project scenarios of likely events in future. This effort is a formal and technical activity, whose backbone is Risk Analysis (presented in Chapter 2). The accuracy of the inputs, namely hazard, exposure and vulnerability assessments, will determine the reliability of the results of the risk analyses, and thereby of the outcomes of the scenarios projected based on them.

The disaster scenarios projected will show the impact of the possible disaster, with and without:

(a) Mitigation measures to be undertaken in the development of the built environment, and

(b) Preparedness measures.

The key decision makers and government officials will be sensitized during mock exercises, with a view to improve the regulatory system, initiate the needed mitigation measures, and sensitize all stakeholders suitably on the importance of the mitigation and preparedness measures. In the absence of all of the above, the impending disasters will force an undesirable situation on the community.

Therefore, the state or UT should:

(1) Undertake forecast scenarios likely after each negative fallout of each hazard that the state or UT is faced with;

(2) Analyze the outcomes of the scenario development exercise and draw valuable lessons for improving the SDMP, DpDMPs and DDMPs;

(3) Study the effect of possible retrofit measures in the built environment, and repeat the scenario development exercise, and examine the impact if retrofit is undertaken; and

(4) Undertake retrofitting of the vulnerable built environment, especially of critical and lifeline structures, when scenario development exercise suggests significant reduction in loss of life and property.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of ALL departments

State academic institutes and R&D agencies engaged in risk assessment of built environment
National institutes and R&D agencies engaged in risk assessment of built environment

5.3.2 Mock Exercises and Drills

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.9, and Matrix C Items C1.5.4, C2.5.4 and C3.5.4)

When a disaster strikes, it is not the time to learn how to mobilize large groups of people in a coordinated way. This is best done in peacetime as pre-announced mock exercises and mock drills. Also, these are undertaken only after detailed planning, preparation and streamlining of the processes. The objectives of the two activities are as below:

(1) *Mock Exercises:* These are **decision maker-based table top activities** to test the effectiveness on paper of the SDMP, DpDMPs and DDMPs (especially the evacuation plan, healthcare management and logistics) and to improve preparedness and response capacities of all government departments. These are referred to also as Simulation Exercises (SIMEXs); and

(2) *Mock Drills:* These are **community-based field level activities** to test the effectiveness on ground of the SDMP, DpDMPs and DDMPs (especially the evacuation plan, healthcare management and logistics) and to improve preparedness and response capacities of all agencies.

Both of these are scientifically-driven activities, using quantitative projections of likely scenarios in expected future events. Also, the Mock Exercises are performed first and Mock Drills later.

The state or UT should:

(1) Conduct periodically mock exercises, by:

(a) Involving all stakeholder departments (especially of police and of fire & emergency services), first responders, elected public representatives, and SDRF;

(b) Helping understand the dynamic multiple risk issues and development of possible scenarios by adopting a holistic approach (not just rescue and relief centric) in DM;

(c) Bringing in the key decision makers, administrators, stakeholders of an organization/department together, who will respond to a given hypothetical flood scenario that keeps evolving with many 'imaginary situations' arising at simulated time as the exercise progresses;

(d) Interacting with the key stakeholder departments to understand their present capacities to handle a disaster, existing emergency resources and personnel;

(e) Varying the complexity of the mock exercise depending upon the potential hazards, response system of the institution and the target community.

(f) Preparing a calendar of mock exercises at local, district and state levels, and execute mock exercises as per the plan, and conducting occasionally unannounced mocks exercises;

(g) Testing effectiveness of DpDMP of each department to handle an improvised situation;

(h) Debriefing at the end of the exercise helps to assess:

(1) Resource adequacy,

(2) Coordination and communication,

(3) Deployment of staff and equipment,

(4) Decision making, and

(5) Changes needed in the Plan;

(j) Prepare and revise the SDMP, DpDMPs and DDMPs based on the assessment after the mock exercise;

(k) Adopt strategies to overcome the lack of resources, technology, equipment and coordination mechanism; and

(l) Updating appropriately the Standard Operating Procedures (SOPs) and action plans for pre- and post-disaster scenarios, and integrating them into the DM planning process.

(2) Organize annually Mock Drills, by:

(a) Involving all stakeholders in government and community for ensuring effective, functional emergency response, along with the inventory of community resources and assets;

(b) Preparing an SOP and an annual calendar for conducting the Drill at the local, district and state or UT levels;

(c) Identifying an agency or NGO with experience in DM to support activities in various sectors;

(d) Ensuring roles and responsibilities of the concerned personnel, departments, corporate bodies and other stakeholders, and mechanisms for conducting the drill are delineated clearly for the proper implementation of a drill;

(e) Strengthening the early warning systems, so as to carry out evacuation within the lead time received prior to the event;

(f) Examining the Medical plan for handling mass casualties, sufficiency of health workers, hospital beds, evacuation centers, triage, uninterrupted water and power, to keep the hospital functional during a disaster;

(g) Preparing a calendar of mock drills at the local, district and state or UT levels, and execute the same as per the plan; and

(h) Debriefing the experiences for improved planning and preparedness during future disasters, especially to:

(1) Prepare annual calendar for disaster preparedness activities of all departments,

(2) Review and revise the SOP and action plans, as needed; and

(3) Strengthen the DM measures.

As an outcome of the mock exercises and mock drills, the challenges and gaps should be identified, and the possible action points drawn up. Towards this end:

(1) Conduct debriefing of the mock exercises and drills;

(2) Analyze the mock exercises and drills to understand:

(a) What went wrong?

(b) What are major positive and negative lessons learnt individually or department-wise?

(c) Where are improvements suggested by the participants?

(3) What is the way forward for better planning mitigation and preparedness to face future events?

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Education, Fire & Emergency Services, Police, Public Works (R&B, Electricity, Water Supply, Irrigation, Municipal Administration, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Education, Fire & Emergency Services, Police, Public Works (R&B, Electricity, Water Supply, Irrigation, Municipal Administration, and Panchayati Raj*

State Administrative Training Institute
Civil Defence

5.4 Response

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C2.2.2, 3.2.2 and C4.2.2)

Disaster Response involves a number of critical coordination functions by the state or UT in the aftermath of disasters. These include: (i) situation assessment, (ii) immediate response (especially search & rescue, and providing basic shelter and medical attention to the affected persons), and (ii) Restoring telecommunications, transportation, power, water and food services. Disaster Response can be seen to be undertaken in two segments, namely:

(a) *Immediate Response* coordinated by the state or UT and supported by the pre-identified stakeholders within the state or UT, including mobilization of the non-government agencies, and

(b) *Response* assisted by other States, UTs and the central government, if required. The state or UT should call upon for assistance the NDRF battalion trained in the subject of the disaster in focus, only if SDRF cannot manage to meet the needs. Likewise, the central agencies and those from the other states or UTs should be requisitioned only when required, ie., the capacity of the state or UT is insufficient to deal with the disaster.

These are articulated and elaborated in the SDMP, the DpDMPs and the DDMPs. Clearly, the state or UT should be able to leverage effectively the various technologies related to Disaster Response. Two aspects dominate here, namely use of communication technologies and information technology.

5.4.1 Communications

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.6 and Matrix C Item C6.7)

All communications should be fail-safe and hence this should be ensured through effective articulation of the requirements laid down in the SDMP. Use of technology products appropriate to the need is essential in achieving this.

The state or UT should:

(1) Develop fail-safe communication plan at various levels, namely state, district and local levels, for smooth and timely communication of actions, by:

  (a) Mapping out exiting communication facilities, need for new facilities, sources of power supply, and alterative arrangements;

  (b) Developing resource inventory of the communication equipment available at the district and local level and put them on Disaster Resource Network;

(c) Assessing the requirement of supervision, maintenance, replacement, repair and transportation for the maintenance of communication facilities;

(d) Designing for networking of inter-organization communications facilities of the Police, SDRF, Armed Forces, and Irrigation Department, etc.;

(e) Establishing new communication facilities wherever needed for disaster response;

(f) Creating mobile vans with complete communication equipment and appropriate personnel; and

(g) Ensuring effective communication and web-based online Decision Support System (DSS) is in place in the EOC and connected with the IRTs at the district, sub-division, tehsil/block levels.

(2) Develop comprehensive communication system preparedness plan to smoothly coordinate disaster response at various levels, by:

(a) Working closely with the Logistics Section of the State of UT to ensure that the communication system as articulated in the IRS are in place and remain in the post-disaster situations, which includes regular use of these systems;

(b) Developing Incident Communication Plan (ICP);

(c) Assigning the role of Communication Leader to work under the direction of logistics section in post-disaster situation;

(d) Maintaining the records of all communications equipment deployed in the field;

(e) Preparing an alternative communication plan for execution in case of possible failure of the normal communications network. The alternative communications network may have wireless, satellite phones, cell phones, HAM radios, etc.;

(f) Establishing communication facilities in the required locations i.e. staging area, relief camps / shelters, warehousing areas, destination points, incident base etc. post disaster situation;

(g) Developing mechanism to constantly review the Communication Plan to meet the changing requirements of the situation;

(h) Assessing the requirement and plan for dedicated back-up sources to operate various communication facilities;

(i) Pre-agreeing with the local vendors / suppliers for ensuring alternate power sources (e.g., batteries, generators and fuel) for communication equipment within a short period of time; and

(j) Designating one station as an emergency public communication system. Locate it in an hazard-resistant building, and provide robust emergency power backup and adequate fuel and supplies; and

(3) Organize coordination with central and state agencies through the communications network established to meet the requirements of any emergency in the state or UT, by:

(a) Designing a suitable interoperable and compatible network between various agencies. This networking is also vital for the integration of agency capabilities, like the NDRF and Armed Forces;

(b) Signing MoUs with the central agencies and communication service providers to restore the communication facilities in case of failure, including seamless interoperability of communications between system of different telecom service providers;

(c) Preparing a plan for integration of the communications system of the central teams (e.g., NDRF and Armed Forces) with the local and police communication system for the management of large scale disasters;

(d) Planning for quick and easy linking of existing independent networks of all departments of the State Government or UT Administration;

(e) Working closely with the electricity department to avoid interruption to communication facilities in case of power failure; and

(f) Organizing the existing communications network so as to meet the requirements of any emergency in the state or UT.

Responsibilities

Ministry of Telecommunications
Ministry of Home Affairs
: National Disaster Management Authority (NDMA)
: National Disaster Response Force (NDRF)

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
State Executive Committee
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of ALL departments

Home Guards
Civil Defence

5.4.2 Information Technology

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.6 and Matrix C Items C6.7 and C6.16)

DM involves large number of stakeholders, and requires periodic exchange of information from each of the stakeholders to the central decision making offices (like those of the Chief Secretary, State Executive Committee, Principal Secretary, Secretary or In-charge of Disaster Management, SDMA, and District Collectors, District Magistrates, or Deputy Commissioners). This can be achieved only through a formally organized data base with appropriate options for each of them to view and extract the needed data and information. Thus, efforts should be made for establishing IT infrastructures consisting of required IT processes, architecture and skills for quick up-gradation and updating of data sets from Departments, PRIs, ULBs and other government agencies, bodies and units engaged in DM. Leveraging communications and information technology support has been articulated and elaborated in the SDMP, especially the part related to the establishment and functioning of the State EOC.

The state or UT should:

(1) Collected data in predefined formats and process it to extract information, which will facilitate uniform reporting, monitoring and evaluation, by:
   (a) Designing dedicated formats for data collection (e.g., assignment of tasks list, communication plan, medical plan, unit logs, and check list of emergency supplies);
   (b) Maintaining proper records of all essential services needed for rescue, response and relief phases, by the state governments;
   (c) Establishing sound reporting mechanism to meet the information needs of both central and state governments about the disaster response;
   (d) Creating a cell at the district level (preferably as part of district EOC) and place dedicated resource persons to collect and update data on all essential services (as per the templates given in the IRS guidelines);
   (e) Imparting training to the various decision-makers for familiarizing the various formats used for presenting the IRS survey and data records;

(f) Collecting and collating information given in standard forms and derive useful information using evaluation tools;

(g) Presenting the information derived using simple charts, tables or even pictures to enable easier understanding by decision makers;

(h) Developing a centralized Disaster management portal integrating the functions of all the sections of the IRS through a user-friendly dashboard; and

(i) Imparting training to the staff of the key departments (including those in the departments of planning and logistics), who are coordinating the IRS activities to login into this portal and populate the data and information of their section.

(2) Disseminate information on response mechanism along with future alerts in preparedness and saving lives and resources, by:

(a) Engaging with a representative of SDMA to work with the planning section at state level for making of Incident Action Plan (IAP) and dissemination of information; and

(b) Creating a cell at the district level (preferably as part of District EOC) and place dedicated resources to collect and update data on all essential services (as per the template given in the IRS guidelines).

Responsibilities

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of ALL departments
District Emergency Operations Center (DEOC)
State Bureau of Economics & Statistics

5.5 Rehabilitation

Rehabilitation involves bringing back the people affected in the disaster back to a regular life, although with some hiatus and some loss. This involves four major components, namely:

(1) Financial compensation to offset some of the loss incurred by affected persons during the disaster,

(2) Restoring physical and mental health of the affected persons, and

(3) Creating economic activities in the neighborhood to restore livelihood (and thereby their self-esteem) of affected persons, and

(4) Initiate social activities that help rebuild the social fabric and camaraderie within the members of the community.

In the above, technology plays a major role in contributing to items (2) and (3) above.

5.5.1 Physical and Mental Health

Technology can be leveraged in the following:

(1) Major equipment and facilities to diagnose the illnesses of affected persons;

(2) Minor devices and sensors to monitor the personal health of people, and

(3) Online information on WHO standards of personal hygiene and dietary habits suitable for Indian conditions.

The state or UT should:

(1) Prepare a plan of the medical facilities needed to address aspects of a physical and mental health (e.g., typical injuries or infections, and psycho-social trauma) that affected persons may face in different disasters; and

(2) Equip the hospitals in the respective regions with needed medical technology infrastructure, and appropriately trained technical manpower to use these technology tools.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of department** of Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of department** of Health*

5.5.2 Economic Activities

Here, economic activities can be chosen to suit the physical and mental health of the persons. The type of technologies short-listed will vary depending on the type of economic activity, e.g., sewing and knitting for women, and manufacturing units for men.

The state or UT should:

(1) Identify the likely economic activities that can be started in the aftermath of disasters in different regions, based on the skills and current engagements of people in those regions, and map it with the technological equipment, devices, sensors and tools that can be used for such activities; and

(2) Arrange at short notice some of these facilities for immediate deployment towards restoring livelihoods for affected people.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Labor and Employment, and Women & Child Welfare*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Labor and Employment, and Women & Child Welfare*

5.6 Reconstruction

Technology is one of the five main aspects in reconstruction. It involves:

(1) Constructing permanent shelters,

(2) Developing cost-effective structural designs that are disaster-resistant,

(3) Training artisans in the use of technology with advanced technology tools,

(4) Judicious use of local materials based on due testing to ascertain their properties, and

(5) Testing of type design structures that are used in constructing large numbers of houses, either as housing for masses or as mass housing.

The state or UT should:

(1) Prepare type-designs for permanent shelters to be built in different regions,

(2) Get the above structural designs of the permanent shelters verified through full-scale testing at a national institute or laboratory having such facilities;

(3) Undertake R&D studies to examine the suitability of local materials in the construction of permanent shelters.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works (R&B), Town & Country Planning, and departments that have physical assets

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works (R&B), Town & Country Planning, and departments that have physical assets
Commissioners of ULBs
Secretaries of PRIs

National Structural Engineering R&D Laboratories
Universities & Institutes engaged in retrofit of built environment (including heritage structures) and full-scale testing (like IIT Kanpur and MNIT Jaipur)

5.7 Research And Development

DM is ever evolving, because conditions of the built environment are changing each day, nature is responding differently to this unregulated built environment, and newer technologies are being proposed each day. Research and Development (R&D) helps mediate between these three dynamically changing situations. Thus, R&D is all pervasive in DM. It can be along many directions, namely in:

(1) Undertaking Disaster Risk Analysis, especially in hazard estimation and zonation, exposure inventory, and vulnerability assessment;

(2) Establishing Disaster Management Systems and Processes, especially in administrative, legal, financial and operational arrangements;

(3) Developing Technologies to assist in the 6 stages of the DM cycle, namely prevention, mitigation, preparedness, response, rehabilitation and reconstruction; and

(4) Undertaking Implementation of pre- and post-disaster DM measures, along the 6 stages of the DM cycle, namely prevention, mitigation, preparedness, response, rehabilitation and reconstruction; and

(5) Monitoring Completion Timelines, Monitoring progress made, Manpower engagement, and maintenance of Chain of Command.

5.7.1 Lessons Learnt from Past Disasters

The use of modern technology and state-of-the-art equipment can improve the accuracy and relevance of post-disaster studies. These studies should be designed to focus on lessons that the failures are highlighting (which guides engineers to: what not to do in the future) and not merely the good practices (which prompts engineers to: what can be emulated and scaled up subsequently). The conclusions arising from such studies can serve the purpose only if they are widely disseminated to all the stakeholders including the community through the print and electronic media, journals on the subject of DM, and forums such as seminars and workshops. On the R&D front, two important activities should be undertaken, namely:

(1) Data Collection and Analysis to help R&D targeted to improve DM Plans; and

(2) Documentation of perishable technical evidence of the impact of the disaster targeted to improve ongoing and planning new mitigation actions.

The state or UT should:

(1) Develop a practice of undertaking Post-Disaster Reconnaissance Surveys (PDRSs) after negative fallout of each hazard;

(2) Commission multi-disciplinary Post-Disaster Reconnaissance Teams (PDRTs) (one for each hazard) consisting of appropriate number of technical and subject specialist, with standing instructions to evaluate various facets of the disaster;

(3) Provide access to them into affected area with clear instructions to be self-reliant and not become a burden on the ongoing Response activities;

(4) Get a debriefing from the PDRT to all SDMA and DDMAs to understand the genesis of the disasters, the shortcomings of the built environment or in the DM practices, and suggested road map for improvements in the current DM practices in the state or UT; and

(5) Commission follow up R&D with the members of the PDRTs in pointed areas based on the lessons learnt from the disasters.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

State academic institutes and R&D agencies engaged in disaster management and disaster safety of built environment
National institutes and R&D agencies engaged in disaster management and disaster safety of built environment

5.7.2 Floods

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C1.1.1, C1.1.2, C1.1.3 and C1.1.4)

Of all the natural hazards, forecasting floods is relatively easier. Notwithstanding this, significant advanced scientific tools are required to project scenarios well before they happen. But, flood forecasting is a national effort,

and part of the responsibility of the Central Water Commission (CWC) of the Ministry of Jal Shakti (MoJS), Government of India.

The state or UT should:

(1) Coordinate with CWC to get the inputs relevant to the state or UT;

(2) Study and monitor rivers flowing from neighboring states and/or countries, by:
   (a) Supporting CWC on R&D related to the state or UT;
   (b) Undertaking state-specific local efforts as per the guidance of CWC; and
   (c) Sponsoring state-specific efforts as per the guidance of CWC.

(3) Undertake Joint R&D and Capacity Development efforts with national level institutions, especially proactive applied R&D activities to address contemporary challenges, and generate solutions and techniques to mitigate the negative effects of floods, by:
   (a) Planning and integrating studies on assessment of hazard, vulnerability and risk arising from floods;
   (b) Commissioning the national institutions (namely CWC, Central Water and Power Research Station (CWPRS), and National Institute of Hydrology (NIH)) to perform the said studies based on nationally agreed methodologies of assessment of hazard, vulnerability and risk arising from floods;
   (c) Employing pre-event investigation techniques using latest technologies (like remote sensing, IoT, wireless communications, and instrumentation technologies) to gather information on floods;
   (d) Undertaking post-event scientific (multi-disciplinary teams) field investigations to assess their severity and impact of the event on the built environment;
   (e) Engaging with national academic institutes and R&D organizations, especially those in the state or UT, to:
      (1) Document electronically (in all media) past floods,
      (2) Identify areas likely to inundate in future likely events,
      (3) Undertake pilot projects to forecast scenarios in future; and

(4) Develop appropriate early warning systems, through simulation with data collected from the field in past floods and that collected using optical imagery and microwave data, and development of virtual reality-based visualizations;
   (a) Preparing hazard zonation maps based on above R&D, and using the same in the development planning and rehabilitation;
   (b) Strengthening flood preparedness, mitigation and response efforts based on scenario analysis and simulation modeling prepared in partnership with national agencies, including:
      (1) Conducting watershed model studies suitable for using remotely sensed information as inputs, to predict flood flow under 'inadequate' or 'no data' situations
      (2) Performing Analytical studies for long reaches, which are complemented by physical model studies for problem reaches for flood management works of a permanent type (e.g., embankments, spurs and revetments) involving huge costs and having significant impact on river behavior;
      (3) Strengthening state libraries and information centers with repositories of technical resources (books, reports, journals, electronic documents, and others) related to flood management; and
      (4) Learn lessons from past experiences and factor improvements into future planning of prevention, preparation, mitigation, relief and response measures towards flood management; and
   (c) Disseminating information related to flood safety.

Responsibilities

Ministry of Jal Shakti
Central Water Commission (CWC)
Central Water & Power Research Station (CWPRS)
National Institute of Hydrology (NIH)
Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Irrigation, Water Resources, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Irrigation, Water Resources, and Panchayati Raj Commissioners of ULBs*
Secretaries of PRIs
State Remote Sensing Application Center

Academic institutes and R&D agencies

5.7.3 Earthquakes

Earthquakes pose a completely different level of challenge, because the subject of earthquake *structural safety* is *not taught* in *any* college in the country as part of the *mandatory* curriculum. Further, there are only a limited number of R&D activities underway at academic institutes and R&D organizations, which are focused on earthquake safety of the built environment. Only a select few of these are sponsored by central and state government bodies. The current R&D work underway is insufficient to make any perceptible difference to the current state of the practice, because most of this R&D is analytical research addressing *structural* **components,** and not experimental studies on full-scale specimens of *building and structural* ***systems.*** This is attributed to shortage of number of faculty members engaged in mainstream teaching and research in earthquake engineering, full-scale earthquake testing facilities in the country, and absence of priority in national funding agencies demonstrated by no focused thrust area on the list R&D domains being funded.

The state or UT should:

(1) Identify and train at least a reasonable number of faculty members of technical institutes and universities in the state or UT in the area of earthquake engineering, especially in earthquake hazard, earthquake resistant design and detailing, and earthquake safety assessment and strengthening;

(2) Commission the technical institutes and universities in the state or UT to offer *degree programs* with earthquake engineering specialization, to begin with at the Master's Program;

(3) Fund select national level technical institutes in the state or UT to:

(a) build full-scale testing laboratory to undertake appropriate R&D studies, and

(b) experimental and analytical R&D studies, especially on buildings, elevated water tanks, and bridges;

(4) Ensure that no government funded housing scheme adopts technologies that are not verified for safety based on full-scale testing of: (a) the whole unit of housing up to 3-storeys, and (b) sub-assemblages of taller buildings; and

(5) Revise bye-laws and technical requirements of the state or UT regulated through PRIs and ULBs, based on experimental and analytical R&D studies.

Responsibilities

Ministry of Earth Sciences
National Center for Seismology (NCS)
India Meteorological Department (IMD)
Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Public Works, and other departments having physical assets*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Public Works, and other departments having physical assets*
Commissioners of ULBs
Secretaries of PRIs

State academic institutes & R&D agencies engaged in earthquake safety of built environment
National institutes and R&D agencies engaged in earthquake safety of built environment
Structural Engineering Laboratory, IIT Kanpur
National Earthquake Testing Facility, MNIT Jaipur

5.7.4 Landslides and Avalanches

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C3.1.2)

The subject of landslide and avalanche assessment is a coordinated national effort. Each state or UT may not have the technical manpower, data and other resources to prepare maps of critical locations where landslides and avalanches are likely to occur. Hence, each state or UT should support and cooperate with central agencies engaged in the subject, by providing local data and information.

The state or UT should:

(1) Undertake *Joint R&D* and *Capacity Development* efforts with national level institutions, especially intensive research required to develop innovative, eco-friendly and cost-effective measures for landslide investigation and remediation practices in the state or UT, by:
   (a) Planning and integrating studies on assessment of *hazard, vulnerability* and *risk* arising from landslides and snow avalanches;
   (b) Commissioning the national institutions (namely *Geological Survey of India (GSI)* for landslides and *Snow & Avalanche Study Establishment (SASE)* for snow avalanches) to perform the said studies based on nationally agreed methodologies of *hazard, vulnerability* and *risk assessment;*
   (c) Employing pre-event investigation techniques using latest technologies (like remote sensing, IoT, wireless communications, and instrumentation technologies) to gather information on potential landslides;
   (d) Undertaking post-event scientific (multi-disciplinary teams) field investigations to understand them (especially causative factors, mechanisms of development, drainage, and anthropogenic factors), and assess their severity and impact of the event on the built environment;
   (e) Engaging with national academic institutes and R&D organizations, especially those in the state or UT, to:
      (1) Document electronically (in all media) perennial & one-off landslides,

(2) Identify potential hotspots, forecast likely events,

(3) Forecasting formation of dams in rivers courses arising from landslides, performing dam-break analyses of these dams, and proposing methodologies for controlled outlet of water from these reservoirs; and

(4) Develop appropriate early warning systems, through simulation with data collected on snow cover monitored using optical imagery and microwave data, and development of virtual reality-based visualizations;

(f) Preparing hazard zonation maps based on above R&D, and using the same in the development planning and rehabilitation; and

(g) Disseminating information related to landslide and snow avalanches safety.

Responsibilities

Ministry of Defence
Snow & Avalanche Study Establishment (SASE)
Ministry of Mines
Geological Survey of India (GSI)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Geology and Mines, Public Works (R&B, Electricity, Water Supply), Irrigation, Municipal Administration, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Geology and Mines, Public Works (R&B, Electricity, Water Supply), Irrigation, Municipal Administration, and Panchayati Raj*
Commissioners of ULBs
Secretaries of PRIs
State Remote Sensing Application Center

Academic institutes and R&D agencies in studies related to landslides and snow avalanches

5.7.5 Droughts

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C4.1.5)

Research needs to be conducted through the university system to cope with water deficit, to manage crops with less water, improve water conservation programs, and enhance the productivity of dry land and rain-fed farming.

The state or UT should:

(1) Prioritize dry land farming research,

(2) Develop drought tolerant cultivars, and

(3) Develop water conservation techniques.

Responsibilities

Ministry of Agriculture
Indian Council for Agricultural Research (ICAR)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Planning, Agriculture, and Animal Husbandry*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Planning, Agriculture, and Animal Husbandry*
State Agriculture University (SAU)

Academic institutes and R&D agencies engaged in studies related to droughts

5.7.6 Chemical Disasters

Chemical Disasters bring a much different challenge in terms of severity of impact, the extent of damage and types of consequences. All the states and UTs may not have internal technical capacity to address these matters. Hence, it is in the interest of the state or UT to build internal capacity through R&D to become capable of forecasting such scenarios, develop *quality control and quality assurance* systems to prevent recurrence of such events in future. But, in the interim, it may be essential to seek support and coordinate with the Government of India to assist its local authorities and local population.

The state or UT should:

(1) Build systems and processes to record, document, synthesize and share information with all stakeholders on the chemical hazard prevalent in the state or UT, by:
   (a) Establishing links with Ministry of Labour and Employment (GoI), MoEF&CC (GoI), Ministry of Petroleum and Natural Gas (GoI), Ministry of Railways (GoI), Ministry of Road Transportation and Highway (GoI), Ministry of Chemical and Fertilizers (GoI), PESO, NEERI (CSIR), ICC, ASSOCHAM, FICCI and other associations dealing with hazardous chemicals;
   (b) Preparing a database and information system of *chemical hazard* and *accidents;*
   (c) Preparing online database to deal with hazardous chemicals;
   (d) Undertaking R&D on effective management of HAZCHEM, and:
      (1) Developing *information system on hazardous waste;*
      (2) Undertaking *field investigations* to study accident's impact on local communities, environment, flora and fauna, and
      (3) Deriving clear directions from the forensic studies on past accidents;
   (e) Archiving chemical accident data generated and historical data collected by various agencies nationwide;
   (f) Synthesizing periodically the details of chemical hazards, accident details, new technologies to mitigate the impact of accidents arising from hazardous chemical;
   (g) Sharing this information with relevant stakeholders; and
   (h) Undertaking studies on improving occupational safety in workplaces.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** S&T*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** S&T*
District Emergency Operations Center (DEOC)
State Disaster Management Centers and Cells

5.7.7 Other Disasters

The *National Disaster Management Plan* 2019 recognises five sets of **natural hazards,** namely:

(1) *Geophysical Hazards,* namely Earthquakes, Landslides, Volcano, and Tsunamis;

(2) *Hydrological Hazards,* namely Avalanche, Coastal Erosion, Coastal flood, Debris Flow, Mud Flow, Rock Fall, Flash Flood Hydrological, Flood Hydrological, Wave Action;

(3) *Meteorological Hazards,* namely Cyclone, Storm Surge, Tornado, Convective Storm, Extra-tropical Storm, Wind, Cold Wave, Derecho, Extreme Temperature, Fog, Frost, Freeze, Hail, Heat-wave, Lightning, Heavy Rain, Sand-Storm, Dust-Storm, Snow, Ice, Winter, Storm, Blizzard;

(4) *Climatological Hazards,* namely Drought, Extreme hot/cold conditions, Forest Fires and Wildfire, Glacial Lake Outburst, Subsidence; and

(5) *Biological Hazards,* namely epidemics (viral, bacterial, parasitic, fungal, or prior infections), insect infestations, and animal stampedes.

Also, it recognises the following **man-made hazards:**

(1) *Accidents,* including industrial, road, air, rail, on river or sea, building collapse, fires, mine flooding, and oil spills;

(2) *Chemical, Biological, Radiological,* and *Nuclear (CBRN) Hazards;* and

(3) *Terrorist* activities.

This Guide responds to disasters listed in Annexure II of the MHA-UNDP Report on *"Disaster Risks and Resilience in India - an Analytical Study."* Of these disasters, this guide addresses only five of them, namely *floods, earthquakes, landslides* and *snow avalanches, droughts* and *chemical disasters.*

The state or UT should:

(1) Examine the other hazards that it is faced with; and

(2) Extend this *Step-by-Step Guide* to include the effects, sensibilities and nuances of those hazards also.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA

5.8 Responsibilities

The responsibilities of the key functionaries in the state government or UT administration pertaining to *Technology* are presented in **Table 5.1.**

5.9 Timelines

The timeline of activities pertaining to *Technology* within which they need to be completed are presented in **Table 5.2.**

Table 5.1: Responsibilities of key functionaries and units of State Government or UT Administration pertaining to Technology

Section	Activity	Key functionaries and units of state government or UT administration								
		CM M	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO/ S(DDMA), C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
5.1	**PREVENTION**									
5.1.1	Monitoring			✓	✓	✓	✓	✓		✓
5.1.2	Forecasting & Early Warning Systems			✓	✓	✓	✓	✓	✓	✓
5.2	**MITIGATION**									
5.2.1	Hazard Resistant New Constructions			✓	✓	✓	✓	✓	✓	✓
5.2.2	Retrofit of Existing Constructions			✓	✓	✓	✓	✓	✓	✓
5.2.3	R&D			✓	✓	✓	✓	✓	✓	✓
5.3	**PREPAREDNESS**									
5.3.1	Scenario Building Simulations			✓	✓	✓	✓	✓	✓	✓
5.3.2	Mock Exercises and Drills			✓	✓	✓	✓	✓		✓
5.4	**RESPONSE**									
5.4.1	Communications		✓	✓	✓	✓	✓	✓		✓
5.4.2	Information Technology			✓	✓	✓	✓	✓		✓
5.5	**REHABILITATION**									
5.5.1	Physical and Mental Health			✓	✓	✓	✓	✓		
5.5.2	Economic Activities			✓	✓	✓	✓	✓		
5.6	**RECONSTRUCTION**									
				✓	✓	✓	✓	✓	✓	✓
5.7	**RESEARCH AND DEVELOPMENT**									
5.7.1	Lessons Learnt from Past Disasters			✓		✓	✓	✓		✓
5.7.2	Floods			✓	✓	✓	✓	✓	✓	✓
5.7.3	Earthquakes			✓	✓	✓	✓	✓	✓	✓

Section	Activity	Key functionaries and units of state government or UT administration								
		CM M	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO/ S(DDMA), C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
5.7.4	Landslides and Avalanches			✓	✓	✓	✓	✓		✓
5.7.5	Droughts			✓	✓	✓	✓	✓		✓
5.7.6	Chemical Disasters			✓	✓	✓	✓	✓		✓
5.7.7	Other Disasters			✓				✓		

Legend:

CM	:	Chief Minister
M	:	Minister (Revenue) or Minister (DM)
CS	:	Chief Secretary
C(DM)	:	Principal Secretary, Secretary or In-charge of Disaster Management
Ss	:	Secretaries of departments
DGP	:	Director General of Police
DGF	:	Director General of Fire Services
AG	:	Advocate General of the State
S(SDMA)	:	Secretary, SDMA
M(SDMA)	:	Member, SDMA
VC(SDMA)	:	Vice-Chairman, SDMA
DG(SDRF)	:	Director, SDRF
DC	:	District Collector, District Magistrate or Deputy Commissioner
DDMO/S(DDMA)	:	District Disaster Management Officer/ Secretary ex officio, DDMA
C(DDMA)	:	Chairman, DDMA
C(ULBs)	:	Commissioners of Urban Local Bodies
S(PRIs)	:	Secretaries of Panchayati Raj Institutions
SRSAC	:	State Remote Sensing Applications Center
SS&T	:	State S&T Bodies
SR&D	:	State R&D Bodies
SAU	:	State Agriculture University
SPTC	:	State Police Training College
SATI	:	State Administrative Training Institute
SCERT	:	State Council for Education, Research and Training
SIDM	:	State Institute of Disaster Management
SEOC	:	State Emergency Operations Center

Note:
In a Union Territory, the Equivalent Officer/Office may be considered.

Table 5.2: Timelines for completion of activities pertaining to Technology

Section	Activity	Timeline		
		Short-term	Medium-term	Long-term
5.1	**PREVENTION**			
5.1.1	Monitoring	✓	✓	✓
5.1.2	Forecasting and Early Warning Systems	✓	✓	✓
5.2	**MITIGATION**			
5.2.1	Hazard Resistant New Constructions	✓	✓	✓
5.2.2	Retrofit of Existing Constructions	✓	✓	✓
5.2.3	Research and Development	✓	✓	✓
5.3	**PREPAREDNESS**			
5.3.1	Scenario Building Simulations	✓	✓	✓
5.3.2	Mock Exercises and Drills	✓	✓	
5.4	**RESPONSE**			
5.4.1	Communications	✓		
5.4.2	Information Technology	✓		
5.5	**REHABILITATION**			
5.5.1	Physical and Mental Health	✓		
5.5.2	Economic Activities	✓		
5.6	**RECONSTRUCTION**			
5.7	**RESEARCH AND DEVELOPMENT**			
5.7.1	Lessons Learnt from Past Disasters	✓	✓	✓
5.7.2	Floods	✓	✓	✓
5.7.3	Earthquakes	✓	✓	✓
5.7.4	Landslides and Avalanches	✓	✓	✓
5.7.5	Droughts	✓	✓	✓
5.7.6	Chemical Disasters	✓	✓	✓
5.7.7	Other Disasters	✓	✓	✓

Note:

(1) The precise timelines will depend on the dimension and complexity of the activities as well as geographical and demographical features of the state or UT. In general,

(a) *Short-term* involves **vital activities** towards DM, which are of immediate nature, for which the funds should be **allocated immediately**;

(b) *Medium-term* involves **essential activities** towards DM, which are of urgent nature, for which the funds should be **made available without fail**; and

(c) *Long-term* involves the remaining **necessary activities** towards DM, which are important, for which the funds *should be* **made available eventually**.

*****

PART - 6
Implementation

6 Implementation

The main segment in the *(infinite)* relay race of DM is *implementation.* Often, the persons who conceive the DM Plans do not implement them at *all levels.* Thus, the *baton exchange* between the stakeholders should be made as smooth as possible to reduce possibilities of any slip up. This is best achieved by putting in place DM systems and processes (some of which are articulated in the preceding chapters of this *Step-by-Step Guide*), rehearsing them in smaller events that happen,

6.1 Disaster Management Activities

The SDMP, DpDMPs and DDMPs list a sequence of activities that the state or UT needs to undertake to be disaster resilient. These activities come under one of the six phases of the DM cycle, namely *prediction, mitigation, preparedness, response, rehabilitation* and *reconstruction.* **Chapter 2** recalls briefly these six phases. The actionable items are listed here.

6.1.1 Prediction

Prediction is understood normally as estimating the *time, location* and *severity* of the occurrence of an event related to a hazard. With the advent of technology (especially advanced instrumentation and analysis), now this is possible with some natural hazards. But, in general, the **good mitigation practices** are **mandatory,** even though some fore-warning can be capitalized on in case of some natural hazards.

(a) Floods

Technology can pre-empt locations that will get inundated during heavy rains and cloud bursts. GIS-based work should be undertaken to pre-articulate the areas likely to inundate (See **Section 5.1**). Evacuation of persons from flood-prone locations is only a *short-term solution;* relocation is a *long-term solution.*

(b) Earthquakes

Prediction of time of occurrence of earthquakes has not been successful yet, even though the regions likely to sustain earthquakes are known broadly. It is prudent to implement all earthquake disaster **mitigation** measures, especially those mentioned in this document.

(c) Landslides and Snow Avalanches

Locations of perennial landslides and snow avalanches are known. But, technology can pre-empt other locations that can sustain such situations too. Relocation of people and property seems to be the only solutions. Some features like roads will continue to be in such locations, but strategies are required to ensure continuity of road transportation even under the landslides and snow avalanches conditions.

(d) Droughts

Technology has made it possible to prevent the likelihood of droughts. In this backdrop, in the:

(1) *long-run,* develop in communities good **mitigation** practices of water conservation, and

(2) *short-run,* undertake measures to supplement the needed water by explicit steps like transporting basic drinking water from other areas.

(e) Chemical Disasters

Chemical disasters occur when due vigilant mitigation measures are not complied with. Thus, prediction per say is not the focus. Instead, stringent quality control and quality assurance measures should be made mandatory, to

verify that the needed systems and processes are in place, and are rehearsed duly at the specified frequency.

The state or UT should:

(1) Commission separate R&D teams to study prediction of hazards, like floods, landslides, snow avalanches, droughts, and chemical disasters;

(2) Seek suggestions from the above teams on measures to be undertaken to mitigate the effects of negative fall out of the said disasters;

(3) Implement the measures suggested by the R&D teams.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of ALL departments

6.1.2 Mitigation

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.2, and Matrix C Items C1.3.1, C1.3.4, C1.3.5, C1.3.6, C1.3.7, C1.3.8, C1.4.2, C1.4.3, C4.3.1 and C4.3.2)

Each hazard poses special requirements that need specialized attention and approach. For example, while floods require the built environment to be located at elevations above HFL, earthquakes require development to be earthquake-resistant. The former requires land-use zoning, while the latter is a purely technical effort. Some such nuances are discussed hereunder.

(a) Floods

Floods are annual events. With unregulated growth of development in low lying areas, it is necessary to examine the safety of the housing, industries and work places in flood plains. In particular, the following works assume prime importance, namely:

(1) Structural safety audit of existing earth embankments;

(2) Maintenance of drainage systems and earth embankments;

(3) Prevent the reclamation of wetlands and natural depressions;

(4) Prevent afforestation;

(5) Assess and enhance safety of deficient dams and embankments;

(6) Implement an action plan (in the form of *integrated water management system* in urban and rural areas, which consider watersheds, treatment of water catchments to remove all forms of pollution, water drainage systems, water treatment, water use, waste water treatment and water recycling) for managing wetlands and natural drainage systems for flood moderation; and

(7) Enforcing flood control measures (e.g., construction of embankments).

These are part of the SDMP, which is prepared in lines with the *NDMA Guidelines on Management of Floods* and on *Management of Urban Flooding.* The state or UT should examine the SDMP and see if the matter of floods is addressed holistically as per the said the NDMA Guidelines; else, the SDMP should be revised to ensure the same.

Alongside, de-silting and dredging of rivers and dams should be undertaken to improve flow, drainage, floodwater diversion through existing channels, and implementation of development projects as per norms. This is part of *day-to-day functioning* of line department of the state or UT. Therefore, officers of the departments of water resources should uphold the dignity of office and conduct their duties as laid down in their employment.

Also, there is an increasing trend of *urban flood* disasters. This is avoidable to a large extent, if not completely, through suitable land-use planning. There is need to accord priority for improving urban drainage systems with special focus on non-obstruction of natural drainage systems.

The state or UT should:

(1) Convene a meeting of the following:

(a) *Chair* : Chief Secretary

(b) *Secretary* : Secretary, SDMA

(c) *Members* : Commissioner (DM) &/or Secretary (Revenue)
Secretaries of UD and Planning
Directors of Municipal Administration
Representatives of NRSA and State RSAC
Representatives of MoUD (GoI)
Representative of Water Resources Department
Commissioners (Municipal Corporations)
CEOs of Metropolitan Water Supply and Drainage Authorities

(2) Identify all infrastructures that are likely to be inundated during urban flooding and prepare a time-bound plan of action as part of the *State DM* Plan on urban flooding, to be monitored by external independent agency/agencies. This shall be in line with the recommendations of *NDMA Guidelines on Urban Flooding*. Map spatial distribution of civic infrastructure and place on a *Decision Support System* for improved management of urban disaster risks, especially urban floods.

(3) Propose new land-use map in keeping with the current *high flood levels.* There is a misconception that housing, buildings and structures in flood plains can be made *flood-resistant.* There is **no such concept as flood-resistant structures.** Once these structures are inundated, the pressure of water will penetrate through the doors and window, break them, and drown people and destroy property. The only way out to save both people and property from such devastation, is to ensure that all built environment is above high flood level. This should uphold the provisions of the *Flood Plain Zone Management Act, 1975.*

Responsibilities

Representative of Ministry of Ministry of Housing and Urban Affairs
Representatives of Department of Space
National Remote Sensing Center (NRSC)

Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Planning, and Urban Development
Directors of Municipal Administration
Representative of Water Resources Department

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

District officers of departments of Planning, and Urban Development
Commissioners of Municipal Corporations
CEOs of Metropolitan Water Supply and Drainage Authorities
Representatives of State Remote Sensing Applications Center (SRSAC)

Waterways and drainage systems for roads highways and expressways should be aligned and designed in all development works only with due coordination and cooperation with the central agencies. The state or UT should:

(1) Assess the existing waterways to ensure vulnerability safety, and resilience of them to flood, by:

- (a) Mapping the existing ways through the PWD, WR and Roads Departments;
- (b) Developing a team of experts involving representation from MORTH, MOR, MOD, NHAI, BRO and state government for carrying out assessment of all existing waterways;
- (c) Developing standardized methods/tools for mapping the waterways in collaboration with the above central agencies;
- (d) Creating inventory of existing waterways and put it in the public domain;
- (e) Determining the encroachments into the waterways and ensure non-obstruction of them by buildings and structures;
- (f) Examining adequacy and if needed, appraising MOSRTH, MOR, MOD, NHAI, BRO for increasing the waterways of bridges/ culverts under roads and railways embankments;
- (g) Coordinating with the different central organizations, such as the Indian Railways, National Highway Authority of India (NHAI) the State Public Works Department, and BRO, for duly requirements of flood resilient construction of waterways;
- (h) Developing an appropriate techno-legal regime for the regulation of developmental activities in the flood plains, preventing blocking and encroachment of waterways;
- (i) Restricting unplanned growth so that the construction of structures obstructing waterways or resulting in increased flood hazard is not allowed;
- (j) Working in close association with the Ministry of Shipping, Road Transport and Highways (MOSRTH), MOR, MOD, NHAI, BRO, state governments/SDMAs and ensure that national highways, state highways, district and other roads are aligned, located and designed properly with respect to height and width, and provided with adequate waterway in the form of vents, culverts, bridges and causeways so as to make them flood safe and not increase the vulnerability of the area to flooding and drainage congestion; and
- (k) Developing a road map (duly approved) to remove buildings and structures obstructing existing waterways in close association with central agencies.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works, Water Resources, and Roads
Directors of Municipal Administration
Representative of Water Resources Department

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works, Water Resources, and Roads

Commissioners of ULBs
Secretary of PRIs

(b) Earthquakes

Earthquake **disasters** occur because of collapse of structures. Hence, earthquake disaster **mitigation** is a technology matter of constructing structures that do not collapse in future earthquake events. The solution is creating a work environment in all municipal bodies that guarantees earthquake safety of the built environment.

Hence, the State of UT should:

(1) Perform risk analysis (see Chapter 3) and identify landmasses that are susceptible to **liquefaction, landslides** or **debris flow,** and:
   (a) Prepare a risk-sensitive land use map for each urban and rural areas,
   (b) Ensure that no new development is sited in these areas, and
   (c) Move existing houses and facilities out of these areas, especially the critical and lifeline structures;

(2) Develop, implement and continually improve a techno-legal regime in the municipal bodies through robust **third-party structural safety peer review** and **third-party structural safety audit** of all structures built in future. Thus, assure regulated development that upholds the technical provisions of structural safety in the prevalent national standards and documents, and the need for structural safety in the SDMP, DpDMPs and DDMPs;

(3) Develop, seek approvals to make legal and implement the systems of **Licensing of Engineers** and **Certification of Artisans.** Thus, ensure that professionals (planners, design engineers, construction engineers, peer reviewers, and engineers maintaining the structures) and artisans (masons, bar benders, fitters, plumbers and electricians) engaged in the construction of all structures have the requisite **technically competence** to undertake their share of the task;

(4) Disseminate **information on criticality of earthquake resilient constructions** among the public, even if it is at a marginal increase in the initial project cost (of land, structure and finishes);

(5) Develop mitigation measures to **reduce losses due to secondary hazards** that could be triggered by earthquake ground shaking (such as fires in buildings and fracture of water and gas pipelines).

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Public Works, Water Resources, and other departments having physical assets across the state or UT*
Directors of Municipal Administration
Representative of Water Resources Department

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Public Works, Water Resources, and other departments having physical assets across the state or UT*

Commissioners of ULBs
Secretary of PRIs

(c) Landslides and Snow Avalanches

Landslide and snow avalanche hazards are exacerbated by human activity, with indiscriminate cutting and modification of slopes of the ecologically fragile mountains. A formal, environmentally sensitive approach is needed to reduce or eliminate losses as part of disaster mitigation.

The state or UT should:

(1) Demarcate areas vulnerable to landslides and snow avalanches, and present the same on hazard maps of 1:10,000 or better scales;

(2) Restrict development in areas prone to landslide and snow avalanches through careful land-use planning;

(3) Develop standard procedures for excavation, constructions and grading along hill slopes, in keeping with the prevalent standards and codes;

(4) Protect existing developments through improvement of surface water and groundwater drainage; and

(5) Develop and install monitoring and EWS for real time warning

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Public Works, and Geology & Mines

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Public Works, and Geology & Mines

Commissioners of ULBs
Secretary of PRIs

(d) Droughts

Certainly, the onset of **droughts** can be estimated. Thus, there is need to pre-empt the situations by making available at least a minimum of water and thereby minimizing the severity of the drought.

The state or UT should:

(1) Study the *drinking water sources,* locations and facilities of *water storage facilities,* and *water distribution systems*, in water scarce situations, by:

  (a) Evaluating the quantum of water requirement in drought prone areas;

  (b) Identifying the Departments to be involved to create storage structures and distribution scheme; and

  (c) Preparing *Detailed Project Reports* to create, upgrade and/or maintain:

    (1) Drinking water sources,

    (2) Storage structures and

    (3) Distribution schemes.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Irrigation & Command Area Development, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Irrigation & Command Area Development, and Panchayati Raj*
CEO or MD of State Irrigation Development Corporation

(2) Identify locations for fodder banks, with preference to locations for in-situ fodder banks and to regions closer to drought prone areas, by:

(a) Assessing the livestock population in drought prone areas and the quantum of fodder required;

(b) Identifying areas for cultivation of fodder crops ahead of requirement;

(c) Exploring the possibility of silage preparation during rainy and soil moisture available seasons;

(d) Procuring fodder seeds/planting material;

(e) Deploying exclusive technical manpower for fodder cultivation; and

(f) Coordinating (through the District Collectors and the SDMA) with the Department of Road Transport and Indian Railways to transport the fodder.

Responsibilities

Ministry of Railways
Divisional Railway Manager of the Zonal Railway

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Agriculture, and Animal Husbandry*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Agriculture, and Animal Husbandry*

(3) Identify potential rainwater harvesting technologies for varied rainfall distributions and drought intensities, by:

(a) Analyzing the hydro-geological data of an area/region from IMD;

(b) Analyzing long-term climate data to identify frequency of droughts;

(c) Assessing available water resources;

(d) Undertaking soil conservation measures;

(e) Selecting the most suitable water harvesting method; and

(f) Introducing TLR Provisions for including Rainwater Harvesting Structures in all the development works (especially the buildings) in drought-prone areas.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Agriculture, Animal Husbandry, Irrigation & Command Area Development, Municipal Administration, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Agriculture, Animal Husbandry, Irrigation & Command Area Development, Municipal Administration, and Panchayati Raj*

Even with only 13% of the river water being used, there is a severe **shortage of water.** This is attributed to many factors. Notwithstanding improvements in those factors, there is a need to consider water conservation as a sustainable approach to utilization of available resources.

The state or UT should:

(1) Identify the *catchment area* for gathering water and channel it to the storage structures, by:
  (a) Determining the slope of the area under consideration for water harvesting;
  (b) Evaluating land cover and land use for runoff evaluation;
  (c) Analyzing the soil type for assessing runoff depth and infiltration;
  (d) Conducting field surveys to validate the site selection;
  (e) Identifying the Departments to be involved to create storage structures and distribution scheme;
  (f) Preparing *Detailed Project Reports* to create:
    (i) Water harvesting structures,
    (ii) Storage structures and
    (iii) Distribution scheme.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Irrigation & Command Area Development, and Panchayati Raj*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Irrigation & Command Area Development, and Panchayati Raj*

(2) Actively plan for check dams, reservoirs with excess capacity, by:

(a) Constructing *check dams* at regular intervals to retain water upstream, improve percolation and recharge ground water, through:

(1) Review of intervals between *check dams* to avoid gully formation;

(2) Implementation of soil conservation measures, like contour bunding; and

(3) Handing over small check dams after completion to *Water User Associations (WUAs)* for operation and maintenance with the help of Irrigation Department; and

(b) Constructing reservoirs to capture water over a dam during excess water flow, through:

(1) Calculation of capacities of reservoirs based on projected water needs;

(2) Assessment of *reservoir sedimentation* against *planned capacity;*

(3) Planning for obsolescence and structural deterioration;

(4) Evaluation of subsurface conditions;

(5) Study of overall geological features of the reservoir site;

(6) Designing the capacities of reservoir storage; and

(7) Preparing *Detailed Project Reports* to create check dams and reservoirs with excess capacity.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Irrigation & Command Area Development, and Panchayati Raj

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Irrigation & Command Area Development, and Panchayati Raj

(3) Augment the groundwater capacity by changing the natural movement of surface water using relevant ground water recharge and augmentation techniques, by:

(a) Demarcating area of recharge;

(b) Analyzing long-term hydro-meteorological data for estimating non-committed surplus monsoon runoff;

(c) Studying hydrological data to ascertain source water for the purpose of recharge;

(d) Evaluating soil and land-use conditions;

(e) Mapping the hydro-geological features of the area or region;

(f) Conducting a physical, chemical and biological analysis of source water;

(g) Assessing subsurface potential for ground water recharge; and

(h) Identifying and executing relevant recharge techniques and structures

Responsibilities

Ministry of Earth Sciences
India Meteorological Department

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Irrigation & Command Area Development, Panchayati Raj, and Rural Development*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Irrigation & Command Area Development, Panchayati Raj, and Rural Development*

(e) Chemical Disasters

With rapid economic development, there has been spread of industries from small to large across the country. The growth of Chemical Industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM). A number of steps are indicated in the SDMP, which is prepared in lines with the *NDMA Guidelines on Chemical (Industrial) Disasters.* The state or UT should examine the SDMP, and ensure that the matter of chemical hazard is addressed holistically as per the said the NDMA Guidelines, else, the SDMP should be revised to ensure the same.

The State and UT should:

(1) Map the hazardous chemical locations and facilities;

(2) Conduct safety audit of hazardous chemical units;

(3) Assess the impact of chemical accidents on local population, and articulate the *worst case scenarios* and most *likely events;*

(4) Establish *Emergency Operation Centers (EOCs)* near chemically hazardous units and zones, and ensure in each of these units or zones:
   (a) Availability of sufficient PPEs relevant to various hazards;
   (b) Availability of sufficient fire fighting equipments;
   (c) Availability of trained manpower to respond during the chemical emergencies; and
   (d) Proper communication between the hazardous chemical units and the district and state administration.

(5) Integrate alarm systems to the control rooms of hazardous chemicals, especially when their impact may extend beyond the boundary wall of hazardous chemical units. In case of a chemical emergency of severe nature, relevant information should go to the EOC of the district administration.

(6) Prepare a land-use map keeping in mind the zone of impact of hazardous chemical accidents.

(7) Ensure mutual aid agreement among hazardous chemical units.

Responsibilities

Ministry of Earth Sciences
India Meteorological Department

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Industries, Labour, and Panchayati Raj

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Industries, Labour, and Panchayati Raj
Managing Director of State Pollution Control Board

Managing Directors of all Chemical Plants

6.1.3 Preparedness

(MHA-UNDP Report: Annexure II (page 259) Matrix C Items C4.4.1 and C4.4.2)

(a) Flood

An important facet of post-disaster actions is the safety of livestock. *Management of livestock in flood DM* includes in evacuation plans evacuating the livestock from the disaster site and arranging their food, shelter and veterinary care also. The state or UT should:

(1) Prepare a livestock management plan which describes how to evacuate livestock from disaster sites based on the warning indicators recorded before the hazard is realized, and arrange their food, shelter and veterinary care (including vaccination before evacuation);

(2) Rescue the animals to temporary shelters along with their owners;

(3) Create an open space beside the temporary shelter to accommodate all the livestock of the people in the shelters;

(4) Provide water and fodder as per the basic minimum standards of relief prescribed for livestock;

(5) Arrange to mobilize a veterinary care team for cattle injured during the disaster within short notice;

(6) Establish administrative arrangements (trained manpower, transport required if any, funds for burial / cremation expenses) by the municipal bodies for clearing the carcasses of dead animals to prevent epidemic spread;

(7) Frame a comprehensive strategy for emergency management of livestock during disasters along with steps for prevention, mitigation and preparedness;

(8) Include preparation of livestock management plan during disasters as a part of capacity building to prepare community-based disaster management plan;

(9) Constitute and make operational *Veterinary Care Centers* and *Veterinary Assistance Teams,* and organize preparedness programs and for emergency field and laboratory veterinary services;

(10) Prepare SOPs for livestock management to enhance inter departmental support and strengthen the weak linkages;

(11) Undertake capacity development at the community, district and state level by departments concerned as a part of their respective DM plans; and

(12) Promote R&D activities to mitigate the impact on livestock during disasters.

Responsibilities

Insurance Regulatory Development Authority (IRDA)
AIC
SLBC

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Irrigation, Geology & Mines, and Animal Husbandry*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Irrigation, Geology & Mines, and Animal Husbandry*
State Institute of Disaster Management (SIDM)
State Administrative Training Institute (SATI)
State Agriculture University

(b) Drought

Sustenance of water bodies is vital in drought prone areas. The state or UT should:

(1) Initiate campaigns on water conservation and protection of water bodies, by especially emphasizing water saving methods during droughts;

(2) Stress on building behaviour change towards ensuring drought resilience, especially changing perspectives on drought management as a proactive and risk based one;

(3) Encourage crop and animal insurance among farmers by providing customized insurance plans, and ensuring *better customer service* and *easy claim settlement;*

(4) Develop and disseminate drought management content through *community radio;* and

(5) Engage NGOs and communities involved in *animal protection* and *care* during drought.

Responsibilities

Insurance Regulatory Development Authority (IRDA)
AIC
SLBC

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Agriculture, Animal Husbandry, Panchayati Raj, Municipal Administration, Information & Public Relations*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Agriculture, Animal Husbandry, Panchayati Raj, Municipal Administration, Information & Public Relations*

Community Radio Operators
Private Insurance Players
Kishore Vaigyanik Kendras (KVKs)
Society for Prevention of Cruelty to Animals (SPCA)
NGOs
Civil Society Organizations

(c) Chemical

An important action following a chemical disaster is ensuring the safety of livestock. *Management of livestock* in *chemical DM* includes plans for evacuating the livestock from the disaster site and arranging their food, shelter and veterinary care.

The state or UT should:

(1) Prepare a evacuation plan which describes how to evacuate livestock along with local population from disaster sites based on the warning and arrange their food, shelter, and medical and veterinary care;

(2) Rescue the local population and animals to temporary shelters along with their owners;

(3) Create open spaces besides the temporary shelters to accommodate all livestock of the people in the shelters;

(4) Provide water and fodder as per the basic minimum standards of relief prescribed for livestock;

(5) Mobilize medical and veterinary care team for affected population and cattle injured during the disaster within short notice;

(6) Establish administrative arrangements (e.g., trained manpower, transport required (if any), and funds for burial or cremation expenses) by the municipal bodies for clearing the carcasses of dead animals and population to prevent spread of an epidemic;

(7) Prepare a comprehensive strategy for emergency management of population and livestock during disasters along with steps for prevention, mitigation and preparedness;

(8) Include preparation of livestock management plan during disasters as a part of capacity building effort when preparing the community-based DM plan;

(9) Prepare SOPs for chemical DM to enhance inter-departmental support and strengthen the weak links;

(10) Undertake capacity development at the community, district and state level by departments concerned as a part of their respective DM plans;

(11) Promote R&D activities to mitigate the impact on local population and livestock during disasters; and

(12) Develop and disseminate chemical DM content through the *community radio.*

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of *Industry, Labour, Agriculture, Animal Husbandry, Panchayati Raj, Municipal Administration, Information & Public Relations*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of *Industry, Labour, Agriculture, Animal Husbandry, Panchayati Raj, Municipal Administration, Information & Public Relations*
State Pollution Control Board

Community Radio Operators
Private Insurance Players
NGOs
Civil Society Organizations

6.1.4 Response

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items B3.8, B5.1, B5.2, B5.3, B6.1, B6.2, B6.3, B6.4, B6.5, and Matrix C Items C1.2.2, C4.2.2, C6.2, C6.3, C6.4, C6.5, C6.6, C6.7, C6.8, C6.9, C6.10, C6.11, C6.12, C6.13, C6.14, C6.15)

Disaster response requires is in two phases, namely (a) Immediate Response by the state or UT, and (b) response assisted by other states and central government, if required. Situation assessment, immediate response by the State, coordination with agencies of central and other state governments, response assisted by other States, and mobilization of non-government agencies are integral parts of this response. Organizing response immediately after the disaster and seeking assistance of central agencies, if required, is the responsibility of the state government. This is elaborated in the SDMP and DDMPs, along with the charter of SDMA and DDMAs; the same should be followed. And, the roles of state, district, PRIs and ULBs administrations are elaborated clearly therein.

The *Standard Operating Procedures (SOPs)* articulated before disasters help build consonance between NDMP and SDMP (and its constituent DpDMPs and DDMPs). The state or UT should articulate the SOPs and rehearse (through mock drills) the following:

(1) Immediate response (search and rescue);

(2) Relief (food, shelter, clothing and sanitation);

(3) Medical assistance and casualty management; and

(4) Communications (wireless radio, ham radio, cell phones).

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Civil Supplies, Water Supply, Power, IT, Medical, and Police (Communication)*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District officers of departments of** Civil Supplies, Water Supply, Power, IT, Medical, and Police (Communication)*
State Pollution Control Board

The standards of relief should be as per the *NDMA Guidelines* on *Minimum Standards of Relief.* The state or UT should:

(1) Adopt the *Guidelines* issued on the subject by NDMA;

(2) Propose *Draft Guidelines* based on *NDMA Guidelines* with appropriate modifications to suit the conditions existing in the state or UT; and

(3) Accord approval of revised guidelines.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA

(a) Search & Rescue

The *Search & Rescue* of people and animals is the first thought and act after any event. The state or UT should:

(1) Build competence in SDRFs to handle *Search and Rescue (SAR) Operations in the State (in line with the NDRF at the national level),* by:

(a) Establish a State Disaster Response Force (SDRF) at the State level, in parallel to the NDRF at the national level, with similar terms of reference and composition, but with competencies specific to the needs of the state or UT. SAR will be one of the tasks of the SDRF;

(b) Create annual calendars for Familiarization Exercises (FAMEX) to be conducted by SDRF across the state or UT;

(c) Conduct FAMEX across State as per calendar;

(d) *Prepare a list of the competencies* needed to undertake *Structural Analysis, Structural Design, Construction;*

(e) *Identify the Departments* that will engage in the SAR, like: *Fire Services;* PWD – *Roads and Buildings, Electricity, Water Supply; Irrigation; Police; Municipal Administration; and Panchayati Raj;*

(f) *Liaise with NDMA* to seek assistance of NDRF to provide such training;

(g) Arrange for such trainings towards *Capacity Development of existing human resources;*

(h) *Detail the trained manpower* to the other States in the event of a disaster in other State, as per the guidance of NDMA; and

(2) Carry out rigorous Training needs' assessment related to competencies required to build earthquake safety in the state or UT, by:

(a) *Identify Departments* that need such human resources, e.g., *Fire Services; PW– Roads and Buildings, Electricity, Water Supply; Irrigation; Police; Municipal Administration; and Panchayati Raj;*

(b) *Identify subject domains* in which the Departments need to build Human Resources:

(1) Technical Human Resources (Level of Competence and Number of Persons), and

(2) Non-Technical Human Resources (Level of Competence and Number of Persons);

(c) Request NDMA to suggest *names of Institutes,* which can provide the training to develop *Technical and Non-Technical Human Resource* towards Capacity Development of existing human resources in the pointed subjects;

(d) Arrange the required training to existing *Technical and Non-Technical Human Resource in the pointed subjects;*

(e) *Undertake Training of Trainers* at the above Institutes towards continually training its existing non-technical Human Resource human resources within the state or UT;

(f) *Detail the trained manpower* on priority to the *other States* in the event of a disaster in other State, as per the guidance of NDMA.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF).

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
Secretaries of departments of Education, Fire Services, Public Works (Roads), Public Works (Buildings), Electricity, Water Supply, Irrigation & Command Area Development, Police, Municipal Administration, Panchayati Raj
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District officers of departments of Education, Fire Services, Public Works (Roads), Public Works (Buildings), Electricity, Water Supply, Irrigation & Command Area Development, Police, Municipal Administration, Panchayati Raj
District Emergency Operations Center (DEOC)

State Administrative Training Institute (SATI)

(b) Evacuation

When there is sufficient time after warning, it is possible to evacuate people and animals before the event. The state or UT should:

(1) Carry out extensive *needs assessment* to determine the severity of disaster incidents and resource capabilities, by:
   (a) Constitute a team of experts to undertake needs assessment for evacuating people and animals;
   (b) Finalize a *methodology* and *process* for needs assessment for evacuation of people and animals;
   (c) *Test* the needs assessment method and customize it based on inputs and feedback from the test;
   (d) Identify, constitute and build the *capacity* of the teams that are required to carry out needs assessment survey for evacuation of people and animals;
   (e) *Deploy* teams at the district, regional and state levels to undertake the evacuation survey;
   (f) *Procure and stockpile resources,* materials and adequate supplies for the survey teams;
   (g) *Capture additional information* based on assessment survey identifying vulnerability and risk factors of people;
   (h) *Revise the method* of undertaking the survey for needs assessment for evacuation of people and animals, based on the evolving situation and changing requirement at the field; and
   (i) Develop an *action plan* to rehabilitate, relocate and support the disaster affected people and animals; and

(2) Develop an evacuation plan as part of the SDMP to protect people and animals, by:
   (a) Employ the *Post-Disaster Needs Assessment (PDNA)* tools and methodologies for the following:
      (1) Search and Rescue,
      (2) Medical Support (both physical and mental),
      (3) Temporary Shelters/Relief camps,
      (4) Civil Supplies,
      (5) Food and essential supplies,
      (6) Transportation,
      (7) Communication, and
      (8) Veterinary care, rehabilitation and ensuring safety of livestock and other animals.
   (b) Identify evacuation sites, where people and animal can be sheltered;
   (c) Create a 24x7 helpline to assist people stranded in their homes, workplace, etc.;
   (d) Develop Standard Evacuation Procedures for evacuation preparedness and planning;
   (e) Sign an MoU with local suppliers for providing *transport services,* and *equipment, tools & materials* for search and rescue;
   (f) Identify resources needed for logistics, operations, management during evacuation;
   (g) Plan to evacuate community and animals stranded in the remote locations of the state or UT;
   (h) Coordinate with central agencies for resource mobilization when the resources are short or when the disaster is a large-scale one;

(i) Build specialized *Search & Rescue Teams,* train the personnel and deploy them, when needed;

(j) Update the resource inventory of the States available on *India Disaster Resource Network (IDRN),* for managing the inventory of equipment, skilled human resources and critical supplies for emergency response;

(k) Plan to monitor and assess any developing situation, and keep the NDMA and NEC apprised of the same. They will also be responsible to constantly evaluate their own capabilities to handle that situation and project the anticipated requirements for the Central resources well in time; and

(l) Pre-agree with local vendors to arrange different mode of transportations for evacuating people and animal safely based on quick assessment survey;

(3) Determine disaster readiness of their institutions and agencies by undertaking simulation exercise to determine their disaster preparedness, and to test the DMPs, by:

(a) Form a team to organize and carry out the simulation exercise / drill under the supervision of a team leader;

(b) Assign roles and responsibilities associated with each of the actors involved in the drill;

(c) Agree upon which type of simulation exercise to be undertaken, i.e., drill, table-top, functional exercise and/or field/full-scale simulation;

(d) Finalize the specific type of exercise depending on time, resource, budget and most importantly the intended goals and needs;

(e) Plan to organize a large-scale evacuation drills at various level viz-a-viz state, district and local involving all line departments to test their preparedness in different situation, time, and contexts;

(f) Document the whole process that can encompass drawing on the debrief notes and reports prepared by the observers and evaluators and incorporate the lessons learnt into the DM plans at various levels;

(g) Integrate auditing mechanisms to assess the preparedness of the line departments along with drill;

(h) Develop manual/guide on carrying out simulation exercise for different key stakeholder departments;

(i) Make it mandatory for the key departments and agencies of the State to organize the drill at least twice in a year;

(j) Develop reporting mechanism at the State, District and Local levels to report about the preparedness drill organized by the departments and agencies;

(k) evelop monitoring mechanisms such as web-portal and/or periodic meetings to assess the progress of the line departments on disaster management activities; and

(4) Coordinate with the central and state agencies important for responding to a disaster situation in an orderly manner, by:

(1) Establish coordination with the central agencies such as MHA, NDMA, NDRF for overall evacuation operations;

(2) Consult central agencies to prepare evacuation plans and protocols; and

(3) Develop mechanisms to share the ground situation with these agencies and request for central assistance for required resources.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District Emergency Operations Center (DEOC)

State Administrative Training Institute (SATI)

(c) Temporary Shelter and Civic Amenities

Temporary shelters are meant for the temporary use by the persons affected by the disaster, when they have lost their regular houses or places of living. Adequate number of these shelters should be constructed at suitable locations (away from the flood plains...!!!) with basic amenities, such as drinking water, sanitation, medical treatment, cooking, tents, and lanterns. To the extent possible, it should be avoided that temporary shelters are used as intermediate shelters for longer periods involving *rehabilitation* and *reconstruction* phases of the DM cycle. In any case, these should not be used as permanent shelters forever!! To reduce the likelihood of using the temporary shelters for longer periods, large amount of work should be done before the disasters strike–in the choosing the site, planning the layout of groups of houses, and designing the structure.

The state or UT should:

(1) Predetermine the locations of shelters, pre-plan their broad layouts (specific to each region), and pre-prepare their structural design, by:
   (a) Identify the agency and / or department that will carry out the assessment of existing structures that can be used as flood shelter to determine their structural safety and resilience to hazards;
   (b) Identify appropriate locations for constructing shelters taking into account the climatic conditions and functional needs of the affected communities through HVRA;
   (c) Collect data on the locally available materials, minimum health and hygiene standards that need to be ensured in such shelters;
   (d) Evolve customized designs of the shelters for various hazards in different regions in consultation with central agencies;
   (e) Consider the gender, age, caste and other disability factors during the course of the design and construction of the shelters;
   (f) Determine the locations of the shelters and ensure the basic amenities such as drinking water, sanitation, medical facilities and other essential supplies in the identified shelters
   (g) Develop site plan for temporary shelters on existing or relocation sites taking into account the following aspects:
      (1) Make sure internal social structure and support system is not disrupted;
      (2) Plan for ancillary functions in the temporary shelters;
      (3) Opportunities for restoring livelihoods;
      (4) Access to social, health and economic infrastructure and services;
      (5) Adequate access to basic civic needs;
      (6) Consider disability-friendly shelters;
      (7) Consider fire and other threats; and
      (8) Ensure adequate WASH facilities;
   (h) Design the temporary shelters considering spatial requirements, selection of materials, construction technology, and execution of shelter construction:
      (a) Consider local climatic conditions,
      (b) Endorse existing local practices, lifestyles and cultures of the affected families, making maximum possible use of local resources to enable owner-driven process,
      (c) Design in-situ temporary shelters on the owners' own land in such a manner that they can be upgraded to comply with the technical norms of safe permanent housing, wherever possible, and

(d) Plan for temporary shelters based on typologies acceptable to the communities;

(i) Develop appropriate IEC strategy and material to inform and educate engineers, contractors, masons and house owners on appropriate standards and norms for disaster-resistant temporary (emergency and intermediate) shelters;

(j) Decide upon appropriate design and technology from available options for shelter construction, as per their needs, preference and resources;

(k) Construct hazard-resistant shelters based on accepted principles of structural safety as laid down in the standards. Especially, when the houses of the same structural are repeated in large numbers, the design should be accepted only after it has been verified duly in full-scale earthquake testing at a laboratory of national importance;

(l) Demonstrate and disseminate appropriate design and technologies, in accordance with the technical guidelines set by the State, to the affected communities;

(m) Implement/ Ensure convergence of MGNREGA, Swachh Bharat Abhiyan and other such relevant schemes for constructing shelters; and

(n) Prepare and implement a capacity building plan for the government personnel, engineers, contractors and masons;

(2) Pre-procure and provide tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials depending on the different typologies, by:

(1) Developing material banks/depots for distribution and identify local vendors;

(2) Stockpilingtents, shelter kits, tarpaulins, bamboo and temporary shelter material in regional warehouses/ stores/ ERCs and have tie-ups with forest depots for bamboo, timber, etc.;

(3) Procuring and providing tents, shelter kits, prefabricated shelters, tarpaulins, bamboo, CGI sheets and other temporary shelter materials catering to the needs of the responders;

(4) Pre-positioning and stockpiling adequate number of shelter kits at strategic locations for immediate distribution after disaster incident;

(5) Ensuring storage and stockpiling of tents in a dry and ventilated environment, to ensure protection from sun, rain and vermin, which may lead to rotting of the canvas

(6) Identifying local teams and authorize them to receive the temporary shelter supplies;

(7) Developing coordination mechanism to seek support from relevant Central Ministry to make sure that the tents or shelters reach the site on time, depending upon the requirements;

(8) Coordinating with Railways, Airlines and other means of transport to provide effective services to the field level;

(9) Protecting warehouses and stockpile tents, shelter kits, tarpaulins, bamboo and temporary shelter materials in them, and having tie-ups with forest depots for bamboo, timber, etc.;

(10) Arrange prior and long-time tie-ups with manufacturers and suppliers to provide tents, shelter kits, prefabricated shelters and materials (such as tarpaulins, CGI sheets, and bamboo). starting within 24 hours of placement of order and help in transporting them; and

(11) Developing *Standard Operating Procedures (SOPs)* for stockpiling materials, procurement, distribution, deployment, and assignment of roles and responsibilities considering multi-hazard and / or concurrent hazards scenarios; and

(3) Develop appropriate and reasonable mechanisms to monitor shelter logistics, supplies and equipments for better preparedness and planning to meet the required needs, by:

(a) Developing a team for monitoring of shelter logistics manually and online;

(b) Maintaining logs of all material movements and details of distribution to required locations;

(c) Monitoring any undue increase in the prices of essential items or hoarding of the same that may subsequently have an adverse impact on people's shelter recovery;

(d) Setting-up material banks/depots for distribution and identify local vendors;

(e) Developing local team involving community, local leaders, local authorities, volunteers, etc., for operation and maintenance of the shelters;

(f) Compiling and maintaining a consolidated database of trained construction artisans such as masons, plumbers, electricians, etc. from government/private vocational training institutes, NGOs and CSR organizations;

(g) Compiling and maintaining a consolidated database of trained building professionals such as engineers and architects as well as building contractors from professional associations;

(h) Developing dashboard and web-portal at the State level to monitor logistics facilities to keep stocks of temporary shelters, tents and other non-food items.

(i) Adopting and implement technical guidelines issued by centre;

(j) Enabling the community to undertake repairs, maintenance and/or modifications on their own as and when necessary; and

(k) Developing long-term plan for the maintenance of the shelters through community efforts to make the system self-reliant.

Responsibilities

Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Urban Development, Rural Development, Social Welfare, and Skill Development*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Urban Development, Rural Development, Social Welfare, and Skill Development*
District Emergency Operations Center (DEOC)

To manage effectively the Relief Supplies, the state or UT should:

(1) Convene a meeting of the following *Empowered Committee:*

(a) *Chair* : Commissioner (DM) &/or Secretary (Revenue),

(b) *Secretary* : Secretary (DDMA),

(c) *Member* : epresentatives of Departments concerned, and of NDMA, GoI

(2) Plan, procure and stockpile all *relief materials of the State.*

Responsibilities

Representative of National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Representatives of all departments concerned

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA

(d) Medical Care

The affected persons should be provided with due medical care. As part of this, there should be a strategy and plan for medical preparedness logistics, along with a detailed Medical Response Plan. Medical preparedness and mass casualty management are part of the *State DM Plan,* the relevant section of which is in line with *NDMA Guidelines on Medical Preparedness* and *Mass Casualty Management*. Alongside, animal care also requires due attention. The state or UT should pre-agree the *Standard Operating Procedures* for this, by:

(1) Convening a meeting of the following:
   (a) *Chair* : DDMO,
   (b) *Secretary* : Secretary (DDMA), and
   (c) *Members* : District Forest Officer, and Deputy Director (Animal Husbandry).

(2) Articulating the SOPs in each District for safeguarding the animals after the receipt of the warning (until the relief stage) and thereafter health, nutrition and medical care.

Responsibilities

Ministry of Health and Family Welfare
National Center for Communicable Diseases
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
District Forest Officer
***Secretaries of department of** Health*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of department of** Health*
Civil Defence

(e) Food and Civil Supplies

Arranging food and essential supplies to affected persons is an important part of relief. The state or UT should:

(1) Prepare a plan for food supplies and logistics, which requires a full understanding of the unique nutritional needs of pregnant and breast-feeding women, infants and children, older people and persons with disabilities, by:
   (a) Agreeing on a suitable methodology to conduct food security and nutrition assessment involving multi-sectoral approach;
   (b) Understanding the situation, current needs, and how to meet those needs, and estimating need assistance to the affected people;
   (c) Identifying the groups that are at-risk, including infants and children, pregnant and lactating women, person with disabilities and illness;

(d) Including market and stakeholders assessment in the conduct food security and nutrition survey to respond to the needs;

(e) Identifying safe locations and buildings, where food can be procured, stored and distributed to the incident sites;

(f) Designing the response to meet immediate needs, and considering measures to support, protect, promote and restore food security.

(g) Considering both in-kind and cash-based options for the food basket;

(h) Developing a food supply team that will make arrangements of food in time for the disaster affected communities;

(i) Developing comprehensive strategies to integrate all food security program along with responses from other sectors; and

(j) Encouraging the *department in charge of food and civil supplies* to develop a robust plan that will have information on adequate food supplies, distribution mechanisms, coordination protocols, and storage capacity.

(2) Understanding food requirements, especially when the quality and quantity of available food or access to food is not sufficient to prevent excessive mortality, morbidity or malnutrition after a disaster incident, by:

(a) Working closely with the Logistics Section of the State IRS to plan, procure, coordinate and mobilize food items;

(b) Mapping the staging areas, where the food items can be delivered, stored and deployed from. For this, consider *schools, community halls, religious places and Aganwadi centers;*

(c) Establishing a suitable Staging Area (SA) near the affected site for immediate, effective and quick deployment of resources. Protect the SA areas;

(d) Considering to establish more than one SA if needed, and deploy Staging Area Managers at each SA;

(e) Developing inventory of the remote and inaccessible areas and plan for quick distribution of relief materials, food items etc (Air dropping) in inaccessible and affected areas;

(f) Considering cultural and religious norms while distributing food items in the post-disaster situations;

(g) Making pre-agreement with the local vendors and suppliers for ensuring availability of food items available within 6-hour time period;

(h) Developing temporary shelters for storing food items, procuring and distributing food items;

(i) Signing MoUs with the organizations, companies, firms and trusts for running community kitchens;

(j) Deploying a dedicated team at the local level to receive the supplies, maintain log (manual or computerized), and distribute them at required locations;

(k) Develop web-portal to be administered, managed, and maintained by the Department of Food and Supply to meet the food and nutrition requirements of the affected community;

(l) Making sure food godowns have sufficient food materials and not situated at vulnerable locations;

(m) Designing and implementing the integrated policies and programs through community involvement integrating public health and food security and nutrition;

(n) Developing a *relief manual,* SOP and practices of the state or UT to cover issues like:

(a) Minimum standards of food/ cooked food to be provided to the affected people,

(b) Special needs of children, pregnant and lactating mothers, old, sick, etc.,

(c) Pre-agreements or MOUs with NGOs for setting up community kitchens, and

(d) Arrangements for dry food, when cooked food cannot be served; and

(i) Involvement of the victims for deciding choice of foods.

Responsibilities

Ministry of Road Transport and Highways
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Director, SDRF
***Secretaries of departments of** Food, and Civil Supplies*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Food, and Civil Supplies*
District Emergency Operations Center (DEOC)

Civil Defence

Drinking water, de-watering pumps, sanitation facilities and public health are integral parts of providing food and civic amenities. Inadequate water quantity and quality is the underlying cause of most public health problems in crisis situations. Also, access to appropriate, safe, clean and reliable sanitation facilities is an important right of people. The state or UT should:

(1) Ensure that both water quantity and quality are met, by:
   (a) Developing initial needs assessment checklist to determine the water needs, identify resources and understand local conditions;
   (b) Carrying out needs assessment survey of the affected people and disaggregate the data by sex, age, disability and so on to meet water requirements;
   (c) Mapping the most appropriate existing groundwater or surface water sources, taking account of potential environmental impacts. Also:
      (1) Consider seasonal variations, and
      (2) Understand different sources of water, suppliers and operators, and access to water within communities and households;
   (d) Determining how much water is required and the systems needed to deliver it.
      (1) Work with stakeholders to locate water points, and
      (2) Establish operation and maintenance systems.
   (e) Ensureing appropriate water point drainage at household and communal washing, bathing and cooking areas and hand washing facilities
   (f) Planning for testing the water for physical, bacteriological and chemical parameters.
   (g) Working with the community and other stakeholders to decide on the siting, design and use of water points (both immediate and long-term plans);
   (h) Working closely with the logistics branch and unit of the *Incident Response System (IRS)* of the state or UT to meet water requirement of the affected communities;
   (i) Signing MoUs with vehicle manufacturers for vehicle mounted RO system along with power sources and with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 6 hours of request;

(j) Making pre-agreements with the local vendors to arrange chlorine tablets for water purification;

(k) Planning for the following so that people have equitable and affordable access to a sufficient quantity of safe water to meet their drinking and domestic needs:

(1) Determine quantity based on context and phase of response;

(2) Ensure minimum 15 liters of water per person per day;

(3) Ensure that the distance from any household to the nearest water point should not be more than 500 meters; and

(4) The queuing time at the water sources should not be more than 30 minutes;

(l) Collaborating with the public and private sector for water arrangements;

(m) Designing water systems and infrastructure to comply with the drainage requirements.;

(n) Planning for installation of water treatment, distribution and usage points;

(o) Determining public health risks associated with the water available and the most appropriate way to reduce them. A risk assessment of the water chain, from the water source to the drinking water storage container may be carried out as follows.

(1) Sanitary survey of the water point;

(2) Observation of use of separate containers for water collection and storage;

(3) Observation of clean and covered drinking water containers; and

(4) Water quality testing; and

(p) Developing plan to protect the water sources from any hazardous events;

(2) Plan for sanitation facilities and ensure logistical arrangement for the affected communities, by:

(a) Developing initial needs assessment checklist to determine the sanitation needs, identify resources and understand local conditions;

(b) Carrying out needs assessment survey of the affected people and disaggregate the data by sex, age, disability, illness, at-risk groups and so on to meet sanitation requirements;

(c) Mapping existing sanitary facilities, need for new construction, and adaptation for children, older people and persons with disabilities or incontinence;

(d) Quantifying toilet requirements before and after disaster incident as follows

(1) Communal toilets are an immediate solution with a minimum ratio of 1 per 50 people, which must be improved as soon as possible, and

(2) A medium-term minimum ratio should be 1 per 20 people;

(e) Building community sanitation facilities that are technically and culturally appropriate considering gender factor;

(f) Ensuring clean sanitation facilities (toilets, showers, washing area) with water and detergent;

(g) Ensuring proper installation of lights at communal facilities for better access, especially those most at risk of threats to their safety to reduce their exposure to risks;

(h) Preparing an operation and maintenance plan to ensure the effective running of sanitation facilities; and

(i) Planning to include community participation, establishing user groups, defining roles and responsibilities, and having a cost recovery or cost sharing plan.

Responsibilities

Ministry of Jal Shakti
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Water Resources, Water Supply & Sanitation, and Health

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of departments of Water Resources, Water Supply & Sanitation, Health

(f) Communications

The state or UT should:

(1) Develop failsafe communications at various levels, i.e., state, district and local levels for smooth and timely warning, by:

(a) Mapping out existing communication facilities, need for new facilities, sources of power supply, and alternative arrangements;

(b) Developing resource inventory of the communication equipment available at the district and local level and put them on Disaster Resource Network;

(c) Working out the requirement of supervision, maintenance, replacement, repair and transportation for the maintenance of communication facilities;

(d) Designing for networking of inter-organization communications facilities of the Police, SDRF, Armed Forces, and Irrigation Department, etc.;

(e) Setting-up new communication facilities wherever needed for disaster response;

(f) Planning for mobile van with complete communication equipment and appropriate personnel; and

(g) Ensuring effective communication and Web-based or online *Decision Support System (DSS)* is in place in the EOC and connected with District, Sub-Division, Tehsil/Block level IRTs for support.

(2) Develop comprehensive communication systems and preparedness to smoothly coordinate disaster response at various levels, by:

(a) Working closely with the Logistics Section of the State Incident Response System (IRS) to ensure communication system is in place in post-disaster situation;

(b) Developing Incident Communication Plan (ICP);

(c) Assigning the role of Communication Leader to work under the direction of logistics section in post – disaster situation;

(d) Maintaining the records of all communications equipment deployed in the field;

(e) Preparing an alternative communication plan for execution in case of possible failure of the normal communications network. The alternative communications network may have wireless, satellite phones, cell phones, HAM radios, etc.;

(f) Establishing communication facilities in the required locations, i.e., staging area, relief camps, shelters, warehousing areas, destination points, incident base etc. post disaster situation;

(g) Developing mechanism to constantly review the Communication Plan to meet the changing requirements of the situation;

(h) Assessing the requirement and plan for dedicated back-up sources to operate various communication facilities;

(i) Pre-agreeing with the local vendors / suppliers for ensuring alternate power sources (i.e. batteries, generators, fuel etc.) for communication equipment within a short period of time; and

(j) Designating one station as an emergency public communication system. Locate it in an hazard-resistant building, and provide robust emergency power backup and adequate fuel and supplies; and

(3) Organize the existing communications network so as to meet the requirements of any emergency in the state or UT considering needed coordination with central and state agencies, by:

(a) Designing a suitable interoperable and compatible network between various agencies, because this networking is also vital for the integration of agency capabilities, like the NDRF, and Armed Forces;

(b) Signing MoUs with the central agencies and communication service providers to restore the communication facilities in case of failure;

(c) Preparing a plan for integration of the communications set up of the central teams (like the NDRF, and Armed Forces) with the local communications set up for the management of large scale disasters;

(d) Planning for quick and easy linking of existing independent networks of all the different line departments of the State Governments or UT Administrations;

(e) Working closely with the electricity department to avoid interruption to communication facilities in case of power failure; and

(f) Organizing the existing communications network so as to meet the requirements of any emergency.

Responsibilities

Ministry of Telecommunications and IT
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments
District Emergency Operations Center (DEOC)

(g) Power

The electrical distribution system may be damaged extensively following disaster incidents. Repairs of transmission lines and major substations may take several weeks, after which power could be delivered only to a few selected facilities. The state or UT should:

(1) Develop a power supply restoration plan for extended power outages, by:

(a) Constituting a team of expert for carrying out detailed structural safety assessment of existing power supply system as well as rapid damage and loss assessment;

(b) Agreeing upon the methodology of the *Structural Safety Assessment (SSA)* of the power supply system as well *Damage and Loss Assessment (DALA);*

(c) Developing a standardized template / tool to carry out SSA and DALA for electricity infrastructure sector;

(d) Pilot Testing of the SSA and DALA tool and customize it based on inputs and feedback from the field testing;

(e) Identifying, constituting and building the capacity of the team that will carry out SSA and DALA of the power supply system;

(f) Planing to conduct the rapid damage assessment of the electrical system and how to quickly communicate damage and repair information to response coordinators;

(g) Planning to carry out the SSA of the electric infrastructure in terms of vulnerability of electric transmission lines, power poles, sub-stations, transformers, staffing adequacy, availability of material equipment and resources, communication and coordination mechanisms, etc.;

(h) Estimating the current production and consumption capacity to determine the shortfall or surplus of the power supply;

(i) Identifying at-risk transmission towers, lines etc. and develop a plan for repairing them in emergencies. Locally store the repair parts and supplies;

(j) Developing action plan to meet the need of the critical departments such as water, telecommunication, transport and health;

(k) Partnering with *National Solar Mission of India* to encourage the community to keep small solar chargers to provide power for mobile phones;

(l) Protecting new and existing electric equipment such as large transformers and those placed atop poles, transmission towers and lines passing through vulnerable locations;

(m) Developing mechanisms to detect the power failures, damages to power lines and equipment as quickly as possible;

(n) Developing a long – term Disaster Power Supply Plan (DPSP) and widely disseminate it with the critical facilities of the state or UT;

(o) Developing guidelines and standards to design new substations and power supply structures considering effects of local hazards;

(p) Informing and encouraging development authorities to deter construction of power infrastructure, transmission lines, towers etc. in high hazard prone areas; and

(q) Sharing the findings of the SSA and integrate them into Master, Regional and Local development planning; and

(2) Install backup system at the key critical facilities to make the electrical system more robust and redundant so that the key equipment can be remain serviceable, by:

(a) Determining the requirement of backup power supplies and repair equipment for key critical facilities through needs assessment. Locally store the repair parts and supplies;

(b) Mapping local vendors, suppliers, companies that can provide backup power equipment, supplies and materials;

(c) Agreeing with them these agencies and stakeholders for emergency situation to provide sufficient amount of supplies and equipment within 6-hour order placement;

(d) Procuring and stockpiling adequate repair equipment and materials for restoring electricity in safe and resilient buildings. Store sufficient fuel and supplies as well based on needs assessment;

(e) Signing MoUs with the private power companies to cater the needs of the critical facilities for an anticipated length of time;

(f) Developing mechanism to ensure that all critical facilities should have alternate power backup for at least 72 hours to maintain functionality during power outage;

(g) Develop a plan with electrical power providers for an emergency service restoration plan and standard operating procedures, which identify personnel assignments and resources;

(h) Planning how to quickly communicate damage and repair information to response coordinators,

particularly the District Emergency Operation Centers, assuming phone connectivity is lost for an extended period;

(i) Developing an inventory of the critical facilities of the State that will need electricity; determine their requirements; and plan to provide sufficient fuel storage, generators, and batteries etc; and

(j) Making it mandatory for critical facilities to develop a detailed *Disaster Power Supply Plan (DPSP)* for extended power outages. The Disaster Power Supply Plan (DPSP) should involve the following steps:

(1) Understand the electric power usage (under normal conditions) for various functions, services within the facility;

(2) Discuss with the Disaster Management team and identify which functions / units are critical and can be temporarily stopped in the event of an electricity supply interruption after a disastrous event;

(3) Develop reasonable estimates of the electricity needs to continue operation of the critical functions;

(4) Identify existing and alternate generators to the emergency needs;

(5) Identify fuel, staffing needs in emergencies; and

(6) Understand the DM plan of the external power supplier and ensure the DPSP aligns with it.

Responsibilities

Ministry of Power
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Electricity, Health, Water, and Telecom*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Electricity, Health, Water, and Telecom*
District Emergency Operations Center (DEOC)
Power Generation and Distribution Companies

(h) Fuel

There should be a plan to ensure supply of fuel to IRTs, and hence to stock-pile fuel for them. The state or UT should:

(1) Develop suitable plan to confirm efficient and timely supply of fuel during emergencies, by:

(a) Assessing and making the requirement of fuel clear with the Central Ministry and coordinate the delivery of fuel through local arrangements;

(b) Coordinating with the IRTs to get the demand estimates of cooking gas, petrol and diesel needs, for transportation of emergency supplies /survivors and for temporary shelter facilities;

(c) Making a detailed plan for procurement of the fuel, storage facilities and safety aspects of the storage/premises, transportation and distribution of fuel;

(d) Ensuring sufficient availability of tankers/ other vehicles for local transportation through the relevant departments;

(e) Coordinate with the Logistic Section of the state or UT level IRT and the relevant departments and agencies to provide effective services (Ground Support Unit) to the field level IRTs for response;

(f) Performing the mapping of existing fuel sources (petrol, diesel and cooking gas) and required time for supply to the other regions within the state or UT;

(g) Devising efficient methods to ensure timely supply of fuel to hilly areas; and

(h) Establishing alternate mechanisms for fuel supply in case of emergencies/disasters through interstate coordination; and

(2) Establish mechanisms for stock piling and distribution of petrol, diesel and cooking fuel during incident response, by:

(a) Ensuring that petrol pumps are functional and adequate petrol, oil and diesel are available to Government for relief, rescue and general public;

(b) Ensure that the state or UT IRTs have suitable plans to ensure adequate supply of petrol, diesel, kerosene and LPG Gas in the affected areas for general public as well as emergency responders/equipment;

(c) Establishing mechanism for stocking the fuel at strategic locations with relevant agencies;

(d) Coordinating with relevant agencies to setup stock piling units / storage units of fuel (Petrol diesel, cooking gas) region to enable supply to any part of the state within the shortest time; and

(e) Reviewing and revising the plan for stocking and distribution of fuel to all major district outlets projecting the increasing demand for fuel with time.

Responsibilities

Ministry of Petroleum
Ministry of Home Affairs
National Disaster Management Authority (NDMA)
National Disaster Response Force (NDRF)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of department of** Civil Supplies*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of department of** Civil Supplies*
District Emergency Operations Center (DEOC)

Petroleum selling companies like HPCL, BPCL and IOCL

(i) Transportation

Transportation includes coordinated efforts with the Incident Response Teams (IRTs) for transporting different resources, relief materials, personnel to the affected site and also transportation of victims if necessary. The state or UT should:

(1) Prepare a strategy and plan for transportation during response, by:

(a) Identifying an in-charge or nodal person to coordinate implement the Incident action plan in coordination with the IRTs;

(b) Preparing a transportation plan for managing the actual deployment and utilization of the transport as per the Incident Action Plan;

(c) Activating and managing transportation in-charge of different Operations Groups, like Road, Rail, Water and Air, as required for incident response;

(d) Assigning specific tasks to activated groups and responders coordinating transportation

(e) Providing necessary road transport to support other modes of transport;

(f) Ensuring that all units moving in the area are familiarized with route with the help of road maps or local guides;

(g) Reporting the progress of transportation activities to the Incident Commander;

(h) Determining the need for additional resources, their proper and full use and place demand accordingly in advance;

(i) Ensuring maintenance of the status of hired resources, their full utilization and timely release and document all activities;

(j) Resolving conflicts if any;

(k) Developing and mproving data collection formats related to transport assignments;

(l) Strengthening the conflict redressal mechanism; and

(m) Reviewing and updating the Transportation plan as required; and

(2) Coordinate with Central Ministries for transportation of relief materials utilizing the services of Railways, Airways, Waterways and Roadways, by:

(a) Coordinating with the IC or Operations Section to plan the transportation needs, procedures, personnel, and the groups to be activated as per the IAP;

(b) Activating the road, railways, airways and waterways groups and authorize a Group In-charge for each group who will coordinate with the transportation in-charge;

(c) Ensuring availability of fuel, mechanics for vehicle repair, parking locations, reporting and managing accidents, if any, apart from maintaining the records of all important activities relating to the number of vehicles deployed, source of vehicles (i.e., Government or private), locations where vehicles are deployed along with resource details they are carrying, etc.;

(d) Engaging coordinator and sub-coordinator for road operations under the Group In-Charge based on the number of vehicles to be handled;

(e) Coordinating with the staging area managers for taking the transportation assignments, briefing the routes to drivers, vehicle tracking, maintaining the records of loading and unloading activities, arrange security support for transportation of relief materials through police administration;

(f) Appointing a Group-in-charge for Railway Operations and also coordinators for further assistance who will lead the transportation activities via Railways;

(g) Coordinating to make trains available, supervision of loading and unloading and recording the activities, arranging warehousing and safe storage, and seeking support for higher authorities in case of restoration works of railway tracks required to resume rail transport operations;

(h) Establishing a similar team for coordinating Airways Operation and Waterways operations for transportation of relief supplies and the affected as required by the Incident Action Plan;

(i) Identifying and training the department personnel who can be potential members of the transportation operations in all four groups – Roads, Railways, Airways and Waterways – for handling a future response operation;

(j) Familiarizing the plans, design /improve the data recording formats for assignment, loading, unloading, storage, etc;

(k) Reviewing and revising the transportation plan as required and incorporate the same as part of State and District level DM plans; and

(l) Supporting the development of a centralized online relief management portal, which can be customized based on the disaster event.

Responsibilities

Ministry of Civil Aviation
Ministry of Railways
Ministry of Home Affairs
National Disaster Management Authority (NDMA)

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Transport, Forest, Environment, and Public Works*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Transport, Forest, Environment, and Public Works*

Airport Officers

(j) Logistics

The state or UT should:

(1) Prepare a Relief Supply Logistics Plan, including the logistics of procurement transportation and distribution of Emergency Supplies required for Government to function as well as the Relief Materials (Food & essentials based on the regional practices and needs), by:

(a) Coordinating with the State IRTs and prepare a logistics plan for movement of relief materials and resources;

(b) Identifying a team led by a Resource Provisioning In-charge for Logistics management of resources and also coordinators for ordering, receiving and distributing relief supplies;

(c) Working closely with the logistics team to communicate the needs, sourcing of the resources and supply to the required locations;

(d) Establishing warehouses or mobilization centers for receiving and supplying relief materials at airport/ railway stations;

(e) Following proper documentation of the goods received and transported through various means and maintain logbooks;

(f) Establishing procedures to involve central agencies for the procurement of relief from the centre or other state agencies in coordination with the relevant departments as mentioned in the action plan;

(g) Mobilizing a crew for loading and unloading work at the relief centers or other destinations;

(h) Communicating the plan to higher authorities and integrate the same with the overall incident action plan;

(i) Preparing the checklist and format of assignments in advance to follow while coordinating with various departments;

(j) Developing an alternate plan to fall upon in case the regular transportation system fails or cannot be activated; and

(k) Reviewing and revising the logistics plan as required.

(2) Prepare a Relief Supply Distribution Logistics Plan, including coordination for distribution of relief supplies to all camps and shelters as per the Incident Action Plan, by:

(a) Receiving the resources at the sourcing units or mobilisation centres;

(b) Making a relief supply plan in coordination with transportation group in-charge, planning and operations section;

(c) Deploying special mechanism for relief supply distribution to the camps and responders in the affected locations;

(d) Arranging suitable vehicles like trucks, lorries or special vehicles depending on the supplies/equipment being transported;

(e) Seeking support of the transportation group to track the vehicles and timely supply of relief supplies;

(f) Maintaining the records of receipt and dispatch of supplies including equipment and personnel by the resource provisioning team;

(g) Monitoring the 'kind', 'type' and 'quantity' of supplies available and dispatched;

(h) Receiveing and responding to requests for personnel, supplies and equipment from the activated response teams;

(i) Imparting training to the identified personnel of the various response teams on their specialized role to be performed during response;

(j) Familiarizing the plans, design and improving the data recording formats of assignments, loading, unloading, storage, etc.;

(k) Reviewing and revising the relief supply plan as required and incorporate the same as part of State and District level DM plans; and

(l) Supporting the development of a centralized online relief management portal, which can be customized based on the disaster event.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Transport, and Civil Supplies*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Transport, and Civil Supplies*
District Emergency Operations Center (DEOC)

(k) Animal Care and Disposal of Animal Carcasses

The state or UT should:

(1) Arrange for for procuring fodder for livestock, stockpiling and fodder supply during disasters, by:

(a) Identifying *Veterinary Assistance Teams (VATs)* as sub-groups of resource provisioning team in the IRS to coordinate livestock management and fodder supply;

(b) Seeking VATs to coordinate with the IRTs to estimate the demand for fodder in the shelters and even outside shelters in the disaster locations;

(c) Entering into agreement with *Food Corporation of India (FCI)* to supply fodder, grain ingredient and protein supplement for livestock affected by disasters at nominal cost;

(d) Conserving monsoon grasses in the form of hay and silage during the flush season which will help in supplementing shortage of fodder during emergencies such as drought or flood;

(e) Setting-up storage units /fodder banks in proper sites like secure highlands that may not be easily affected by a natural calamity while setting up fodder banks. These may be closed facilities also so as to prevent contamination;

(f) Coordinating with the resource provisioning team as per the *Incident Action Plan (IAP)* to ensure supply of fodder to the shelters along with emergency supplies;

(g) Identifying and mapping the sources of fodder/ feed concentrate in the state;

(h) Establishing fodder banks at the village level for storage of fodder in the form of bales and blocks for feeding animals during drought and other natural calamities;

(i) Imparting training for the local farmers to preserve cattle feed and storage techniques for emergencies; and

(j) Involving relevant persons and organizations outside the government animal health services who also have a role in animal health emergency National Veterinary Association, livestock industry groups, national/state authorities and Departments of Finance, Health and Wildlife.

(2) Arrange for safe removal and disposal of carcasses of animal killed in disasters, by:

(a) Identifying and forming an Animal Carcass Management Group with health staff and sanitation workers from municipal bodies/district collector;

(b) Identifying Supervisors for this task force who will give necessary advice and tactical decisions for execution;

(c) Equipping and training the staff in carcass removal/disposal at pre-identified sites to ensure that no other health hazard is created both for the staff as well as the public-

(d) Using recommended safety kits and personal protection gear by the staff deployed in carcass disposal so that they are not infected;

(e) Facilitating administrative orders for dispersal of financial relief as per norms for the process of carcass removal and safe disposal;

(f) Adopting Standard Operating Procedures as stipulated in the national guidelines for Carcass disposal into the SDMP and DDMP;

(g) Ensuring mechanisms for supply of disposal equipment, protective gear for staff and vehicles for transportation;

(h) Identifying sites for animal carcass disposal in advance;

(i) Building suitable infrastructure like incinerators for disposal of dead animals so that burial and disposal methods of animal carcasses and other products (tissues) of animal origin must be done without causing epidemics and harming the environment;

(j) Imparting necessary training on regular basis as part of disaster preparedness; and

(k) Reviewing and revising the carcass disposal strategy and methods with latest techniques.

(3) Prepare plan for ensuring management of livestock during disasters dealing with evacuation, food and safe shelter, rehabilitation and Veterinary care, by:

(a) Developing and establishing reliable early warning systems to prevent and minimize livestock casualties through early evacuation;

(b) Making arrangements of livestock and cattle evacuation from disaster hit areas to safe shelters

(c) Mobilizing necessary resources, e.g., access to feed, water, health care, sanitation and shelter;

(d) Seeking VATs to coordinate with *Shelter Managers* to estimate demand for fodder within and outside the shelters;

(e) Arranging professionals from Veterinary Aid Centers for providing health care to the livestock during emergencies;

(f) Facilitating early rehabilitation of the affected livestock and provide free movement of animals for grazing from affected states to the unaffected so as to reduces pressure on pastures;

(g) Creating public awareness about natural disasters that different regions and the country are most likely to experience and their consequences on the livestock sector;

(h) Including preparedness measures such as posting emergency telephone numbers, holding disaster drills and installing warning systems Implementation of simulation exercises to test and modify animal health emergency plans and preparedness are also necessary;

(i) Assessing resource needs and planning for their provision during animal health emergencies;

(j) Initiating flood and fire insurance policies for farms are important mitigation activities;

(k) Establishing veterinary aid centers at village level and enhancement of the capabilities of emergency field and laboratory veterinary services; and

(l) Providing rehabilitation packages for livestock livelihood to deliver a comprehensive package of combined services including restocking, shelter construction and income-raising activities.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Forest, Environment, Agriculture, and Animal Husbandry*
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Forest, Environment, Agriculture, and Animal Husbandry*
District Emergency Operations Center (DEOC)

Animal Welfare Organizations

6.1.5 Rehabilitation

(MHA-UNDP Report: Annexure II (page 259) Matrix B Items B6.1 and B64, and Matrix C Item C6.17)

Setting up of temporary relief camps is the early step in rehabilitation phase. The use of premises of educational institutions for establishing *temporary relief camps* needs to be discouraged. The state or UT should:

(1) Pre-identify locations for establishing them, especially to address recurring disasters;

(2) Pre-identified agencies to supply the necessary stores;

(3) Ensure adequate provision of drinking water and bathing, sanitation and essential health care facilities;

(4) Constitute special task forces, where feasible, from amongst the disaster affected families to explore the possibility of providing food through community kitchens, and provision of education through the restoration of schools and anganwadis;

(5) Arrange for efficient governance systems (like entitlement cards, and laminated identification cards) as a part of uniform humanitarian governance practices; and

(6) Stockpile necessary relief equipment and tools (e.g., cranes and power saws) and material (such as food, drinking water, shelter, clothing, medicines, medical supplies, masks, kerosene and candles) at appropriate locations in the state or UT.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments

Equal efforts should be made before disasters to bring back the livelihood of the affected persons immediately after the event. The state or UT should:

(1) Harness the provisions available with the state or UT on employment generation programs (e.g., MNREGA) and dovetailing them to the disaster situation, to create suitable employment generation in the near neighborhood of the relief camps; and

(2) Undertake skill development before the disasters, by:

  (a) Identifying possible trades and required skills that can be created following the disaster; and

  (b) Developing MoUs with potential employers to dovetail the skill development to meet the requirements of the potential employer.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Panchayati Raj, Municipal Administration, Housing, Social Welfare, Rural Administration, Water Supply & Sanitation, Education, Energy, Skill Development

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of departments of Panchayati Raj, Municipal Administration, Housing, Social Welfare, Rural Administration, Water Supply & Sanitation, Education, Energy, Skill Development

Employment generation immediately after the event strikes should be achieved by providing opportunities for unskilled work in public works for people seeking work in drought affected areas as a relief measure, ensuring quick and prompt payment of wages, arranging health check-up of those seeking work, and drawing from various funds including Disaster Response Fund to implement the employment schemes. The state or UT should:

(1) Identify potential sectors and trades to support the affected community and restore the local economy, by:
   (a) Constituting a team at district level with government officials - serving and retired, eminent citizens, elected leaders, womens' group representatives, banking institutions, etc to meet and brainstorm about the local resources and capacities, and possibilities of employment;
   (b) Analyzing the existing livelihood strategies and sustainability of businesses in view of existing and future risks;
   (c) Identifying innovative and needed trades which will help rebuild the affected community with equal opportunities;
   (d) Considering works for reconstruction of physical infrastructure such as houses, buildings, railways, roads, and communication network;
   (e) Adopting short- and long-term strategies for restoring agriculture, canal irrigation, animal husbandry, etc.;
   (f) Reviving heritage livelihood and traditional trades;
   (g) Making a plan to engage maximum manpower in the chosen sectors and identify the right people;
   (h) Rendering necessary financial support from the Government and other financial institutions for employment schemes;
   (i) Monitoring the effectiveness of the plan and generation of employment;
   (j) Building public awareness on the various government schemes of employment and schemes for promoting self-employment;
   (k) Providing a congenial environment to encourage MSMEs; and
   (l) Incentivizing trades/professions that provide livelihood opportunities to a large sect of unskilled laborers; and

(2) Provide employment and livelihood rehabilitation is an important aspect of rebuilding the affected community understanding their needs, and regional practices, by:
   (a) Developing a strategy to employ maximum people from the disaster affected areas to the "build back better" works;
   (b) Conducting a needs assessment to find the employment opportunities related to rehabilitation of affected community to be taken up on priority basis;
   (c) Creating a mechanism to register persons in the shelters and outside, who are in need of work and livelihood rehabilitation – both offline and online;

(d) Assigning the available manpower to the identified tasks for reconstruction and retrofitting works of houses and utility infrastructure, based on their prior experience;

(e) Utilizing schemes that help in building societal resilience, like MGNREGA and NRHM, which can engage unskilled laborers;

(f) Arranging required transportation facilities to support the laborers travel to and from the work site;

(g) Ensuring timely payment of the daily wages as a relief measure;

(h) Earmarking annual plan funds specially to serve in the disaster-prone high-risk areas for reviving the livelihood and economic status of the affected community;

(i) Drawing from various funds including SDR Fund to implement the employment schemes; and

(j) Identifying environment and climate resilient projects with employment prospects and providing financial support for such schemes.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Labour, and Social Welfare*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Labour, and Social Welfare*

6.1.6 Reconstruction

In the early stages of DM in the state or UT, this is likely to be a significant part of the DM effort. Reconstruction largely constitutes rebuilding the assets destroyed during the previous event, along with a few items that are considered necessary. Of this, housing and lifeline facilities (e.g., bridges, water tanks, water and sewage treatment plants, and power stations) are the dominant set. To reduce the time of implementation, it is best to prepare type-designs of these structures and facilities before the events, and use the same in the reconstruction.

The state or UT should:

(1) Identify potential sites where reconstruction is likely;

(2) Prepare type-designs of dominant constructions, namely houses, schools and hospitals, by undertaking architectural and structural designs in keeping with the regional social practices and materials available; and

(3) Keep ready the bill of quantities and tender documents to facilitate early construction of a set of these constructions.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
***Secretaries of departments of** Planning, Finance, Public Works, Education, and Health*

District Collector, District Magistrate or Deputy Commissioner
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Planning, Finance, Public Works, Education, and Health*
Commissioner of ULBs
Secretary of PRIs

6.2 Timelines

Individuals, rather than institutions, need to drive the DM process in the future. Mainstreaming of DM has to be done at three levels, namely thought, word and deed. The subject of DM is too big to gobble in one shot; the only way is to nibble at it each day, every day, and from today|Pacing-up is the crucial in the implementation of DM across the country. But, the acute shortage of available needed human resources, demands that a special strategy is required to implement DM strategies and plans in a comprehensive way across India. In this regard, decentralization of DM to DDMAs (with due supervision from SDMAs) is essential. Therein, Preparedness for Response largely should be the onus of the DDMAs.

6.2.1 Prioritization

The precise timelines of different DM activities will depend on the dimension and complexity of the activities as well as geographical and demographical features of the state or UT. Also, the task is gigantic of mainstreaming DM in the state or UT. Therefore, it is necessary to sequence the DM activities into three sets based on their hierarchy in establishing and mainstreaming the DM activities (namely vital, essential and desirable), and availability of funds to undertake the DM activities (namely, available immediately, to be made available without fail at the earliest, and to be made available eventually). In all the three cases, every action starts right now!!

The state or UT should identify:

(1) The **activities vital** towards DM, which should be implemented in the short-term; these are of immediate nature, for which the funds should be **allocated, if neccesary at the cost of excluding other sctivities, as they belong to a category of over-riding priorities;**

(2) The activities essential towards DM, which should be taken up in the medium-term; these are of urgent nature, for which the funds should be **made available without fail; and**

(3) The remaining activities desirable towards DM, which can be considered in the long-term; these are important, for which the funds *should be* **made available eventually.**

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of departments of Planning, and Finance

District Collector, District Magistrate or Deputy Commissioner
DDMAs
Chairman, DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of departments of Planning, and Finance

6.2.2 Pilot District Program

With an imperfect start of DM already staring at us, the speed of implementation and completion of various activities is not easy to estimate. To estimate reasonably the time taken to implement the DM activities, the state or UT may launch a *Pilot District Program* with focus on implementing all facets of DM. The state or UT should:

(1) Undertake all DM activities in one small District, which that is under the threat of at least three major hazards;

(2) Bring together available (but scarce) human resources of Subject Specialists (in each *Hazard* and in each *Cross-Cutting Theme*) to implement DM in one district;

(3) Undertake the following in this model district, by:

(a) Establishing all Systems and Processes;

(b) Focussing on the DM activities especially on work related to long-term agenda *(Prevention*, *Mitigation and Preparedness);*

(c) Grooming the required number of human resources to be competent in their areas of work (i.e., specialists and generalists);

(d) Fast-tracking the implementation (say, in a limited period of 1 year);and

(e) Documenting and showcasing the entire process of DM implementation to the other states and districts from the second year onwards.

Responsibilities

Chief Minister
Minister for DM and/or Revenue
Chief Secretary
Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments
State Emergency Operations Center (SEOC)

District Collector, District Magistrate or Deputy Commissioner
DDMAs
Chairman, DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments
District Emergency Operations Center (DEOC)

6.3 Monitoring

DM in today's times involves man, material, machine, money and methods. Further, DM involves a number of uncertainties, like:

(1) Large number of stakeholders with varying competence, commitment and sensibilities,

(2) Many assumptions made during planning stage which may not be realized in reality,

(3) Dynamically changing requirements at the field level owing to natural circumstances,

(4) Different challenges in different regions of the country owing to seasons, and

(5) Availability of limited funds for DM owing to competing social demands.

For this reason, there is a need to monitor the DM activities, towards making appropriate amends in the way DM is approached, reflected by the SDMP, DpDMPs and DDMPs.

While everything may appear important and choices may appear difficult, it is necessary for all authorities systematically to prepare lists of available options and order them in a sequence of descending order of priority. It is only then that the task of addressing what needs to be done should be taken up, having regard to the human and financial resources available and the timeframes. And, when a destination has been identified in terms of promised quantified deliverable outputs, and the financial, operational legal and administrative implications spelt out, a road-map needs to be drawn to the destination, duly marked off by milestones and sign-posts.

6.3.1 External and Independent Review

The entire journey should be monitored by an external and independent center of excellence (like an *Indian Institute of Management*), which should be associated with the entire chain of DM activities in all its stages namely during *Design, Implementation, Monitoring and Evaluation (DIME)*. In the past, assigning the sole responsibility of overseeing the ongoing DM preparations and activities to a single agency has resulted in unparalleled gains. Also, the engagement of such an agency should eventually lead to the overall DM processes in the state or UT.

Therefore, the state or UT should:

(1) Commission independent *external audit agency/*agencies for continually auditing the DIME activities of DM in the state or UT; and

(2) Make improvements continually in the SDMP, DpDMPs and DDMPs, based on the outcomes of the observations of the external and independent agency.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
***Secretaries of departments of** Planning, and Finance*

District Collector, District Magistrate or Deputy Commissioner
DDMAs
Chairman, DDMAs
DDMO, Secretary ex officio, DDMA
***District Officers of departments of** Planning, and Finance*

6.3.2 Periodic Review

Monitoring should be done not in a *mechanically periodical manner,* but in a manner corresponding to the rhythm of the plans and programs, and undertaken at times when events requiring monitoring are expected to occur. The format should be flexible to with reference to the type of disaster and the place in focus.

Therefore, the state or UT should:

(1) Undertake review periodically, beyond what the external independent agency is charged with; and

(2) Make improvements continually in the SDMP, DpDMPs and DDMPs, based on the outcomes of the observations of the external and independent agency.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Secretary, SDMA
Secretaries of ALL departments
District Collector, District Magistrate or Deputy Commissioner
DDMAs
Chairman, DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments

6.3.3 Disaster Preparedness Index Dashboard

The capacity to cope with natural and manmade threats is the ability to face and manage adverse conditions using *available skills and resources.* The effectiveness of the DM measures undertaken can be examined through **indicators** and **benchmarks.** Indicators are explicit measures of important factors relevant to disasters, which enable measurement of what is actually happening against what has been planned for, offering a valuable insight into the efficacy of policies or programs. They can be:

(1) Physical or infrastructural indicators,

(2) Institutional/procedural indicators,

(3) Social indicators,

(4) Economic indicators, and

(5) Environmental or ecological indicators.

On the other hand, an authenticated and credible benchmark is a reference point for measuring progress or achievements, and can be set for any indicator. Benchmarks are not used commonly in DM, because the field of DM is not a well developed discipline yet. But, the available data is enough to formulate suitable benchmarks for various sectors (such as land use management, technical education, structural safety, early warning and evacuations) and can be readily formulated. Therefore, gathering comparative data on the value of each indicator before starting the implementation of actions enables establishment of reasonable performance targets and measurement of the extent of the changes made in the course of implementing the needed DM measures.

The time has come to initiate the construction of an assessment tool, called the ***Disaster Preparedness Index (DPI),*** based on indicators and benchmarks. In terms of risk, it must be designed for multi-hazardous situations with the in-built flexibility to rework it for a particular hazard. Also, it could be designed for use at the state or UT level and customized to meet specific local demands in different geographic regions. The goal should be to improve **proactive planning** and implement **effective and efficient actions,** which can mitigate *vulnerability* to disasters.

The state or UT needs to engage urgently and purposefully in creating legitimate space for a DPI in the agenda for DM for monitoring the implementation of DM measures. Saving lives, property and livelihoods can no longer brook delay by the developmental efforts being neutralized by familiar and predictable events. Clearly, DM cannot wait and therefore needs to be addressed to the exclusion, if necessary, of all other items on the agenda of the governments. Across the world, a DPI has not been attempted to rate the readiness of the country or a region. This simple yet effective DPI will be the early proposal of an index to gauge the progress made in the process of implementing DM imperatives.

(a) Sample DPI for Earthquake Safety

As an example, the case of earthquake hazard is considered to show the monitoring of the progress of the implementation of the DM measures. Here, the DM measures required as per the NDMA Guidelines are used as the indicators in the DPI related to earthquake safety. But, the list should be expanded with the additional specific requirements related to earthquake safety stated in the SDMP, DpDMPs and DDMPs of each state or UT.

For example, **Tables 6.1, 6.2** and **6.3** provide the list of imperatives that need to be acted upon as per the *National Disaster Management Guidelines – Earthquake Management.* Each of these indicators is given equal weight, and the current preparedness of the state or UT in this direction is rated on a scale of 10. The state or UT can rate itself on its preparedness towards each of the sub-elements of three components, namely:

(1) Preparedness towards Earthquake Mitigation Readiness,

(2) Preparedness towards Earthquake *Management Readiness,* and

(3) Preparedness towards Earthquake *Community* Readiness.

The cumulative of the ratings of the state of UT from the above three components is shown in **Table 6.5.** The scale of 10 may be further sub-divided as per **Table 6.4** to rate partial achievement of milestones on way of accomplishment of each indicator.

The responsibility of assessing the DPI should rest with independent bodies, which are not the implementing agencies, namely the departments and agencies of the state or UT. Hence, the SDMA at the state or UT level and the DDMAs at the district level should undertake to assess its DPI. They should maintain records of the progress made in implementing the DM imperatives agreed to in the SDMP.

Table 6.1: Sub-Components of DPI for State Governments – Preparedness towards Earthquake Mitigation Readiness

S.No. (as per NDMA Guidelines – EM)	Aspects of Readiness	Index Value (on a scale of 10)
3A	Train Professionals	
3C	Undertake Pilot Projects on Earthquake Resistant Construction	
3E	Undertake Mandatory Third Party Detailed Technical Audit	
4A	Develop Inventory of Existing Built Environment	
4B	Assess Vulnerability of Existing Constructions	
4C	Prioritise Vulnerable Structures	
4D	Develop Measures for Earthquake Retrofitting	
4E	Undertake Retrofitting to Strengthen Vulnerable Structures	
5A	Develop and Update Seismic Design Codes	
7A	Education in Schools and Colleges	
7B	Technical Education	
7C	Training of Artisans	
7D	Capacity Building of Practising Professionals	
7E	Earthquake Research and Development	
7F	Documentation and Dissemination	
15 items	**Sub-Total out of 150**	

Table 6.2: Sub-Components of EDPI for Union and State Governments – Preparedness towards Earthquake Management Readiness

S.No. (as per NDMA Guidelines – EM)	Aspects of Readiness	Index Value (on a scale of 10)
3B	Dissemination of Documents	
3D	Modifying Regulations and Town Planning Bye-Laws	
5B	Develop and Update Municipal Acts, Regulations and Bye-Laws	
5C	(a) Registration and Licensing of Professionals	
	(b) Certification of Artisans	
5D	Improve Building Permit Process: Scrutiny of Structural Designs	
5E	Evolve Risk Transfer Mechanisms	
5F	Improve Participation of Financial Institutions	
8 items	**Sub-Total out of 80**	

Table 6.3: Sub-Components of EDPI for Union and State Governments – Preparedness towards Earthquake Community Readiness

S.No. (as per NDMA Guidelines – EM)	Aspects of Readiness	Index Value (on a scale of 10)
6A	(a) Sensitise National Stakeholders	
	(b) Sensitise State, District, City and Community Level Stakeholders	
6B, 6E	(a) Prepare National Earthquake Disaster Management Plan	
	(b) Prepare State Earthquake Disaster Management Plans	
	(c) Undertake Mock Drills as per the DMPs	
6C	Equip and make functional the EOCs	
6D	Organise and streamline NGOs and Volunteer Groups	
6F	Prepare District, City and Community Disaster Management Plans	
6G	Map vulnerable land areas	
8A	Trigger Based Categorisation	
8B	Response Plans for Different Triggers	
8C	Incident Response System	
8D	Support Functions and Partnerships	
8E	NDRF	
8F	Other Emergency Response Teams	
8G	Emergency Equipment and Logistics	
8H	Emergency Medical Response Capability	
17 items	**Sub-Total out of 170**	

Table 6.4: Summary of the DPI for the three sub-components of Preparedness towards Earthquake Safety

S.No.	Component of Preparedness towards	Index Value	
		Maximum	Current
1	Earthquake *Mitigation* Readiness	150	
2	Earthquake *Management* Readiness	80	
3	Earthquake *Community* Readiness	170	
	Total	**400**	

Table 6.5: Sub-marking of Index Value on reaching milestones of each indicator

S.No.	Milestone of Each Objective	Sub-marking of Index Value
1	*Indicator* included in annual DM agenda of state or UT, annual plan drawn up, and nodal officer identified	1
2	Administrative systems and processes duly in place	1
3	Funds allocated in the annual budget	1
4	Legal and Techno-Legal regime duly enabled as per SDMP, DpDMPs & DDMPs	1
5	Operational arrangements made as per SDMP, DpDMPs & DDMPs	1
6	First cycle of activities completed, and corrections made in the systems and processes before start of second cycle	1
7	Second cycle of activities completed	1
8	Long-term improvement made in the SDMP, DpDMPs & DDMPs in administrative, legal, financial and operational arrangements related to the *Indicator*	1
9	Performance of state or UT during a disaster related to the *Indicator* is as planned	1
10	Improvements have been made in activities related to the *Indicator* after a disaster	1
	Total	**10**

The SDMA and DDMAs should:

(1) Seek the engagement of the state or UT and its departments and agencies responsible for an indicator in the DM implementation, towards the preparation of the DPI;

(2) Upload all data and information as required on to a Dashboard at:
   (a) The offices of the *key functionaries* of the state or UT,
   (b) The offices of the SDMA and the DDMAs, and
   (c) The EOCs at the state and district levels, and

update the same meticulously as each milestone is achieved or as the situation changes during the implementation of the DM measures;

(3) Hold meetings with the concerned key functionaries of departments and agencies responsible for an indicator in the DM implementation, to seek progress in the implementation of the DM measures;

(4) Share the status to different stakeholders on the level of preparedness of the state or UT, through customized messaging to elicit positive response from them; and

(5) Table as a formal item in the agenda the current status of DPI to understand the level of preparedness of the state or UT, at each regular meeting of the SDMA and DDMAs.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
SDMA
Chairman, SDMA
Secretary, SDMA
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMAs
Chairman, DDMAs
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments

(b) Dynamic Updating

The inputs to assessing the DPI should be updated dynamically by the SDMA and nodal Departments responsible for the implementation of each measure of DM. The trend-lines of the DPI can be drawn up to understand changes that are happening over time with regard to the various DM measures. But, the true test of the readiness of a state or UT will be when the hazard is realized, but the disaster does not happen. Or, if a disaster occurs, the aspect where the state or UT has not put enough effort will be exposed.

For instance, the numbers in **Tables 6.1, 6.2, 6.3** and **6.4** will be examined dynamically by the state or UT, and take needed corrective action or encouragements to its stakeholders to improve the preparedness of the state or UT.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
Secretaries of ALL departments

District Collector, District Magistrate or Deputy Commissioner
DDMO, Secretary ex officio, DDMA
District Officers of ALL departments

6.4 Chain of Command

DM is permanent and continuous activity, and not just response when events occur. Thus, there is only one chain of command in DM, which functions seamlessly before, during and after disasters. But, it can be seen in two parts, namely:

(1) *Peacetime command system (PCS)*, which is the usual system of functioning of SDMA and DDMAs, and

(2) *Incident response system (IRS).*

The PCS engages the entire set of stakeholders (namely the *government,* the *industry,* and the *community*), in an elaborate manner, but with sharp timelines for the deadlines to be met by them towards mainstreaming and implementing DM.

In the PCS, the all stakeholders of DM in the state or UT focus on all six verticals of the DM cycle – *Prevention, Mitigation, Preparedness, Response, Rehabilitation* and *Reconstruction.* On the other hand, in the Incident Response System (IRS, which is a sub-set of the PCS), the select set of stakeholders focus only on the Response vertical of the DM cycle. During an event, the stakeholders of the PCS engaged in the other five verticals of the DM cycle watch from the sidelines of the action arena, keep drawing valuable lessons form the incident, and come into action when called and/or as soon as the emergency phase of Response is over.

IRS describes a way of managing the response activities; NDMA has issued national guidelines on IRS. It is important that IRS is part of pre-event planning, especially on matters related to response during disasters.

6.4.1 Activating Incident Response System

(MHA-UNDP Report: Annexure II (page 259) Matrix C Item C3.2.2)

The *Incident Response System (IRS)* is the Indian version of the *Incident Command System (ICS)* established and followed in the United States of America. The ICS was one of the best DM Systems; the High Powered Committee (HPC), headed by J C Pant in 2001, recommended that it be followed in India. The IRS is an effective mechanism for reducing the ad-hoc measures in response. It envisages a composite team with various sections to attend to all the possible response requirements. The IRS designates officers to perform various duties and get them trained in their respective roles. Also, it emphasizes the need for proper documentation of various activities for better planning, accountability and analysis. It helps in reducing significantly the chaos and confusion during the response phase. Everyone will know what needs to be done, who will do it and who is in command.

The NDMA Guidelines on Incident Response System (IRS) issued in 2009 elaborates the chain of command and lines of control in the event of the onset or occurrence of a disaster. The SDMP should emphasize the urgency of establishing and rehearsing the IRS in its response planning.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
Secretaries of departments of Planning, and Finance

District Collector, District Magistrate or Deputy Commissioner
DDMA
DDMO, Secretary ex officio, DDMA
District Officers of departments of Planning, and Finance

6.4.2 Energizing Emergency Operations Center

(MHA-UNDP Report: Annexure II (page 259) Matrix B Item B3.7)

The establishment of the *Emergency Operations Centers (EOCs)* at the state and district levels is the top priority as per the SDMP and DDMPs. This involves equipping them urgently with contemporary communication

technologies and facilities, and upgrading them periodically. For the last mile connectivity and control of the operations in the disaster hit areas, availability of portable platforms should be catered for. The integration into the DM communication system of *ham radios* and such other innovative facilities is given preference, because it brings redundancy in the communication system during disasters. Also, the EOC should be functioning with technical professionals, who have background and experience in meteorological, chemical, biological, geophysical and other domains relevant to the hazards that the state or UT is faced with.

Responsibilities

Principal Secretary, Secretary or In-charge of Disaster Management
Secretary, SDMA
Secretaries of departments of Planning, and Finance

District Collector, District Magistrate or Deputy Commissioner
DDMA
DDMO, Secretary ex officio, DDMA
District Officers of departments of Planning, and Finance

6.5 Responsibilities

The responsibilities of the key functionaries in the State Government or UT Administration pertaining to *Technology* are presented in **Table 6.6.**

6.6 Timelines

The timeline of activities pertaining to *Technology* within which they need to be completed are presented in **Table 6.7.**

Table 6.6: Responsibilities of key functionaries and units of State Government or UT Administration pertaining to Implementation

Section	Activity	Key functionaries and units of the state government or UT administration								
		CMM	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO S(DDMA) C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
6.1	**DISASTER MANAGEMENT ACTIVITIES**									
6.1.1	Prediction			✓	✓	✓	✓	✓		✓
6.1.2	Mitigation		✓	✓	✓	✓	✓	✓	✓	✓
6.1.3	Preparedness			✓	✓	✓	✓	✓		✓
6.1.4	Response			✓	✓	✓	✓	✓		✓
6.1.5	Rehabilitation			✓	✓	✓	✓	✓		✓
6.1.6	Reconstruction			✓	✓	✓	✓	✓	✓	✓
6.2	**TIMELINES**									
6.2.1	Prioritization			✓	✓	✓	✓	✓		✓
6.2.2	Pilot District Program	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.3	**MONITORING**									
6.3.1	External and Independent Review			✓	✓	✓	✓	✓		

Section	Activity	Key functionaries and units of the state government or UT administration								
		CMM	CS	C(DM)	Ss DGP DGF AG	S(SDMA) M(SDMA) VC(SDMA) DG(SDRF)	DC	DDMO S(DDMA) C(DDMA)	C(ULBs) S(PRIs)	SRSAC SS&T SR&D SAU SPTC SATI SCERT SEOC NGOs
6.3.2	Periodic Review			✓	✓	✓	✓	✓		
6.3.3	Disaster Preparedness Index Dashboard			✓	✓	✓	✓	✓		
6.4	**CHAIN OF COMMAND**									
6.4.1	Activating Incident Command System			✓	✓	✓	✓	✓		
6.4.2	Energizing Emergency Operations Center			✓	✓	✓	✓	✓		

Legend:

CM	: Chief Minister
M	: Minister (Revenue) or Minister (DM)
CS	: Chief Secretary
C(DM)	: Principal Secretary, Secretary or In-charge of Disaster Management
Ss	: Secretaries of departments
DGP	: Director General of Police
DGF	: Director General of Fire Services
AG	: Advocate General of the State
S(SDMA)	: Secretary, SDMA
M(SDMA)	: Member, SDMA
VC(SDMA)	: Vice-Chairman, SDMA
DG(SDRF)	: Director, SDRF
DC	: District Collector, District Magistrate or Deputy Commissioner
DDMO / S(DDMA)	: District Disaster Management Officer/ Secretary *ex officio*, DDMA
C(DDMA)	: Chairman, DDMA
C(ULBs)	: Commissioners of Urban Local Bodies
S(PRIs)	: Secretaries of Panchayati Raj Institutions
SRSAC	: State Remote Sensing Applications Center
SS&T	: State S&T Bodies
SR&D	: State R&D Bodies
SAU	: State Agriculture University
SPTC	: State Police Training College
SATI	: State Administrative Training Institute
SCERT	: State Council for Education, Research and Training
SIDM	: State Institute of Disaster Management
SEOC	: State Emergency Operations Center

Note: In a Union Territory, the Equivalent Officer/Office may be considered.

Table 6.7: Timelines for completion of activities pertaining to Implementation

Section	Activity	Timeline		
		Short-term	Medium-term	Long-term
6.1	**DISASTER MANAGEMENT ACTIVITIES**			
6.1.1	Prediction	✓		
6.1.2	Mitigation	✓	✓	
6.1.3	Preparedness	✓		
6.1.4	Response	✓		
6.1.5	Rehabilitation	✓		
6.1.6	Reconstruction	✓		
6.2	**TIMELINES**			
6.2.1	Prioritization	✓		
6.2.2	Model District Program	✓		
6.3	**MONITORING**			
6.3.1	External and Independent Review	✓		
6.3.2	Periodic Review	✓		
6.3.3	Disaster Preparedness Index Dashboard	✓		
6.4	**CHAIN OF COMMAND**			
6.4.1	Activating Incident Command System	✓		
6.4.2	Energizing Emergency Operations Center	✓		

Note:

(1) The precise timelines will depend on the dimension and complexity of the activities as well as geographical and demographical features of the state or UT. In general,

(a) *Short-term* involves **vital activities** towards DM, which are of immediate nature, for which the funds should be **allocated immediately**;

(b) *Medium-term* involves **essential activities** towards DM, which are of urgent nature, for which the funds should be **made available without fail**; and

(c) *Long-term* involves the remaining **necessary activities** towards DM, which are important, for which the funds *should be* **made available eventually**.

*****

PART - 7
Closing Comments

7 Closing Comments

The unprecedented situation of the Corona Virus pandemic has posed a completely new challenge. We need to realize that nature is responsive to skillful interrogation. It is a occasion to find the *right* questions, and not depending just on *outdated* answers or re-iterating *the no longer relevant* questions. That said, a realistic estimate of the mortality rate of any pandemic can only be accomplished, provided its spread has completely declined. The timeline is imprecise of the ongoing global pandemic COVID 19, referenced euphemistically as *The Great Reset.* The end of Corona Virus situation is not in sight; even the best of conjectures drawn from the Spanish Flu (1918-1920, which devastated the world, including India too over a hundred years ago) do not come anywhere near that of what happened in the other pandemics (like Swine Flu, Zika Virus, and SARS). Currently, a great chase is on for developing a vaccine to contain the Corona Virus, both globally and locally. This effort has brought nations and communities together. Presently, the great chase for developing a vaccine to contain the Corona Virus, both globally and locally, has effectively resulted in finding concurrently not one but several different variants of the vaccine. And, this colossal effort has brought nations and communities together.

The Corona Virus will continue to occupy center-stage of our activities in the near future, and we must cope with it through "online" *strategies* and *improvisations.* In time, pandemics should be seen as a major vertical in the list of disasters. The extra attention and effort to mitigate the effects of this virus notwithstanding, classical DM should continue to remain the major effort of all stakeholders involved.

7.1 The Gigantic Task

Given the bewildering complexity of the unfolding canvas, and the rapidity with which change is occurring, it is absolutely imperative that the DM apparatus at all levels of the state or UT remains constantly tuned to the external environment, always on the lookout for threats and opportunities, in an online and real-time mode. All effort and activities spanning the DM continuum should remain driven by the imperatives of environmental sensitivity. The need to preserve, protect and defend the benefits of growth and development, which have resulted from long years of imaginative planning and in meticulous implementation heads to remain upper must in the psyche of planners and administrators. Needless to say, all effort should be undertaken in an inclusive and participatory manner, apart from being transparent and accountable. Finally, especially in the area of reconstruction, it must be remembered that the challenge presented by the occurrence of a disaster is really, in the long run, an opportunity to build back better!

7.2 Major Steps Needed, Now...

Much more is lost in disasters than that is gained in extraordinary development effort, if the imperatives of DM, especially those related to *Disaster Mitigation* and *Disaster Preparedness,* are not addressed. A holistic approach to DM *alone* can mitigate the losses in disasters. The few actions suggested in this *Step-by-Step* Guide will help make strong beginnings along all six phases of the DM cycle, especially Disaster Mitigation and Disaster Preparedness.

7.2.1 Urgency

Over the last decade, India has made major strides in *Disaster* **Response,** by developing due competence in the various facets of *Disaster Response,* especially in Rescue and Relief. This is evident from the establishment and successful deployment of the unique force for the purpose of *Disaster Response,* called *National Disaster Response Force;* the NDRF has been acclaimed internationally for its efforts. Now, India should reach a similar level along the directions of *Disaster* **Mitigation** and *Disaster* **Preparedness,** by dedicating special efforts with the same zeal and fervor as was done in Disaster Response.

7.2.2 Prioritization

Work related to all DM activities mentioned in this *Step-by-Step Guide* should be started **now!!** But, they will be run at different speeds, as per a priority suggested in **Section 5.1,** especially **Table 6.1.** Understandably, the activities will complete at different times. This is because of three reasons, namely: (a) need to complete the prerequisite activities, (b) available competent human resources, and (c) available financial resources. Therefore, the SDMA and DDMAs should consider *all activities* mentioned in the SDMP, DpDMP and DDMPs, and sequence the prioritization of all these activities in keeping with the discussion in **Section 6.1.** While the vital activities will get done in the short run, the essential activities will be done as soon as finances are made available, and the necessary when both finances and administrative requirements are met with.

7.2.3 Human Resources

A DM system should be built eventually in the state or UT to train and equip personnel, both *technical* and *administrative,* not only to possess updated *skills* and *knowledge,* but also the *ability* to *keep pace* with the changing external environment through a *constant, meaningful dialog.* In such a DM system, while *systemic excellence* should find center space, *individual brilliance* also should shine to accommodate stakeholders with varied competence.

7.2.4 Monitoring Progress

India has made significant progress in *education* and *science & technology.* And, now, it is time to make the DM come into focus. Notwithstanding extreme poverty, diverse geography and large demography, DM should be given high priority, even at the cost of the other development works, because the DM imperatives are essential even for all development works. And, as mentioned in Section 5.5.1, when DM measures are being *designed* and *implemented,* they should be *monitored* and *evaluated* alongside as well.

A *Disaster Preparedness Index (DPI)* should be put in place by the state or UT for a quick assessment of the status. It is desirable to have such a benchmarking exercise to measure the progress made thus far, and make space for corrections. Such an index exists in no country across the world. India can show a way to the rest of the world, by planning its work and working its plan.

7.3 The Road Ahead...

Only a few states and UTs in India have recognized the significance of the imperatives of Disaster Management, and made good progress by taking the critical early steps to establish DM. Now, the remaining states and UTs need to make such beginnings, and those that took early steps should establish on a firmer footing. This *Step-by-Step Guide* is an attempt to handhold them while they begin or continue to embark on the journey of establishing the much needed DM systems and processes in time to come.

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Annexures

Annexure A

Matrix of Activities to be taken up by states and UTs arising from the Disaster Management Act, 2005

The list of activities suggested in the MHA-UNDP Report to be taken up by states and UTs arising from the *Disaster Management Act, 2005,* are listed in **Table A.1.**

Table A.1: Activities arising from the Disaster Management Act, 2005

A1	**State Government**	**Section**
A1.1	Establishing State Disaster Management Authority	14
A1.2	Holding meetings of the State Authority	15
A1.3	Appointing officers and other employees of State Authority	16
A1.4	Constituting State Executive Committee	20
A1.5	Constitute District Disaster Management Authority	25
A1.6	Appointing officers and other employees of District Authority	29
A2	**State Disaster Management Authority**	**Section**
A2.1	Constituting advisory committee of State Authority	17
A2.2	Laying down State Disaster Management Policy	18 (2)(a)
A2.3	Approving State Disaster Management Plan	18 (2)(b)
A2.4	Approving Departmental Disaster Management Plans	18 (2)(c)
A2.5	Laying down guidelines for integrating DM in development plans and projects	18 (2)(d)
A2.6	Coordinating implementation of State Plan	18 (2)(e)
A2.7	Provisioning funds for mitigation and preparedness	18 (2)(f)
A2.8	Reviewing departmental development plans to ensure that DM is integrated therein	18 (2)(g)
A2.9	Reviewing measures taken by departments for mitigation, capacity building and preparedness and issuing guidelines as necessary	18 (2)(h)
A2.10	Laying down guidelines for minimum standard of relief	19
A3	**State Executive Committee**	**Section**
A3.1	Constituting sub-committees of State Executive Committee	21
A3.2	Coordinate and monitor implementation of National Policy, National Plan and State Plan	22 (2) (a)
A3.3	Examine vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation	22 (2) (b)
A3.4	Monitor the implementation of disaster management plans prepared by the departments of the Government of the State and District Authorities	22 (2) (c)
A3.5	Monitor the implementation of the guidelines laid down by the State Authority for integrating of measures for prevention of disasters and mitigation by the departments in their development plans and projects	22 (2) (e)
A3.6	Evaluate preparedness at all governmental or non-governmental levels to respond to any threatening disaster situation or disaster and give directions, where necessary. for enhancing such preparedness	22 (2) (f)
A3.7	Coordinate response in the event of any threatening disaster situation or disaster	22 (2) (g)
A3.8	Give directions to any Department of the Government of the State or any other authority or body in the State regarding actions to be taken in response to any threatening disaster situation or disaster	22 (2) (h)

A3.9	Promote general education, awareness and community training in regard to the forms of disasters to which different parts of the State are vulnerable and the measures that may be taken by such community to prevent the disaster, mitigate and respond to such disaster	22 (2) (i)
A3.10	Advise, assist and coordinate activities of the Departments, District Authorities, statutory bodies and other governmental and non-governmental organizations engaged in disaster management	22 (2) (j)
A3.11	Provide necessary technical assistance or give advice to District Authorities and local authorities for carrying out their functions effectively	22 (2) (k)
A3.12	Advise the State Government regarding all financial matters in relation to disaster management	22 (2) (l)
A3.13	Examine the construction, in any local area in the State and, if it is of the opinion that the standards laid for such construction for the prevention of disaster is not being or has not been followed, may direct the District Authority or the local authority, as the case may be, to take such action as may be necessary to secure compliance of such standards	22 (2) (m)
A3.14	Provide information to the National Authority relating to different aspects of disaster management	22 (2) (n)
A3.15	Lay down, review and update State level response plans and guidelines and ensure that the district level plans are prepared, reviewed and updated	22 (2) (o)
A3.16	Ensure that communication systems are in order and the disaster management drills are carried out periodically	22 (2) (p)
A3.17	Perform such other functions as may be assigned to it by the State Authority or as it may consider necessary	22 (2) (q)
A4	**Departments of State Government**	**Section**
A4.1	Take measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the guidelines laid down by the National Authority and State Authority	39 (a)
A4.2	Integrate into its development plans and projects, the measures for prevention of disaster and mitigation	39 (b)
A4.3	Allocate funds for prevention of disaster, mitigation, capacity-building and preparedness	39 (c)
A4.4	Respond effectively and promptly to any threatening disaster situation or disaster in accordance with the State Plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee	39 (d)
A4.5	Review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness	39 (e)
A4.6	Provide assistance, as required, by the National Executive Committee, the State Executive Committee and District Authorities, for:	39 (f)
	(1) Drawing up mitigation, preparedness and response plans, capacity building, data collection and identification and training of personnel in relation to disaster management	
	(2) Assessing the damage from any disaster	
	(3) Carrying out rehabilitation and reconstruction	
A4.7	Make provision for resources in consultation with the State Authority for the implementation of the District Plan by its authorities at the district level	39 (g)
A4.8	Make available its resources to the National Executive Committee or the State Executive Committee or the District Authorities for the purposes of responding promptly and effectively to any disaster in the State, including measures for:	39 (h)
	(1) Providing emergency communication with a vulnerable or affected area	

	(2) Transporting personnel and relief goods to and from affected area	
	(3) Providing evacuation, rescue, temporary shelter or immediate relief	
	(4) Carrying out evacuation of persons or live-stock from an area of any threatening disaster situation or disaster	
	(5) Setting up temporary bridges, jetties and landing places	
	(6) Providing drinking water, essential provisions, healthcare and services in an affected area	
A4.9	Such other actions as may be necessary for disaster management	39 (i)
A5	**District Disaster Management Authority**	**Section**
A5.1	Constituting advisory and other committees of District Authority	28
A5.2	Prepare a disaster management plan including district response plan for the district	30 (2) (i)
A5.3	Coordinate and monitor the implementation of the National Policy, State Policy, National Plan, State Plan and District Plan	30 (2) (ii)
A5.4	Ensure that the areas in the district vulnerable to disasters are identified and measures for the prevention of disasters and the mitigation of its effects are undertaken by the departments of the Government at the district level as well as by the local authorities	30 (2) (iii)
A5.5	Ensure that the guidelines for prevention of disasters, mitigation of its effects, preparedness and response measures as laid down by the National Authority and the State Authority are followed by all departments of the Government at the district level and the local authorities in the district	30(2) (iv)
A5.6	Give directions to different authorities at the district level and local authorities to take such other measures for the prevention or mitigation of disasters as may be necessary	30(2) (v)
A5.7	Lay down guidelines for prevention of disaster management plans by the department of the Government at the districts level and local authorities in the district	30(2) (vi)
A5.8	Monitor the implementation of disaster management plans prepared by the Departments of the Government at the district level	30(2)(vii)
A5.9	Lay down guidelines to be followed by the Departments of the Government at the district level for purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor	30(2)(viii)
A5.10	Monitor the implementation of measures referred to in clause (viii)	30(2) (ix)
A5.11	Review the state of capabilities for responding to any disaster or threatening disaster situation in the district and give directions to the relevant departments or authorities at the district level for their up gradation as may be necessary	30 (2)(x)
A5.12	Review the preparedness measures and give directions to the concerned departments at the district level or other concerned authorities where necessary for bringing the preparedness measures to the levels required for responding effectively to any disaster or threatening disaster situation	30 (2) (xi)
A5.13	Organize and coordinate specialized training programs for different levels of officers, employees and voluntary rescue workers in district	30 (2) (xii)
A5.14	Facilitate community training and awareness programs for prevention of disaster or mitigation with the support of local authorities, governmental and non-governmental organizations	30(2) (xiii)
A5.15	Set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public	30(2) (xiv)
A5.16	Prepare, review and update district level response plan & guidelines	30(2) (xv)
A5.17	Coordinate response to any threatening disaster situation or disaster	30(2) (xvi)

A5.18	Ensure that the Departments of the Government at the district level and the local authorities prepare their response plans in accordance with the district response plan	30(2)(xvii)
A5.19	Lay down guidelines for, or give direction to, the concerned Department of the Government at the district level or any other authorities within the local limits of the district to take measures to respond effectively to any threatening disaster situation or disaster	30(2)(xviii)
A5.20	Advise, assist and coordinate the activities of the Departments of the Government at the district level, statutory bodies and other governmental and non-governmental organizations in the district engaged in the disaster management	30(2)(xix)
A5.21	Coordinate with, and give guidelines to, local authorities in the district to ensure that measures for the prevention or mitigation of threatening disaster situation or disaster in the district are carried out promptly and effectively	30 (2) (xx)
A5.22	Provide necessary technical assistance or give advice to the local authorities in the district for carrying out their functions	30(2) (xxi)
A5.23	Review development plans prepared by the Departments of the Government at the district level, statutory authorities or local authorities with a view to make necessary provisions therein for prevention of disaster or mitigation	30(2)(xxii)
A5.24	Examine the construction in any area in the district and, if it is of the opinion that the standards for the prevention of disaster or mitigation laid down for such construction is not being or has not been followed, may direct the concerned authority to take such action as may be necessary to secure compliance of such standards	30(2)(xxiii)
A5.25	Identify buildings and places which could, in the event of any threatening disaster situation or disaster, be used as relief centers or camps and make arrangements for water supply and sanitation in such buildings or places	30(2)(xxiv)
A5.26	Establish stockpiles of relief and rescue materials or ensure preparedness to make such materials available at a short notice	30(2)(xxv)
A5.27	Provide information to the State Authority relating to different aspects of disaster management	30(2)(xxvi)
A5.28	Encourage the involvement of non-governmental organizations and voluntary social-welfare institutions working at the grassroots level in the district for disaster management	30(2)(xxvii)
A5.29	Ensure communication systems are in order, and disaster management drills are carried out periodically 30(2)(xxviii)	
A5.30	Perform such other functions as the State Government or State Authority may assign to it or as it deems necessary for disaster management in the District	30(2)(xxix)

Annexure B

Matrix of Activities to be taken up by states and UTs arising from the National Policy on Disaster Management, 2009

The list of activities suggested in the MHA-UNDP Report to be taken up by states and UTs arising from the *National Policy on Disaster Management, 2009,* are listed in **Table B.1.**

Table B.1: Activities arising from the National Policy on Disaster Management, 2009

B1	INSTITUTIONAL AND LEGAL ARRANGEMENTS	Para
B1.1	**State Governments** The primary responsibility for disaster management rests with the States. The institutional mechanism put in place at the Centre, State and District levels will help the States manage disasters in an effective manner.	3.3.6
B1.2	**District Administration** At the District level, DDMAs will act as the District planning, coordinating and implementing body for disaster management and will take all measures for the purposes of disaster management in the District in accordance with the guidelines laid down by NDMA and SDMA.	3.3.8
B1.3	**Management of Disasters impacting more than one State** At times, the impact of disasters occurring in one State may spread over to the areas of other States. Similarly, preventive measures in respect of certain disasters, such as floods, etc., may be required to be taken in one State, though the impact of their occurrence may affect another. The administrative hierarchy of the country is organized into National, State and District level administrations. This presents some difficulties in respect of disasters impacting more than one State. Management of such situations calls for a coordinated approach, which can respond to a range of issues quite different from those that normally present themselves, before, during and after the event. NDMA will encourage identification of such situations and promote the establishment of mechanisms on the lines of Mutual Aid Agreement for coordinated strategies for dealing with them by the States, Central Ministries and Departments and other agencies concerned.	3.3.9
B1.4	**State Police Forces and Fire Services** The State Police Forces and the Fire Services are crucial immediate responders to disasters. The Police Forces will be trained and the Fire Services upgraded to acquire multi-hazard rescue capability.	3.4.3
B1.5	**Civil Defence and Home Guards** The mandate of the Civil Defence and the Home Guards will be redefined to assign an effective role in the field of disaster management. They will be deployed for community preparedness and public awareness. A culture of voluntary reporting to duty stations in the event of any disaster will be promoted.	3.4.4
B1.6	**State Disaster Response Force** States will be encouraged to create response capabilities from within their existing resources. To start with, each State may aim at equipping and training one battalion equivalent force. They will also include women members for looking after the needs of women and children. NDRF battalions and their training institutions will assist the States/UTs in this effort. The States/UTs will also be encouraged to include DM training in their respective Police Training Colleges and basic and in-service courses, for gazetted and non-gazetted officers.	3.4.5

B2	FINANCIAL ARRANGEMENTS	Para
B2.1	**Mitigation Funds** It shall be the responsibility of the States to constitute the Disaster Mitigation and Response Funds at the State as well as District levels. The modalities for the application of these funds will be worked out in accordance with the provisions of the Act.	4.4.2
B2.2	**Mitigation Projects** The guidelines on various disasters will form the basis for the formulation of plans for mitigation projects at the National, State and District level. State Governments will identify Mitigation Projects for implementation.	4.4.3
B3	**DISASTER PREVENTION AND MITIGATION**	**Para**
B3.1	**Risk Assessment and Vulnerability Mapping** DM authorities at the State and District levels need to carry out risk and vulnerability assessment of all disaster prone areas. Hazard zonation mapping and vulnerability analysis based on GIS and remote sensing data, needs to mandatorily include a ground check component. Hazard and Consequence Mapping on GIS platforms will be prepared for all chemical accident prone districts.	5.1.2
B3.2	**Increasing Trend of Disasters in Urban Areas** State Governments and UTs concerned should accord priority for improving urban drainage systems with special focus on non-obstruction of natural drainage systems. Urban mapping of infrastructure of spatial resolution will be taken up for development of Decision Support System (DSS) for management of urban risks.	5.1.4
B3.3	**Critical Infrastructure** It is of utmost importance that critical infrastructure like dams, roads, bridges, flyovers, railway lines, power stations, water storage towers, irrigation canals, delta water distribution networks, river and coastal embankments, ports and other civic utilities are constantly monitored for safety standards in consonance with worldwide safety benchmarks and strengthened where deficient. The building standards for critical infrastructure need to be aligned to the safety norms and Departments/Authorities concerned would ensure the requisite actions and measures to ensure this.	5.1.5
B3.4	**Environmentally Sustainable Development** Environmental considerations and developmental efforts, need to go hand in hand for ensuring sustainability. Restoration of ecological balance in Himalayan regions and raising coastal shelter belt plantations need to be incorporated wherever necessary in DM plans. Eco systems of forests, islands, coastal areas, rivers; and the agricultural, urban and industrial environment are also to be considered for restoration of ecological balances and sustainable development. Zonal regulations must ensure the preservation of natural habitats.	5.1.6
B3.5	**Climate Change Adaptation** Synergies in our approach and strategies for climate change adaptation and DM shall be encouraged and promoted.	5.1.7
B3.6	**Communications and Information Technology Support** Efforts should be made for setting up IT infrastructures consisting of required IT processes, architecture and skills for quick upgradation and updation of data sets from the PRIs or the ULBs.	5.2.5
B3.7	**Strengthening of the Emergency Operations Centres**: The establishment of Emergency Operations Centers at the State, Metro and District level and equipping them with contemporary technologies and communication facilities and their periodic upgradation, will be accorded priority. For last mile connectivity and control of the operations at the disaster hit areas, availability of portable platforms will be catered for.	5.2.7

	The integration of Ham radios and such other innovative facilities, into the DM communication system, will be advantageous.	
B3.8	**Medical Preparedness and Mass Casualty Management** The surge and casualty handling capacity of all hospitals at the time of disasters, will be worked out and recorded through a consultative process, by all the States/UTs in the pre-disaster phase. The State and District authorities will be encouraged to formulate appropriate procedures for treatment of casualties by private hospitals during disasters. These plans will also address post-disaster disease surveillance systems, networking with hospitals, referral institutions and accessing services and facilities such as availability of ambulances and blood banks.	5.2.8
B3.9	**Training, Simulations and Mock Drills** State and District authorities will be encouraged to generate a culture of preparedness and quick response. Gradually State Governments will be encouraged to plan a series of exercises for various types of disasters in collaboration with NDMA to enhance the response level of various stakeholders.	5.2.10
B3.10	**Community Based Disaster Preparedness** During any disaster, communities are not only the first to be affected but also the first responders. Community participation ensures local ownership, addresses local needs, and promotes volunteerism and mutual help to prevent and minimize damage. Therefore, the efforts of the States/UTs, in this regard need to be encouraged. Community plans will be dovetailed into the Panchayat, Block and District DM Plans.	5.3.1
B3.11	**Stakeholders' Participation** The participation of civil society stakeholders will be coordinated by the SDMAs and DDMAs. Civil Defence, NCC, NYKS, NSS and local Non-Governmental Organizations (NGOs) will be encouraged to empower the community and generate awareness through their respective institutional mechanisms. Efforts to promote voluntary involvement will be actively encouraged.	5.3.3
B3.12	**Corporate Social Responsibility and Public-Private Partnership** SDMAs need to network with the corporate entities to strengthen and formalize their role in the DM process for ensuring safety of the communities.	5.3.4
B3.13	**Media Partnership** The media plays a critical role in information and knowledge dissemination in all phases of DM. The versatile potential of both electronic and print media needs to be fully utilized. Effective partnership with the media will be worked out in the field of community awareness, early warning and dissemination, and education regarding various disasters.	5.3.5
B4	**TECHNO-LEGAL REGIME**	**Para**
B4.1	**Risk Assessment and Vulnerability Mapping** DM authorities at the State and District levels need to carry out risk and vulnerability assessment of all disaster prone areas. Hazard zonation mapping and vulnerability analysis based on GIS and remote sensing data, needs to mandatorily include a ground check component. Hazard and Consequence Mapping on GIS platforms will be prepared for all chemical accident prone districts.	5.1.2
B4.2	**Techno-Legal Regime** The relevant Acts, Rules and Regulations warranting amendments need to be identified and brought in conformity with the DM Act in a phased manner by the State governments and other agencies concerned.	6.1.1
B4.3	**Revision of Municipal Regulations** Municipal regulations such as development control regulations, building bye-laws and	6.2.1

	structural safety features will be reviewed periodically to identify safety gaps from seismic, flood, landslide and other disasters and suitable modifications will be made to align them to the revised building codes of the Bureau of Indian Standards (BIS).	
B4.4	**Land Use Planning** A review of master plans and their compliance, on priority, will be essential and regarded as the paramount responsibility of the States/UTs. At the macrolevel, there is a need for preparation of land use planning based on the inventory database of various uses. As far as urban settlements are concerned, the future land use is to be assessed keeping in view the anticipated intensity of development.	6.3.1
B4.5	**Safe Construction Practices** The design and specification of houses being constructed, under the Indira Awas Yojana (IAY) and other government welfare and development schemes, will also be re-examined to ensure hazard safety. Building codes will be updated every five years as a mandatory requirement and also put in the public domain. Observance of the National Building Code should be made mandatory in all the State/ Municipal building bye-laws.	6.4.1
B4.6	**Enforcement** After having put the techno-legal and compliance system in place, the States/UTs will also ensure their enforcement by establishing an effective mechanism, under the provisions of the Act.	6.6.1
B5	**RESPONSE**	**Para**
B5.1	**Role of State, District and Local Authorities** It is the primary responsibility of the State Governments/SDMAs to monitor and assess any developing situation and keep the NDMA and NEC apprised of the same. They will also be responsible to constantly evaluate their own capabilities to handle that situation and project the anticipated requirements for the Central resources well in time. Inter-state assistance and cooperation will be encouraged. The States/ UTs will also be responsible to develop their own response potential progressively and complete the process at the earliest. This will comprise training and equipping of State response forces, community preparedness, training and creation of response caches at the District level. District level preparations will provide the cutting edge to all response activities. Local authorities, PRIs and ULBs will play a significant role in the entire process, particularly in response and rescue operations, relief and rehabilitation, awareness generation and disaster preparedness, restoration of livelihood options and coordination with NGOs and civil society.	7.4.1
B5.2	**Standard Operating Procedures** State Governments, District Authorities and other stakeholders will prepare SOPs in consonance with the National and State Plans. SOPs will be prescribed for activities like search and rescue, medical assistance and casualty management, evacuation, restoration of essential services and communication at disaster sites, etc. The other important activities are provision of food, drinking water, sanitation, clothing and management of relief camps.	7.5.1
B5.3	**Animal Care** Animals both domestic and wild are exposed to the effects of natural and man-made disasters. It is necessary to devise appropriate measures to protect animals and find means to shelter and feed them during disasters and their aftermath, through a community effort, to the extent possible.	7.10.1
B6	**RELIEF AND REHABILITATION**	**Para**
B6.1	**Setting up of Temporary Relief Camps** DDMAs, especially in recurring disaster prone areas, may identify locations for setting up temporary camps. Agencies to supply the necessary stores will be identified in the	8.2.1

	pre-disaster phase. The use of premises of educational institutions for setting up relief camps needs to be discouraged. The temporary relief camps will have adequate provision of drinking water and bathing, sanitation and essential health care facilities. Wherever feasible, special task forces from amongst the disaster affected families will be set up to explore the possibility of providing food through community kitchens, and provision of education through the restoration of schools and anganwadis. Efficient governance systems like entitlement cards, laminated identification cards etc., will be developed as a part of uniform humanitarian governance practices through the respective DDMAs.	
B6.2	**Management of Relief Supplies** Ensuring minimum standards of relief and speedy management of supplies are important features of relief operations. SOPs will be put in place for ensuring the procurement, packaging, transportation, storage and distribution of relief items, which needs to be carried out in an organized manner. The affected community and local authorities need to work in tandem in managing the relief camps. Guidelines will be evolved to manage the donations received in cash or kind to ensure transparency and accountability.	8.3.1
B6.3	**Review of Standards of Relief** In most States, existing standards of relief need to be reviewed to address the contemporary needs of communities affected by disasters. The SDMAs may review the Relief Codes/manuals and prepare DM Codes for prescribing the norms, standards and criteria for the provision of relief in conformity with the guidelines of NDMA.	8.4.1
B6.4	**Temporary Livelihood Options and Socio-Economic Rehabilitation** In the aftermath of any major disaster, generally a demand always arises to generate temporary livelihood options for the affected community and the State Governments should recognize this aspect in their DM planning process. Any such option must ensure that the assets, infrastructure and amenities created are hazard resistant, durable, sustainable, and cost-efficient.	8.5.1
B6.5	**Provision of Intermediate Shelters** In the case of devastating disasters, where extreme weather conditions can be life-threatening or when the period of stay in temporary shelters is likely to be long and uncertain, construction of intermediate shelters with suitable sanitary facilities will be undertaken to ensure a reasonable quality of life to the affected people. The design of such shelters will be eco-friendly and in consonance with local culture. It would be desirable for SDMAs to plan during periods of normalcy, the layout of intermediate shelters which is cost-effective and as per local needs with multi-use potential.	8.6.1

Matrix of Activities to be taken up by states and UTs arising from the National Plan on Disaster Management 2019, and the NDMA Guidelines

The list of activities suggested in the MHA-UNDP Report to be taken up by states and UTs arising from the *National Plan on Disaster Management,* 2019, and the *National Disaster Management Guidelines* prepared by the *National Disaster Management Authority* during 2007-2019, are listed in **Table C.1.**

Table C.1: Activities arising from the National Plan on Disaster Management 2019, and the NDMA Guidelines

C1	**Management of Floods**
C1.1	**Understanding Risk**
C1.1.1	**Observation, Networks, Information Systems, Monitoring and Forecasting** (1) Support and cooperate with central agencies (2) Sponsor state-specific efforts (3) Support local efforts
C1.1.2	**Zoning, Mapping and Classification of Flood Prone Areas** (1) Support and cooperate with central agencies (2) Sponsor state-specific efforts (3) Support local efforts
C1.1.3	**Studies and monitoring of rivers flowing from neighboring countries** (1) Support and cooperate with central agencies (2) Carry out state-specific efforts (3) Sponsor state-specific efforts (4) Support local efforts
C1.1.4	**Research and Development** (1) Support and cooperate with central agencies (2) Sponsor/carry out state-specific efforts (3) Support local effort
C1.1.5	**Hazard, Vulnerability and Risk Assessment** Undertake HRVA as part of preparing and periodically revising the DM plans
C1.1.6	**Monitoring, Forecasting and Warning Systems** (1) Support, cooperation for data collection and updates
C1.1.7	**Dissemination of warnings, data and information** (1) Inter-state data and information sharing where applicable (2) Coordination and cooperation with the central Agencies (3) Ensure facilities and infrastructure for the implementation of adequate access to communities at risk (4) Dissemination of warnings to all, down to the last mile – remote rural or urban; (5) Regular updates to people in areas at risk (6) Warnings using all types of options, types of technologies, and media (7) Monitoring compliance by various network operators and service providers.
C1.2	**Inter-Agency Coordination**
C1.2.1	**Disaster Management** Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks
C1.2.2	**Response** Organise immediate response and seeking assistance of central agencies, if required

C1.2.3	**Warnings, Information and Data** (1) Dissemination of warnings to all, down to the last mile – remote, rural or urban; (2) Regular updates to people in areas at risk
C1.2.4	**Non-Structural measures** Adapting the norms/codes as per State's requirement, enforcement, monitoring
C1.3	**Investing in DM – Structural Measures**
C1.3.1	**Flood control measures such as construction of embankments and levees** (1) Identification safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk (2) Construction of multi-purpose shelters in (3) Coastal villages/ habitations prone to frequent cyclone (4) Proper maintenance of drainage systems and flood embankments
C1.3.2	**Social Housing Schemes** Ensure that flood-resistant features are incorporated in the planning and execution of social housing schemes in flood prone areas
C1.3.3	**Multi-purpose Flood Shelters** Ensure availability of shelters, undertake proper maintenance, and make arrangements to support the people shifted to temporary shelters
C1.3.4	**Waterways and drainage systems for roads Highways, and Expressways** Coordination and cooperation with the central agencies and ensure proper alignment and design in all state projects
C1.3.5	**Enhancing the safety of dams and reservoirs** (1) Carry out measures to increase safety, reduce risks from flooding (2) Undertake pre- and post-monsoon inspections of dams and reservoirs (3) Monitor the implementation of safety enhancements in accordance with norms
C1.3.6	**De-silting/ dredging of rivers to improve:** (1) Flow; (2) Drainage; (3) Floodwater diversion through existing Channels; and (4) Implementation of projects as per norms
C1.3.7	**Hazard resistant construction, strengthening and retrofitting of all lifeline structures and critical Infrastructure** Collaboration with technical agencies and implementation
C1.4	**Investing in DM – Non-Structural Measures**
C1.4.1	**A. Regulation and enforcement of laws, norms, regulations and guidelines** **B. Regulation of Reservoir Integrated Water Resource Management** (1) Implementing land-use regulation for low lying areas as per flood control norms (2) Regulation of inhabitation of low-lying areas along the rivers, nallas and drains (3) Implementing flood management action plan (4) Review and modification of operation manuals for all major dams/ reservoirs (5) Support and cooperate with central agencies; (6) Sponsor state-specific efforts; support local efforts; Cooperate with central efforts (7) Prevention and removal of encroachment into the waterways and natural drainage systems
C1.4.2	**Regulations to promote flood resilient buildings and infrastructure** Revise and implement the relevant rules in flood prone areas
C1.4.3	**A. Wetland conservation and restoration** **B. Catchment Area Treatment and Afforestation** (1) Discourage reclamation of wetlands, natural depressions

	(2) Action plan managing wetlands and natural drainage systems for flood moderation (3) Implementation of watershed management including catchment area treatment and afforestation programs
C1.4.4	**Public Private Partnerships** Promote private participation in disaster management facilities
C1.5	**Capacity Development**
C1.5.1	**Training** (1) Training and orientation programs for state government staff, professionals for veterinary care and support to disaster affected animals (2) Incorporating disaster response and search & rescue in the training programs of youth (such as village volunteers), and for protection of disaster-affected animals
C1.5.2	**Curriculum Development** (1) Update curriculum for undergraduate engineering courses to include topics relevant for flood hazard mitigation (2) Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma/UG/PG levels for Health Professionals (3) Improving curriculum periodically using new technologies
C1.5.3	**Awareness Generation** (1) Carry out mass media campaigns (2) Promote culture of disaster risk prevention, mitigation, and better risk management (3) Promote attitude and behaviour change in awareness campaigns/ IEC (4) Promote use of insurance/ risk transfer (5) Promote community radio (6) Strengthening network of civil society organizations for awareness generation about DM and DM (7) Information on care and protection of disaster-affected animals
C1.5.4	**Mock Drills / Exercises** Joint planning and execution of emergency drills
C1.5.5	**Vocational Training and Skill Development** (1) Conduct training programs (2) Develop a team of Trainer-of-Trainers for different trades relevant to flood-resistant construction
C1.5.6	**Empowering women, marginalized, and persons with disabilities** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
C1.5.7	**Community-Based Disaster Management** (1) Manage and cope with disasters based on a multi-hazard approach (2) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach (3) Training for panchayat, SHG,NCC, NSS, Youth, local community organizations

C2	**Management of Earthquakes**
C2.1	**Understanding Risk**
C2.1.1	(1) Earthquake Monitoring Services (2) National Seismological Network (3) Real Time Seismic Monitoring Network (RTSMN) (a) Share information widely
C2.1.2	**Earthquake Hazard and Risk Assessment** Share information widely

C2.1.3	**Seismic Zonation** Ensuring implementation, enforcement, compliance and monitoring; awareness creation
C2.2	**Inter-Agency Coordination**
C2.2.1	**Disaster Management** Preparing and implementing of DM Plans, and ensuring the functioning of agencies with DM tasks
C2.2.2	**Response** Organizing immediate response and seeking assistance of central agencies, if necessary
C2.2.3	**Non-Structural Measures** Adapting the norms/codes as per State's requirement, enforcement and monitoring
C2.3	**Investing in DM – Structural Measures**
C2.3.1	**Social Housing Schemes** (1) Review existing social housing schemes (2) Ensure that earthquake resistant features complying with relevant building codes are incorporated in planning and execution of social housing schemes
C2.3.2	**Seismic retrofitting of prioritized EXISTING lifeline structures and buildings** Implementation strengthening and seismic retrofitting as per recommendations of safety audits in all govt. departments, agencies, public utilities, schools, colleges, community halls, etc.
C2.3.3	**Earthquake-resistant construction of all NEW lifeline structures and buildings** Collaboration with technical agencies, and implementation
C2.4	**Investing in DM – Non-Structural Measures**
C2.4.1	**Regulations and model codes for town planning, civil works and public infrastructure** (1) Adopt suitable bye-laws for rural and urban areas, put model codes into practice and ensure proper compliance (2) Ensure strict compliance with code implementation through relevant departments and agencies
C2.4.2	**Structural safety audit of lifeline structures and buildings; prioritization of lifeline structures and buildings for strengthening and seismic retrofitting** (1) Carry out safety audit of lifeline buildings and critical infrastructure, and (2) Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals
C2.4.3	**Licensing of Professionals** Implement licensing of engineers through appropriate legal framework and institutional mechanism
C2.4.4	**Public Private Partnerships** Promote private participation in DM activities
C2.5	**Capacity Development**
C2.5.1	**Training** (1) Contribute to the national effort to build the requisite number of trained personnel to handle seismic safety in India (2) Trainings in search and rescue
C2.5.2	**Capacity Building** DM related aspects to be included in undergraduate and professional courses
C2.5.3	**Awareness Generation** (1) Carry out mass media campaigns (2) Promote culture of disaster risk prevention, mitigation, and better risk management (3) Promote attitude and behaviour change in the awareness campaigns/IEC (4) Promote use of insurance/ risk transfer (5) Promote Community Radio (6) Strengthening the network of civil society organizations for awareness generation (7) Mock drills and rehearsals

C2.5.4	**Mock Drills / Exercises** Joint planning and execution of emergency drills
C2.5.5	**Documentation and Dissemination** Popularization and distribution of documentation in local languages
C2.5.6	**Empowering women, marginalized, and persons with disabilities** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
C2.5.7	**Community-based DM** (1) Manage and cope with disasters based on a multi-hazard approach (2) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach (3) Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

C3	**Management of Landslides & Snow Avalanches**
C3.1	**Understanding Risk**
C3.1.1	Hazard Zoning, mapping, geological and geotechnical Investigations in regions prone to landslides and snow avalanches Support to and cooperation with central agencies
C3.1.2	**Research and Development** Support to and cooperation with central agencies
C3.1.3	**Hazard, Vulnerability and Risk Assessment** Undertake HRVA as part of preparing and periodic revision of DM plans
C3.1.4	**Dissemination of Warnings** (1) Ensure facilities and infrastructure for implementation of adequate access to communities at risk (2) Dissemination of warnings to all, down to the last mile – remote, rural or urban; (3) Regular updates to people in areas at risk
C3.1.5	**Monitoring, Warning Systems, and Dissemination** (1) Support and collaboration in implementation
C3.2	**Inter-Agency Coordination**
C3.2.1	**Disaster Management** (1) Preparation and implementation of DM Plans and ensure the functioning of agencies with DM tasks
C3.2.2	**Response** Organizing the immediate response and seeking assistance of central agencies
C3.2.3	**Warnings, Information, Data** (1) Dissemination of warnings to all, down to the last mile – remote, rural or urban; (2) Regular updates to people in areas at risk
C3.3	**Investing in DM – Structural Measures**
C3.3.1	**Protection of Human Settlements** (1) Improving infrastructure, roads, and land stabilization work
C3.3.2	**Protection of Heritage Structures** (1) Support and collaboration
C3.3.3	**Multi-Hazard Shelters** (1) Identification of safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk

	(2) Construction of multi-purpose shelters in high risk areas at safe sites away from hazard-prone locations (3) Proper maintenance of roads in risk-prone areas
C3.4	**Investing in DM – Non-Structural Measures**
C3.4.1	**Site selection for Human Settlements in Landslide and Snow Avalanche Prone Area** (1) Adopt suitable byelaws for rural and urban areas (2) Enforce model codes into practice and ensure proper compliance (3) Ensure proper compliance
C3.4.2	**Regulations and Building Codes** Ensure implementation and adherence to codes and guidelines
C3.4.3	**Licensing and Certification of Professionals** (1) Implement licensing of engineers through appropriate legal framework and institutional mechanism
C3.4.4	**Public Private Partnerships** Promote private participation in disaster management facilities
C3.5	**Capacity Development**
C3.5.1	**Training** (1) Support and collaboration to national agencies (2) Training and skill upgrades for search and rescue (3) Conduct regular training programs for professionals including those for care and protection of disaster affected animals
C3.5.2	**Curriculum Development** (1) Include information on landslides and snow avalanches in the curriculum
C3.5.3	**Awareness Generation** (1) Carry out mass media campaigns (2) Promote culture of disaster risk prevention, mitigation, and better risk management (3) Promote attitude and behaviour change in the awareness campaigns/ IEC (4) Promote use of insurance/ risk transfer (5) Promote community radio (6) Strengthening network of civil society organizations for awareness generation about DM (7) Inform people about care and protection of disaster-affected animals
C3.5.4	**Mock Drills / Exercises** (1) Joint planning and execution of emergency drills
C3.5.5	**Documentation** (1) Constitute multi-institutional and multidisciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate
C3.5.6	**Empowering women, marginalized, and persons with disabilities** (1) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of DM at the state, district and local levels
C3.5.7	**Community Based Disaster Management** (1) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach (2) Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

C4	**Management of Droughts**
C4.1	**Understanding Risk**
C4.1.1	**Vulnerability Maps** (1) Carry out comprehensive assessment of water availability (2) Prepare maps of areas likely to face water deficit before onset of next monsoon (demarcate blocks and preferably villages) (3) Undertake village wise assessment of water storage in the vulnerable blocks
C4.1.2	**Assessment, Monitoring and Early Warning** (1) Coordinate with central agencies in the compilation, for refining forecast accuracy for the region, andanalysis of all the drought, water deficit, and crop related data (2) Ensure functioning of DMC under control of SDMA/ CoR with requisite facilities and staff (3) Separately, at the end of SW and NE monsoon, as applicable, prepare and update a robust database of micro-level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio-economic factors (4) Separately, at the end of SW and NE monsoon, prepare crop advisory for blocks that are likely to face water deficit (5) Separately, at the end of SW and NE monsoons, prepare comprehensive water conservation, re-distribution, and management plan for the areas in the state that are likely to experience water deficit
C4.1.3	**Drought Declaration** (1) Monitor key indicators for drought declaration with the support of relevant Central/ State agencies/Departments (2) State Govt. to issue a formal declaration of drought affected areas after which Collector will notify the district and talukas affected and initiate drought response measures
C4.1.4	**Hazard Risk Vulnerability Assessment** (1) Undertake HRVA as part of preparation/ revision of DM plans including change in vulnerability and risk considering climate change scenarios (2) Estimate vulnerability of crops to rainfall uncertainties
C4.1.5	**Research** (1) Conduct research through the university system to cope with water deficit, to manage crops with less water, improve water conservation programs, enhance the productivity of dryland/ rain-fed farming
C4.2	**Inter-Agency Coordination**
C4.2.1	**Disaster Management** Preparing and implementing of DM Plans, and ensuring the functioning of agencies with DM tasks
C4.2.2	**Response** Organizing immediate response and seeking assistance of central agencies, if necessary
C4.2.3	**Warnings, Information, Data** (1) Disseminate warnings to the last mile – remote, rural and urban areas (2) Issue regular updates to people in areas at risk
C4.2.4	**Non-Structural Measures** Adapting norms and codes as per State's requirement, enforcement and monitoring
C4.3	**Investing in DM – Structural Measures**
C4.3.1	**Storage Facilities** (1) Drinking water storage and distribution facilities (2) Fodder storage facilities to maintain fodder banks. (3) Rainwater harvesting systems – individual and community
C4.3.2	**Water Conservation Structures** (1) Water harvesting and storage structures

	(2) Check dams, reservoirs with excess capacity (3) Groundwater recharge augmentation systems
C4.3.3	**Social Housing Schemes** (1) Ensure rainwater harvesting and storage in the social housing schemes especially in drought-prone areas
C4.4	**Investing in DM – Non-Structural Measures**
C4.4.1	**Mitigation Measures** (1) Coordinate the efforts of the central agencies in implementing mitigation measures (2) Promote private participation in disaster management facilities (3) Improve the implementation of watershed development programs (4) Risk management for dry land/ rain-fed farmers through agricultural extension, and financial institutions based on assessments at the end of monsoon (SW or NE as applicable) (5) Drought-Proofing
C4.4.2	**Promote water conservation, harvesting, efficient irrigation, afforestation** (1) Promote water efficient irrigation systems (sprinklers, drip, etc.) (2) Promote protective irrigation through micro-irrigation systems (3) Provide advice to farmers to cope with drought, crop management under drought conditions, and efficient water management (4) Training in water and soil moisture conservation (5) Promote village-level information systems for natural resource management (6) Afforestation and other options
C4.4.3	**Agricultural credits, agricultural inputs, finance, marketing, and crop insurance** (1) Need-based credit (2) Promote financial inclusion (3) Monitor the availability of credit and other financial support from banks and other financial institutions to farmers in drought prone areas (4) Ensure the insurance programs reach the target audiences (especially dry land/ rain-fed farmers) and dependent agricultural labour (5) Marketing support (6) Ensuring availability of quality agricultural inputs
C4.4.4	**Reducing climate change impact** (1) Implement various water and soil conservation programs taking into account climate change impacts
C4.5	**Capacity Development**
C4.5.1	**Training and Capacity Building** (1) Formulate and implement national training and capacity building program for drought management, especially, better water conservation, integrated water management (surface and ground water), and cropping systems (2) Implement different training programs for officials at various levels, elected representatives, community leaders, civil society organizations, animal welfare organizations (3) Ensure availability of qualified and experienced trainers conversant with drought mitigation and management techniques (crop, animal care, integrated water resources–surface and ground water) (4) Professionals for veterinary care and support to drought-affected animals
C4.5.2	**Curriculum Development** (1) Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture and veterinary courses offered by state institutions (2) Include drought mitigation in secondary and higher secondary school curriculum
C4.5.3	**Awareness Generation** (1) Carry out mass media campaigns

	(2) Promote culture of disaster risk prevention, mitigation, and better risk management covering crop and water management (including conservation of surface and groundwater) (3) Promote attitude and behaviour change in the awareness campaigns/IEC (4) Promote use of insurance/ risk transfer (5) Promote community radio (6) Inform people about care and protection of disaster-affected animals
C4.5.4	**Empowering women, marginalized, and persons with disabilities** (1) Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
C4.5.5	**Drought Management Plans** (1) Ensure development of state, district, block, taluka and village drought management plans
C4.5.6	**Mainstreaming Drought Management in Development Plans** (1) All state government departments or agencies will mainstream DM efforts in their developmental plans

C5	**Management of Chemical Disasters**
C5.1	**Understanding Risk**
5.1.1	**Information System and Research** (1) Build systems and processes to record, document, synthesize and share information with all stakeholders on the Chemical hazard prevalent in the State
5.1.2	**Zoning and Mapping of Hazardous Chemical units** (1) Develop Industrial zones on basis of hazard potential and effective Disaster Management for Hazardous Chemical Units
5.1.3	**Chemical hazard monitoring** (1) Prepare state-specific chemical hazard information online and share with all stakeholders
5.1.4	**Hazard Risk Vulnerability Assessment** (1) Undertake HRVA as part of preparing and periodic revision of DM Plan considering Chemical Hazards scenarios
C5.2	**Inter-Agency Coordination**
5.2.1	**Disaster Management** (1) Preparing and implementing of DM Plans, and ensuring the functioning of agencies with DM tasks
5.2.2	**Response** (1) Organizing immediate response and seeking assistance of central agencies, if necessary
5.2.3	**Non-Structural Measures** (1) Adapting the norms/codes as per State's requirement, enforcement and monitoring
C5.3	**Investing in DM – Structural Measures**
5.3.1	**Shelters, Evacuation, Access and Escape Route** (1) Review existing shelters and evacuation route (2) Ensure Access and Escape route are clear, and in line with the norms
5.3.2	**Decontamination facilities** (1) Review for process of establishing decontamination facilities for off–site emergencies of MAH units.
5.3.3	**Firefighting facilities** (1) Ensure sufficient Firefighting facilities (fixed and movable) with respect to Chemical Hazards present in the State/Districts as per established norms/guidelines

C5.4	Investing in DM – Non-Structural Measures
5.4.1	**Existing rules/regulations/guidelines related to hazardous industries** (1) Ensure implementation and adherence to existing rules/regulations and guidelines
5.4.2	**Safety Audit of Hazardous Chemical Units** (1) Carry out safety audit of Hazardous Chemical Units, and (2) Ensure implementation, monitoring, enforcement and proper compliance of Rules and Regulations by public and private units
5.4.3	**Public Private Partnership** (1) Develop a PPP model for off-site disaster Management facilities
5.4.4	**Licensing of Professionals** (1) Implement licensing of auditors through appropriate legal framework and institutional mechanism
C5.5	**Capacity Development**
5.5.1	**Training** (1) Contribute to the national effort to build the requisite number of trained personnel to handle chemical emergencies in India (2) Trainings support for SDRF, community and volunteers (3) Assess training needs related to competencies required to build chemical safety in the State
5.5.2	**Capacity Building** (1) Curriculum Development - DM related aspects to be included in undergraduate and professional courses
5.5.3	**Awareness Generation** (1) Carry out mass media campaigns (2) Promote culture of disaster risk prevention, mitigation, and better risk management (3) Promote attitude and behaviour change in the awareness campaigns/IEC (4) Promote use of insurance/ risk transfer (5) Promote Community Radio (6) Strengthening the network of civil society organizations for awareness generation (7) Mock drills and rehearsals
5.5.4	**Mock Drills / Exercises** (1) Joint planning and execution of emergency drills (2) Promote the planning and execution of emergency drills by all ministries and in all states and UTs
5.5.5	**Empowering Women, marginalized and person with disabilities** (1) Incorporate gender sensitive and equitable approaches in capacity development covering all aspects of Disaster Management
5.5.6	**Community-based DM** (1) Promotion, Guidance and Support (2) Manage and cope with disasters based on a multi-hazard approach (3) Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach (4) Training for panchayat, SHG, NCC, NSS, Youth, local community organizations

C6	Preparedness and Response
C6.1	**Early Warning**
	(Satellite inputs, Maps and Information Dissemination) (1) Disseminate early warning signals to district administration, local authorities, and public at large in the areas likely to be affected by a disaster so as to reduce loss of life and property (2) Disseminate warnings & information up to the last mile (3) Ensure appropriate compilation/analysis of received data (4) Use satellite imageries and other scientific methods for risk assessment and forecasting
C6.2	**Evacuation of People and Animals**
	(1) Assess evacuation needs, such as the number of people and animals to be evacuated and mode of evacuation (2) Mobilize transport and resources for evacuation (3) Identify and prepare sites for temporary relocation of affected people and animals (4) Identify requirements of resources for evacuation (such as helicopters, aircrafts, high speed boats and ships) to be provided to the affected state government (5) Request for central resources, if needed (6) Coordinate with central agencies to mobilize required resources (7) Monitor the situation (8) Earmark resources, units and battalions of SDRF for quick deployment (9) Prepare handbook and manuals and SOP for evacuation of people and animals (10) Undertake review and revise DMPs and SOPs after each major incident (11) Prepare evacuation plan taking into account local conditions and periodically update it (12) Undertake mock and simulation drills (13) Prepare operational checklists (14) Prepare list of agencies and organizations who could assist in evacuation (15) Prepare web-based inventory of resources & its regular update
C6.3	**Search and Rescue of People and Animals**
	(1) Train and activate various positions of IRTs (state, district, sub- division and tehsil) on response at their respective administrative jurisdiction (2) Train, equip and make ready SDRF teams to move at a short notice to the affected areas (3) Station strategically state-of-the-art equipment for search, rescue and response with dedicated trained manpower (4) Have MoU in place with suppliers for blankets, tarpaulins, tents, boats, inflatable lights, torches, ropes, etc. with a condition that they will be supplied quickly at short notice (usually within 24 hours) (5) Select Nodal Officer for coordination is in regular touch with MHA/NDMA for additional requirements (including help from other Central Ministries)
C6.4	**Medical Care**
	(1) Health and Family Welfare Dept. works with the logistic section of the state level IRT to provide effective services (Medical Unit) to the field level IRTs for response. (2) District-wise repository of hospitals (both Government and Private), availability of beds, doctors, paramedics and other trained staff available along with other infrastructure details and update it on a regular basis (3) Include hospital-wise information in DM Plans at local levels (4) Tie-up with companies for easy availability of common medicines during emergency (5) Hygienic conditions are prevalent at all times in various facilities established as well as hospitals to curb the spread of Diseases (6) Establish sound protocols for coordination between state's health department and central agencies (7) Ensure strict compliance with minimum standards of relief as per Section 12 of the DM Act, 2005

C6.5	Drinking Water, Dewatering Pumps, Sanitation Facilities and Public Health
	(1) Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005
	(2) Provide disaster-affected areas with clean drinking water and to prevent the spread of water borne diseases
	(3) Provide emergency water supplies when there is scarcity of potable water
	(4) Respond to the public health needs so as to prevent and mitigate a sudden outbreak of epidemic, water and food contamination as well as other public health-related problems in the aftermath of a disaster
	(5) Provide effective services to field level IRTs by Departments of Water Resources and Drinking Water & Sanitation Works with the logistic section of the state level IRT
	(6) Necessary arrangements are made for supplying drinking water through tankers
	(7) Necessary arrangements are made for supplying chlorine tablets
	(8) Have MoU in place with vehicle manufacturers for vehicle mounted RO Systems with integrated power source and pouch facility with a condition that system should be in place usually within 6 hours of placing order
	(9) Have MoU in place with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 6 hours of request
	(10) Ensure availability of hygienic portable toilets and bleaching powder through pre- disaster agreements/contracts with suppliers
C6.6	**Food and Essential Supplies**
	(1) Dept. of Food and Civil Supply works with the logistic section of the state level IRT to provide effective services to the field level IRTs for response.
	(2) Agreements/MoUs with organizations, trusts, and firms for setting up community kitchens in the affected areas.
	(3) Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the supplies reach the site on time
	(4) Deploy a dedicated team at the local level to receive the supplies, maintain log (manual or computerized), and distribute them at required locations
	(5) Food godowns have sufficient food materials and not situated at vulnerable location
C6.7	**Communications**
	(1) Fail-safe communication plan is prepared with all early warning agencies
	(2) Logistic section of the state level IRT coordinates with central agencies to provide effective communication support to the field level IRTs for response
	(3) State and district EOCs are equipped with satellite phones, VHF and HF as a backup to the landline
	(4) All communication equipment, especially the satellite phones are in good working condition 24x7 on all days through regular testing
	(5) Plans for communication including telephone and HAM is prepared for smooth coordination with field level IRTs
	(6) Establish protocols and responsibilities for coordinating with central agencies and various service providers
	(7) Prepare, update and maintain a District-wise list of HAM Operators who could be contacted and deployed at the site of emergency
	(8) Have binding agreements with telecom service providers to restore damaged facilities and set up temporary facilities on emergency basis
	(9) Ensure Inter-Operability among different telecom service providers
C6.8	**Housing and Temporary Shelters**
	(1) Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005
	(2) Logistic section of the state level IRT must coordinate with Railways to provide effective services to the field level IRTs for response
	(3) Alternate places for the establishment of facilities as mentioned in the IRS guidelines such as relief camp, base, camp etc. are identified in advance and included in the local DM Plan

	(4) Identify shelter suppliers for supply of tents/shelters up to the village level and enter into an MoU for supply at short notice (usually less than 24 hours) as per requirement (5) Stockpile tents, tarpaulins and temporary shelter material in regional warehouses/stores/ERCs (6) Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the tents/shelters reach the site on time (7) Deploy a dedicated team at the local level to receive the tents/ shelters (8) Maintain logs (manual or computerized) of all material movements and details of distribution to required locations
C6.9	**Power**
	(1) Electricity Board and Power Distribution Companies work with the logistic section of the state level IRT to provide effective services to field level IRTs for response (2) Pre-disaster arrangements for quick restoration of power supply with alternate mechanisms to critical facilities usually within 6 to 12 hours of placement of order (3) Pre-disaster agreements with central and neighbouring state governments for technical support in restoration of power supply and infrastructure (4) Mobile power supply units or other arrangements with power generation companies for quick deployment at the site during emergency
C6.10	**Fuel**
	(1) Logistic section of the state level IRT to coordinate with relevant departments/agencies to provide effective services (Ground Support Unit) to field level IRTs for response (2) Assess and indicate clear requirement of fuel to the Central Ministry and coordinate the delivery of fuel through local arrangements (3) Ensure sufficient availability of tankers/other vehicles for local transportation through the relevant Dept. (4) Establish mechanism for stocking the fuel at strategic locations with relevant agencies
C6.11	**Transportation**
	(1) Dept. of Transport works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) to the field level IRTs for response (2) Requirement of transport for the sending the relief material, responders are arranged (3) Need of the transport of various activated section of the IRT as per Incident Action Plan is fulfilled (4) Indian Railway works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) (5) Restoration of railway tracks and functioning of railway at the earliest (6) Coordinate with Central Govt. for transportation of relief materials (7) Within and near Airports: AAI works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) and also provide Nodal Officer for coordination of the relief operations (8) Restoration of Airport at the earliest involving specialized response force of the central government (9) Coordination with state and district administration to provide air support (10) Cater to the needs of transporting affected people, if required
C6.12	**Relief Logistics and Supply Chain Management**
	(1) Establish a mobilization centre at the airport/railway station for the movement of relief supplies within the state (2) Deploy special transport mechanism for the movement of relief supplies within the state (3) Make arrangements to receive and distribute relief and emergency supplies received from different parts of the country (4) Coordinate transportation (air, rail, road, water) with Central ministries, departments and agencies (5) Arrange alternative means of transportation to send relief supplies to the affected locations, if normal transport cannot reach

C6.13	**Disposal of animal carcasses**
	(1) Equip and train the staff in carcass removal/disposal at pre-identified sites to ensure that no other health hazard is created both for the staff as well as general public
C6.14	**Fodder for Livestock in scarcity-hit areas**
	(1) Mobilize fodder and cattle feed to meet shortages, as in drought or scarcity condition
	(2) Transport fodder from storage facilities or collection centers to the scarcity-hit area
	(3) Organize collection centers for fodder and cattle feed
	(4) Enlist PSUs and private agencies for providing fodder and other support
C6.15	**Rehabilitation and Ensuring Safety of Livestock and Other Animals, Veterinary Care**
	(1) Include provisions for evacuation, safety, and rehabilitation of animals in SDMP
	(2) Set-up of livestock camps/ shelters for animals in distress due to disasters, including drought
	(3) Organize proper care of animals in the camps/ shelters
	(4) Ensure proper management and running of livestock camps/ shelters
	(5) Proper rehabilitation of animals
	(6) Provide veterinary care to disaster-affected livestock, including in drought-hit areas
C6.16	**Data Collection and Management**
	(1) Representative of SDMA works with the planning section at state level for making of IAP and dissemination of information
	(2) Creation of a cell at the District level (preferably as part of District EOC) and place dedicated resources to collect/update data on all essential services (as per the template given in the IRS guidelines) which will help during the response phase for effective reporting an compilation
C6.17	**Relief Employment**
	(1) Provide opportunities for unskilled work in public works for people seeking work in drought affected areas as a relief measure
	(2) Ensure quick and prompt payment of wages
	(3) Carry out health check-up of those seeking work
	(4) Draw from various funds including Disaster Response Fund to implement the employment schemes
C6.18	**Media Relations**
	(1) Dept. of Information and Public Relations works with the Command staff as Information and media officer of the state level IRT to provide effective services
	(2) Ethical guidelines for coverage of disaster is prepared and shared with all media agencies
	(3) Plan is prepared for providing/broadcasting warnings, do's and don'ts etc. to media and ensure its dissemination

C7	**DisasterManagement** **Responsibilities**
C7.1	**Mainstreaming Disaster Management and Institutional Strengthening**
	(1) Promote coherence and development of relevant laws, regulations, and public policies
	(2) Adopt and implement DM strategies and plans, across different levels and timescale
	(3) Carry out assessment of the technical, financial and administrative capacity for disaster risk management at all levels within the state
	(4) Make institutions efficient and responsive
	(5) Improve work culture
	(6) Develop mechanisms, and processes to ensure transparency and accountability
	(7) Strengthen/establish coordination and convergence mechanisms at state, district, and local levels
	(8) Promote necessary mechanisms & incentives to ensure high levels of compliance with the safety-enhancing provisions
C7.2	**Capacity Development**
	(1) Implementation in state departments and agencies

	(2) Involving communities, panchayats, municipalities, urban local bodies, elected representatives, civil society organizations, private sector, and educational institutions, etc., (3) Develop capabilities at state, district, block and local levels to understand disaster risk, develop DM plans, implement relevant policies, laws, and ensure compliance with risk reduction safety standards
C7.3	**Promote Participatory Approaches**
	(1) Empower local authorities (2) Implement participatory approaches in disaster management based on a multi-hazard approach, with emphasis on hazards more frequent in the region/ location (3) Establish and strengthen government coordination forums composed of relevant stakeholders (4) Promote for participation of individuals, households, communities, and businesses in all aspects of disaster management
C7.4	**Work with Elected Representatives and Political Parties**
	(1) Sensitize the political leadership (2) Involve in discussions on DM the political leadership at state, district, block, municipal and village levels
C7.5	**Grievance Redress Mechanism**
	Ensuring the functioning of a sound grievance redress mechanism in all departments and agencies involved in disaster response
C7.6	**Promote quality standards, such as certifications and awards for Disaster Management**
	(1) Ensure implementation of standards (2) Develop suitable bye-laws specifically for urban and rural areas (3) Monitor compliance

Annexure D

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National Institute of Disaster Management

(Ministry of Home Affairs, Government of India)

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