



Government of Himachal Pradesh

HIMACHAL PRADESH

STATE DISASTER MANAGEMENT PLAN

2017

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HIMACHAL PRADESH STATE DISASTER
MANAGEMENT AUTHORITY

Himachal Pradesh State Disaster Management Plan 2017

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FOREWORD



The state of Himachal Pradesh is prone to various types of disasters. Out Of the total 33 hazards identified by HPC the State is vulnerable to 25 hazards. Every year the state faces the fury of nature in the form of perils caused by the vagaries of nature and aggravated by the intervention of human beings causing havoc to life and property. It is ironical that the poor and weaker sections of society who have the least capacity to cope with the situation are the worst affected.

The threat of an impending earthquake in the state hangs like the proverbial Damocles sword over the large numbers who live in the highest risk zone V as per the seismic zoning map of India. Over 70% of the people of the state are agrarian and very much dependent on the seasonal rainfall and changing climatic conditions. Erratic rainfall and weather conditions cause frequent flash floods in the catchments of the major drainage systems of the state causing extensive damage to property and life.

Vulnerability to natural disasters coupled with socio economic vulnerability of people underscores the need for evolving a comprehensive plan for disaster management. Traditionally communities have accepted disasters as acts of God and lived with them. With the advent of modern technologies, it has now become possible to manage a disaster at various stages using knowledge products and techniques available to us to predict and mitigate the impact. Preparation of plan, identification of roles and responsibilities of key stakeholders is an important step in this direction. The implementation of policy, rules, guidelines and available tools and techniques will go a long way in reducing the risks and vulnerability of people and critical infrastructure in the state. In order to ensure disaster mitigation, we need to mainstream sustainable development by incorporating vulnerability reduction as part of the planning process. The State Disaster Management Plan envisages using the available resources in all phases of disaster management, while addressing the multidimensional and multi sectoral aspects of disasters and the differing with varying vulnerability across the state.

While the existing command and operation centric institutional mechanism is very effective and robust for carrying out response, relief, rehabilitation, the plan recognizes the need to reorient it to address the whole gamut of disaster management issues like prevention, mitigation, response, relief, rehabilitation and reconstruction. The plan also attempts to put in place a coordinated, comprehensive and management centric response system with the active participation of community and by delineating proper sequence of actions at various stages of disaster management.

I am sure that the availability of this plan will strengthen and facilitate proactive action on all phases of disaster management as it provides necessary direction and guidance for different stakeholders including victims of the disaster.

I hope that this effort of the HPSDMA and SEC will usher in a new era of enhanced capacities for managing disasters risks and in generating necessary knowledge, skills, resources, motivation, attitude and accountability that will help in evolving a culture of prevention and preparedness and mitigating the impact of all possible hazards.

(Vidya Chander Pharka)

Chief Secretary cum Chairman,
State Executive Committee

Cum CEO State Disaster Management Authority
Govt. of Himachal Pradesh



PREFACE



The Disaster Management Act, 2005 stipulates every state in India to prepare its own disaster management plan aimed at reducing potential loss of life and property in disasters as well as ensuring strong preparedness, response, relief and rehabilitation measures for coping with disasters.

This Plan has been prepared as per the guidelines provided by the National Disaster Management Authority and based on the detailed Hazard, Risk and Vulnerability Analysis of the Himachal Pradesh. The roles and functions to be played by the different organs of institutional mechanism have been defined taking into consideration the specificities of the state. Disaster management, by its very nature, requires a multi-disciplinary approach hence a strong coordination mechanism forms the core of successful Disaster Management. This Plan outlines the functions of the principal Agencies like SDMA, SEC, State Relief Commissioner, and DDMA. The Himachal Pradesh State Disaster Management Authority (HP SDMA) and SEC is supported by the line departments. However, the functions identified for each line department are mandatory and each line department and DDMA are required to prepare their own disaster management plans in conformity with the State Plan.

In order to identify the training requirements and to assess the present status of knowledge, attitude and prevailing practices, TNA of all stakeholders has been conducted so that training and awareness programmes are more focused and result-oriented.

HPSDMP 2012 has been updated and revised taking into consideration all the new developments that have taken place since the adoption of the plan and lessons learned during the course of implementation of the plan. Efforts have been made to build upon the foundation and structure of the 2012 Plan rather than redrawing and reframing a new Plan. The revised Plan has evolved through a process of consultation with the stakeholders and accepted and approved by the State Government. It has encouraged development of various functional, procedural and operational systems for disaster management.

The Plan has been structured for easy understanding and clear demarcation of roles and responsibilities for scenarios before, during and after disasters. Past experience has shown that each disaster situation throws up a new set of challenges which the government has to deal with. It is therefore impractical to go to each spectrum in anticipating every possible situation. The Plan adopts a comprehensive approach to prepare the State Machinery to tackle any Disaster like situation i.e. Earthquake Landslides, Drought, Floods/Flash floods, Cloud burst, Dam Burst, Forest fire, Urban and Rural Fire, stampede etc.

It is hoped that the Plan serves the purpose for which it is designed, to ensure safety and well-being of the citizens of Himachal Pradesh.

(Tarun Shridhar)

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The plan was prepared by the HPSDMA in Consultation with the UNDP India and all stakeholders including Department of Revenue. The draft was revised and reformatted by the Revenue- DM Department and UNDP India by reassessing the vulnerability risks and district specific peculiarities. The contributions of Dr. P.G. Dhar Chakrabarti (Retd IAS 1980) in preparing the draft document are highly appreciated. The comments and inputs provided by concerned Departments have also helped in preparing this plan. The SDMP -2017 has been aligned with three landmark International agreements adopted by the global community in 2015 that have significant bearing on disaster management. These are:

- a) Sendai Framework for Disaster Risk Reduction 2015-2030
- b) Sustainable Development Goals 2015-2030
- c) Paris Agreement on Climate Change

HPSDMP -2012 may also be referred for the reference purpose. We would like to thank and appreciate all the staff of Revenue-DM department who have contributed directly or indirectly in preparing this plan.

(Dev Dutt Sharma)

Special Secretary (Rev- DM) to the
Government of Himachal Pradesh.



ACRONYMS



AAI	Aridity Anomaly Index
AC	Area Commander
ADB	Asian Development Bank
ASHA	Accredited Social Health Activist
BDO	Block Development Officer
BIS	Bureau of Indian Standards
BMTPC	Building Materials and Technology Promotion Council
BPL	Below Poverty Line
BRO	Border Roads Organisation
BSNL	Bharat Sanchar Nigam Limited
CBA	Cost Benefit Analysis
CBO	Community Based Organization
CCA	Climate Change Adaptation
CDRN	Corporate Disaster Resource Network
CHC	Community Health Centre
CMO	Chief Medical Officer
COR	Commissioner of Relief
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CWC	Central Water Commission
DDMA	District Disaster Management Authority
DDMF	District Disaster Mitigation Fund
DDRF	District Disaster Response Fund
DEOC	District Emergency Operation Centre
DFO	Divisional Forest Officer
DM	Disaster Management
DMC	Disaster Management Cell
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRDO	Defence Research and Development Organisation
DSS	Decision Support System
EOC	Emergency Operation Centre
ESF	Emergency Support Function
FC	Finance Commission
FIR	First Information Report
FSI	Forest Survey of India
GDP	Gross Domestic Product
GIS	Geographical Information System
GLOF	Glacial Lake Outburst Flood
GO	Government Organization
GOI	Government of India
GPS	Global Positioning System
GSI	Geological Survey of India

HFA	Hyogo Framework for Action
HFL	Highest Flood Level
HIPA	Himachal Institute of Public Administration
HP	Himachal Pradesh
HPKV	Himachal Pradesh Krishi Vishvavidyalaya
HPSDMP	Himachal Pradesh State Disaster Management Plan
HRVA	Hazard Risk Vulnerability Analysis
HVRA	Hazard Vulnerability Risk Analysis
IAG	Inter Agency Group
IAP	Incident Action Plan
IAY	Indira Awas Yojana
IC	Incident Commander
ICIMOD	International Centre for Integrated Mountain Development
ICP	Incident Command Posts
IDDR	International Day for Disaster Reduction
IDKN	India Disaster Knowledge Network
IEC	Information, Education and Communication
IIT	Indian Institute of Technology
IMD	India Meteorological Department
IPCC	Intergovernmental Panel on Climate Change
IPH	Irrigation and Public Health
IRS	Incident Response System
IRT	Incident Response Team
ISRO	Indian Space Research Organisation
ITBP	Indo-Tibetan Border Police
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KVK	Krishi Vigyan Kendra
LHZ	Landslide Hazard Zonation
MAH	Maximum Accident Hazard
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MBT	Main Boundary Thrust
MCT	Main Central Thrust
MFT	Main Frontal Thrust
MHA	Ministry of Home Affairs
NADAMAS	National Agricultural Drought Assessment and Monitoring Systems
NCC	National Cadet Corps
NCMC	National Crisis Management Committee
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDRF	National Disaster Response Force
NDRF	National Disaster Response Fund
NEC	National Executive Committee
NEOC	National Emergency Operation Centre
NGO	Non-Governmental Organization
NH	National Highway
NHPC	National Hydel Power Corporation

NIDM	National Institute of Disaster Management
NIIT	National Institute of Information Technolog
NRHM	National Rural Health Mission
NRSC	National Remote Sensing Centre
NSS	National Service Scheme
NYKS	Nehru Yuva Kendra Sangathan
PAP	Programme, Activities and Projects
PCM	Project Cycle Management
PDNA	Post Disaster Needs Assessment
PGA	Peak Ground Acceleration
PHC	Primary Health Centre
PMGSY	Pradhan Mantri Gram Sadak Yojana
PML	Probable Maximum Loss
PPP	Public-Private Partnership
PRI	Panchayati Raj Institution
PSHA	Probabilistic Seismic Hazard Assessment
PWD	Public Works Department
RO	Responsible Officer
RRC	Regional Response Centre
SAR	Search and Rescue
SASE	Snow and Avalanche Study Establishment
SCERT	State Council for Educational Research and Training
SDG	Sustainable Development Goal
SDM	Sub-Divisional Magistrate
SDMA	State Disaster Management Authority
SDMF	State Disaster Mitigation Fund
SDMP	State Disaster Management Plan
SDRF	State Disaster Response Force
SDRF	State Disaster Response Fund
SEC	State Executive Committee
SEOC	State Emergency Operation Centre
SEOI	Socio Economic Vulnerability Index
SFDRR	Sendai Framework for Disaster Risk Reduction
SOP	Standard Operating Procedure
SP	Superintendent of Police
SPI	Standardized Precipitation Index
SSA	Sarva Shiksha Abhiyan
TNA	Training Need Assessment
UC	Unified Command
UDD	Urban Development Department
ULB	Urban Local Body
UNISDR	United Nations International Strategy for Disaster Reduction
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WCS	Worst Case Scenario
WRD	Water Resources Department
YSPUHF	Dr. Yashwant Singh Parmar University of Horticulture and Forestry







1.1 Background

Himachal Pradesh is one of the most multi-hazard prone State of India. The State faces various types of natural hazards like the geological hazards, earthquake and landslide; hydrological hazards of riverine floods, flash floods and glacial lake outburst floods; meteorological hazards of droughts, hailstorms and cloudbursts; and climatological hazards of cold wave, frosts and avalanche. The frequency and intensity of most of these hydro-meteorological hazards are compounded by climate change and its impacts on agriculture, horticulture, human settlements and human and animal health. Further, the State routinely faces various manmade hazards such as fires, transport related accidents, stampedes in religious fairs etc. that take a toll of consume considerable human lives.

Sparse density of population of the mountainous State has kept the level of human exposure to the risks of disaster in Himachal Pradesh relatively low as compared to many States of the country. However, location of high value infrastructure, such as hydro-electric projects and communication networks, productive assets, and vulnerable houses, social and community infrastructure in various hazard zones has exposed the economy of the State to considerable risks of disasters. Such risks are particularly existing in unplanned and growing urban settlements, such as the capital city of Shimla.

The State routinely faces small to medium scale disasters with average annual loss of 1,678 human lives, 7,711 animals, 349 thousand tons of agricultural and horticultural crops, and 119 thousand trees besides damages to 8,671 houses and unaccounted damages to roads and other infrastructure¹. Further, the potential maximum loss that could be many times more if major earthquake ruptures the seismic fault lines with devastating impact on the life and economy of the State. Considering the average return period, experts have warned that such catastrophic disaster is long overdue in this Himalayan State.

Following the passage of Disaster Management Act in 2005, Himachal Pradesh, like most of the States of Indian Union, has set up institutional mechanisms of disaster management at State and district levels, announced its disaster management policy and adopted its State Disaster Management Plan (HPSDMP) in 2012. Section 23(5) of the Act makes it imperative that the HPSDMP is updated and revised every year to incorporate the changes that have taken place in policies, programmes and guidelines and the valuable lessons learnt during the process of implementation of the plan. Therefore, this first revision of HPSDMP has been prepared after consultation with all stakeholders before it is finalized.

1.2 Context

This is an opportune time for the revision of the HPSDMP as the first National Disaster Management Plan (NDMP) has been released in June, 2016 providing a blueprint of detailed plans of action for the State governments and their agencies. The NDMP has been aligned with three landmark international agreements adopted by the global community in 2015 that have significant bearing on disaster management. These are:

- a) Sendai Framework for Disaster Risk Reduction, 2015-2030
- b) Sustainable Development Goals 2015-2030
- c) Paris Agreement on Climate Change

1. Disaster Analysis and Management: Loss, Rescue, Relief and Rehabilitation (LR3), Economics and Statistics Department, Government of Himachal Pradesh, 2016

The Sendai Framework for Disaster Risk Reduction² has made at least six major departures in the global framework on disaster management that are relevant for the State. These are:

- a) For the first time the global framework on disaster management has outlined the activities that should be taken up at the national and sub-national level for implementation of the framework³;
- b) For the first time the global framework has fixed a set of outcome-based global goals and targets of disaster risk reduction, which implies that similar goals and targets, as appropriate, have to be pursued at the national and sub-national levels;
- c) The Framework has prescribed 'all-of-society' approach for disaster risk management which means that all the stakeholders have to be involved for the development and implementation of HPSDMP;
- d) The Framework has further prescribed a 'whole-of-government' approach by emphasizing the need to strengthen disaster risk governance;
- e) There is significant shift in emphasis from disaster management to disaster risk management by focusing on understanding risks and investing on risk prevention and mitigation as well as enhancing disaster preparedness for effective response, relief, rehabilitation and reconstruction; and
- f) There is considerable emphasis that disaster risk reduction is essential for sustainable development across various sectors, in particular, poverty reduction, food security, health, education, habitat, infrastructure, environment and natural resource management.

It is important that all these issues are adequately incorporated in the updated and revised HPSDMP.

The 2030 Agenda for Sustainable Development⁴ has embedded disaster risk management in as many as eight out of 17 Sustainable Development Goals (SDGs) with specific targets for building disaster resilience across different sectors of development⁵. These include:

- a) Goal-1 on ending poverty in all its forms (Target 1.5: Reduce exposure of the poor to climate related to extreme events and disasters);
- b) Goal-2 on ending hunger, achieving food security and promoting sustainable agriculture (Target 2.4: Strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters);
- c) Goal-3 on ensuring healthy lives (Target 3.6: Develop early warning and reduce risk of national and global health);
- d) Goal-4 on ensuring inclusive and equitable quality education (Target 4a: Build and upgrade educational facilities that are safe);
- e) Goal-9 on building resilient infrastructure (Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure);
- f) Goal-11 on making cities and human settlements safe, resilient and sustainable (Target 11.5: Significantly reduce the number of deaths, affected and economic losses by disasters);
- g) Goal-13 on combating climate change and its impact (Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters); and
- h) Goal-15 on reversing land degradation (Target 15.3: Restore land affected by drought and floods).

It is important that all these goals and targets are incorporated in the HPSDMP. Another landmark agreement of 2015 –Paris Agreement on Climate Change – has outlined eight specific action areas for enhancing understanding, action and support' for disaster reduction. These include:

2. Sendai Framework for Disaster Risk Reduction 2015-2030

3. The details of the activities to be taken up at national and sub-national levels are provided in Annexure-I.

4. Transforming Our World: the 2030 Agenda for Sustainable Development

5. The details of Sustainable Development Goals and Targets with elements of disaster risk management embedded into these are provided in Annexure-II

- a) Early warning systems;
- b) Emergency preparedness;
- c) Slow onset events;
- d) Events that may involve irreversible and permanent loss and damage;
- e) Comprehensive risk assessment and management;
- f) Risk insurance facilities, climate risk pooling and other insurance solutions;
- g) Non-economic losses; and
- h) Resilience of communities, livelihoods and ecosystems.

Most of these issues are included in the Sendai Framework, but the significance of the Paris Climate Agreement lies in the importance that is attached for integrating climate change adaptation (CCA) with disaster risk reduction (DRR). HPSDMP 2012 misses this aspect and the updated and revised edition shall fill up this crucial gap in the plan.

The context of revision of HPSDMP 2012 are further defined by many developments that have taken place subsequent to the adoption of the plan. The most important are the pronouncement of State Policy on Disaster Management in 2012, release of National Plan on Disaster Management in 2016 and the experiences gained in the implementation of the plan. These are discussed in the following paragraphs.

1.3 State Policy on Disaster Management

The Himachal Pradesh State Policy on Disaster Management 2012 was released subsequent to the adoption of the HPSDMP. Largely based on the National Policy on Disaster Management 2009, the State Policy provides an overarching framework of disaster risk management for the State. As per the policy the Himachal Pradesh Vision on disaster management is to

Build a safe and disaster resilient Himachal Pradesh by developing a holistic, proactive, technology driven, and community based strategy through a culture of prevention, mitigation, preparedness and response.

The same vision should inspire the HPSDMP. The State Policy does not have a Mission Statement, but it does articulate the Aim of the Policy as follows:

The Policy aims at providing guiding principles for reducing, preventing, mitigating disaster risk and creating a system for effective disaster response. The Policy also aims at providing guidelines for post disaster relief, rehabilitation and reconstruction codes and guidelines. The policy also aims at consolidating the existing practices and procedures in DM and to issue new directions keeping in view the provisions of Disaster Management Act, 2005. In a nutshell, the Policy aims at taking forward the Disaster Management Act, 2005.

The State Policy defines six elements of disaster management continuum, namely the pre-disaster phase of prevention, mitigation and preparedness and the post-disaster phase of response, rehabilitation, reconstruction and recovery, and further discusses each of these elements. All these elements shall be integrated in disaster management plans that would be developed through a combination of top-down coordination and bottom-up approach.

The Policy underlines the nexus of disaster and development and emphasizes that multi-pronged approach for risk prevention and mitigation:

- a) Incorporating elements of mitigation and risk reduction into all the development projects and programmes.
- b) Initiating state level mitigation projects in accordance with the guidelines issued by the National Disaster Management Authority (NDMA) for various hazards in high priority areas with the help of Government Departments and Agencies.
- c) Developing a culture of safety and safe practices in the state.
- d) Integrating the element of DRR into the development plans, policies and projects.
- e) According high priority to projects contributing to vulnerability reduction of the area, particularly in urban areas.
- f) Indigenous knowledge on disaster and coping mechanisms adopted by various States and sections of society will be given due weightage.

The State Policy has outlined a number of measures to be adopted for disaster preparedness, such as early warning systems for hydro-meteorological hazards, strengthening of emergency operation centres, medical preparedness and mass casualty management, use of communication and information technology, training, simulation and mock drills etc. The Policy has defined the role of State, district and local authorities as also various nodal departments for performing various emergency response and support functions during disasters and highlighted the importance of standard operating procedures, incident response system, medical response, animal care, media partnership and government organization (GO)-non-governmental organization (NGO) and Inter Agency Group (IAG) coordination for effective response.

The Policy has further outlined the legal, institutional, financial arrangements, techno-legal regime, training & capacity development, knowledge management, research & development for disaster management in the State. All these policy issues have been factored in the updated and revised HPSDMP.

1.4 National Plan on Disaster Management

The first National Disaster Management Plan released in May 2016 is aligned with the four Priorities of Action of the Sendai Framework, namely (a) understanding disaster risk; (b) strengthening disaster risk governance to manage disaster risk; (c) investing in DRR for resilience; and (d) enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction. The Plan provides a matrix of activities to be taken up by the Central and State governments and their agencies on these priorities of action for mitigating the risks of six natural (cyclone, flood, earthquake, tsunami, landslide and drought) and three manmade disasters (fire, industrial disasters and nuclear & radiological emergencies). These are based on the various hazard-specific guidelines issued by the NDMA from time to time. The Plan further provides a similar matrix of activities for disaster preparedness and response, risk governance, recovery and building back better. All these activities to the extent relevant for the State of Himachal Pradesh have been factored in the updated and revised HPSDMP. A consolidated list of these activities is provided in Annexure III.

1.5 Review of State Disaster Management Plan

HPSDMP 2012 was the first ever disaster management plan prepared for the Himalayan State. The plan analyzes the hazards, risks and vulnerabilities for natural and manmade disasters and provides a blueprint for disaster management covering the pre-disaster prevention, mitigation and preparedness and

post-disaster response, recovery and reconstruction. The implementation of the plan during the past five years has demonstrated the strengths as well as the weaknesses of the plan, as highlighted in a recent review of the plan⁶. The updated and revised plan retains the strong elements of the plan while addressing the weak features in the context of changing situations.

HPSDMP 2012 is detailed and comprehensive. Part-I of the Plan starts with a brief profile of the State; makes vulnerability analysis and risk assessment in respect of all natural and manmade hazards; outlines the prevention and mitigation measures including strategies for mainstreaming DRR in development; lists out the preparedness measures necessary for the State; provides a detailed blueprint of response plan including institutional and trigger mechanism, relief and rehabilitation measures; mentions the recovery plan; suggests mechanisms for partnerships with various stakeholders including GO-NGO coordination; discusses the financial arrangements; and highlights the need for knowledge management and documentation of best practices. Part-II of the document comprises detailed Disaster Specific Response Plans in respect of four main natural hazards of the State, namely earthquake, landslide, snow-avalanche and flash floods. Part-III of the Plan deals with coordination and implementation, and review and updation of the Plan. The revised HPSDMP follows the same structure with appropriate modifications as considered necessary.

HPSDMP 2012 follows the National Disaster Management Guidelines on Preparation of State Disaster Management Plans issued by the NDMA in 2007, but it fails to take into account nearly two dozen guidelines issued by the NDMA on different aspects of disaster risk management⁷. The updated and revised HPSDMP incorporated the guidelines of the NDMA as relevant and appropriate for the State.

The Plan provided a common reference point for all the departments and agencies of the State Government, district administration and other stakeholders involved with disaster management in the State. All the 12 districts of the State and the Municipal Corporation of Shimla have prepared their respective disaster management plans in conformity with the State Plan. However, only five Departments of the State Government – Animal Husbandry, Higher Education, Home Guards, Public Works Department, and Town and Country Planning - have prepared their departmental disaster management plans. None of the departmental disaster management plans conform to the standards and specifications of such plan, particularly for mainstreaming DRR in sustainable development in the context of Sendai Framework and Sustainable Development Goals. Considering the importance of departmental plans for mainstreaming DRR, the State Government has recently finalized a Model Template for preparation of Departmental Disaster Management Plan. This has been taken into consideration in the updated and revised HPSDMP.

HPSDMP 2012 catalyzed development of a series of functional, operational and procedural documents on disaster management in the State. These include the Standard Operating Procedure (SOP) for Responding to Disasters, State Disaster Management and Relief Manual, Emergency Operation Centre Manual, Guidelines for On-Site and Off-Site Emergency Plans for Factories and Industrial Units, Guidelines for Conducting Earthquake and Fire Mock Drills in Schools and Educational Institutions, Standard Operating Procedure for Averting Threats Emanating from Landslide Dams on Rivers in Mountainous Regions etc. All these SOPs and Manuals have been appropriately factored in the updated and revised HPSDMP.

The Vulnerability Assessment and Risk Analysis in the Plan were conducted on the basis of various secondary sources, which highlighted the need for evolving a comprehensive Hazard Risk Vulnerability Analysis (HRVA) in the form of an atlas. The Government of Himachal Pradesh had commissioned development of the HRVA Atlas of Himachal Pradesh based on data from primary sources. The online digital Atlas was launched this year providing a hands-on tool for risk analysis by various departments and agencies of the State Government as well as other stakeholders. The chapter on Hazard Risk Vulnerability of the revised HPSDMP draws from this HRVA Atlas.

6. *Review of Himachal Pradesh State Disaster Management Plan and Approach and Methodology for Revision and Updation, June 2016.*

7. <http://ndma.gov.in/en/ndma-guidelines.html>

HPSDMP 2012 triggered the process of a comprehensive Training Need Assessment(TNA) to identify the capacity gaps for disaster risk management across different sectors and at various levels. The Government of Himachal Pradesh has completed the TNA in DRR and CCA through a consultative process. The chapter on Disaster Preparedness has taken into account the findings of the TNA for development of capacity across all sectors and at all levels.

HPSDMP 2012 facilitated the process of multi-stakeholder engagement with DRR. This process has recently been institutionalized with the setting up of the Himachal State Platform for DRR. Himachal is among very few States to have set up such a platform. The revised plan has provided avenues for further strengthening engagement with stakeholders. Promotion of Public-Private Partnerships for DRR is one of the special focus areas of such engagement.

1.6 Scope

HPSDMP 2012 has been updated and revised taking into consideration all the new developments that have taken place since the adoption of the plan and lessons learned during the course of implementation of the plan. Efforts have been made to build upon the foundation and structure of the 2012 Plan rather than redrawing and reframing a new Plan. The revised Plan has evolved through a process of consultation with the stakeholders and accepted and approved by the State Government. It has encouraged development of various functional, procedural and operational systems for disaster management.

1.7 Objectives

Considering the changing paradigm of disaster risk management as reflected in global frameworks, the national plan and the valuable experiences gained in the implementation of the HPSDMP 2012, the objectives of the revised plan may be redefined and further enlarged as follows:

- a) Promote a culture of prevention, preparedness and resilience at all levels;
- b) Improve understanding of hazards, vulnerabilities and risks of disasters;
- c) Strengthen disaster risk governance at all levels;
- d) Encourage proactive mitigation measures based on technology, traditional wisdom and environmental sustainability;
- e) Facilitate investment in DRR for resilience through various structural and non-structural measures;
- f) Mainstream DRR into developmental planning, process and practices;
- g) Develop capacities of all stakeholders in general and local communities in particular to cope with disasters;
- h) Strengthen scientific and technological capabilities in all aspects of disaster management;
- i) Enhance disaster preparedness for effective response;
- j) Provide clarity on roles and responsibilities of various departments and agencies in various aspects of disaster risk management;
- k) Promote “Build Back Better” in disaster recovery, rehabilitation and reconstruction;
- l) Facilitate integration of disaster risk resilience in the implementation of Sustainable Development Goals in all relevant sectors in the State;
- m) Promote integration of DRR with CCA;
- n) Provide a plan of action with clear goals, targets and road map for the next fifteen years aligning the same with the global and national targets; and
- o) Provide a Monitoring & Evaluation framework for assessing the progress in the implementation of the plan.

1.8 Goals and targets

Considering that the State Plan has to be revised and updated every year in terms of section 23(5) of Disaster Management Act, it may not be realistic to set up ambitious goals and targets for the revised Plan. However, the first revision of SDMP bears special significance as it is prepared after the adoption of the new global framework for DRR for the period till 2030. The National Plan has been aligned with the global framework and calibrated to facilitate the implementation of the Sendai Framework. The State Plan has incorporated the prescriptions of the global framework to the extent these are relevant in the specific context of Himachal Pradesh. Therefore, HPSDMP fully endorses the expected outcome and goal of the framework:

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

HPSDMP further endorses the global targets for substantial reduction in number of disaster deaths and affected areas, reduction in direct economic loss and damage to critical infrastructure, and increase in access to multi-hazard early warning systems and disaster risk information and assessments to people.

To support the assessment of progress in the implementation of the Plan and further aligning with the Sendai Framework, HPSDMP sets the following targets to be achieved on a short, medium and long term basis. The short-term targets are fixed for a period of two years, while the medium term targets are fixed for a period of five years and the long term targets are fixed for 15 years in conformity with the global framework for DRR and sustainable development goals. The medium-term targets shall be reviewed in the second revision of the Plan which would set up new medium term targets for the next five years.

Table-1.1: Short, Medium and Long Term Targets of HPSDMP

Long Term Targets (to be achieved by the end of 2030)	
1.	Substantially reduce the average number of deaths every year due to natural and manmade disasters
2.	Substantially reduce the average number of persons affected every year due to natural and manmade disasters
3.	Reduce direct economic losses due to disasters in relation to GDP of the State
4.	Substantially reduce damages to critical infrastructure and disruption of basic services including roads, electricity, water, health and educational facilities by developing their resilience
5.	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people of the State

Medium Term Targets (to be achieved by the end of 2025)

1. Developing comprehensive disaggregated data base on disaster damage and loss as per international standards retrospectively from 2005 to 2016 and thereafter prospectively from 2017 onwards to enable assessing the global targets on DRR and resilience.
2. Developing action plan on seismic retrofitting of all lifeline buildings, selecting cost-effective method for retrofitting, fixing time line, allocating resources for the same.
3. Developing early warning systems for landslides, flash floods, cloudbursts and GLOFs
4. Developing guidelines on mainstreaming DRR in development, identifying state and central sector schemes that have possibilities for mainstreaming, developing appropriate strategies for mainstreaming, and implementing these strategies.
5. Setting up mechanisms for diffusing hailstorms in all major fruit growing districts of the State.

Short Term Targets (to be achieved by the end of 2020)

1. Developing Disaster Management Plan for every department of the State Government and revised Disaster Management Plans for all the districts of the State in conformity with the State Plan.
2. Reviewing all relevant legislations, rules, regulations, bye laws, codes etc. to ensure that elements of DRR as appropriate are incorporated therein.
3. Retrofitting of all critical lifeline infrastructures from the risks of earthquakes and other natural disasters.
4. Strengthening Disaster Management Centre of Himachal Institute of Public Administration (HIPA) and training institutes of all concerned departments for developing all round capacities for disaster management.
5. Developing comprehensive guidelines on adaptation and application of NDMA guidelines on Incident Response System for disaster response in the State.



2.1 Introduction

Risks of disasters are created when vulnerable conditions are exposed to hazards. Hazards are the potentiality of a physical event that may cause loss of life or property. Such events may be either natural such as earthquake, landslides or flood or manmade such as accidents, epidemics or fires. Vulnerabilities are the factors or processes that increase susceptibility of an area or a community to impact of hazards. Such vulnerabilities may be either physical, such as vulnerable conditions of housing or infrastructure; social, such as vulnerable social groups like women, children, aged and disabled; economic, such as vulnerable production systems or livelihood condition; and environmental such as environmental degradation such as deforestation or environmental pollution. The level of risk is determined by the magnitude of hazards, the extent of vulnerabilities and the degrees of exposure.

Situated in the lap of the Himalayas between latitude 30°22 to 33°12' N and 75°45'E to 79°4'E, Himachal Pradesh faces multiple hazards of nature. The State is crisscrossed by tectonic and neo-tectonic faults, shear zones and thrusts, which make it extremely vulnerable to earthquakes and landslides of varying magnitudes. Four major perennial rivers of the Himalayas – Chenab, Ravi, Beas and Satluj – either originate or pass through the State. Numerous large and small tributaries feed these rivers as also three other major rivers of the region – Indus, Yamuna and Ganges. The entire State is hilly with varying altitudes, geomorphology, temperature and climatic conditions, making the State prone to various hydro-meteorological hazards like flood, flash flood, cloudbursts, droughts, forest fire, cold wave, avalanche and frosts. Climate change with rising temperature and uncertain rainfall is impacting the frequency and intensity of these hazards, creating new hazards like glacial lake outburst floods (GLOF) and making irreversible impacts on the rich flora and fauna, horticultural and agronomic practices and human and animal health.

The hazard and vulnerability profile of Himachal Pradesh, as presented in HPSDMP 2012, was based on the Vulnerability Atlas of India developed initially in 1996 and revised subsequently in 2006 on the basis of inputs received from various technical agencies of Government of India, such as Geological Survey of India, India Meteorological Department and Central Water Commission and data from Census 2001.

As the Vulnerability Atlas of India was developed in very coarse resolution for the country as a whole, the Government of Himachal Pradesh decided to prepare a higher resolution GIS based Hazard Vulnerability Risk Atlas that would integrate the existing and new data on hazards and vulnerabilities and generate composite risk maps for the State and its administrative districts and blocks. This digital Atlas has been uploaded in the website of State Disaster Management Authority for the guidance of all State Government departments and agencies, district administration and other stakeholders. The Atlas maps update about the intensities of four natural (earthquake, landslide, flood, drought, avalanche and GLOF) and two human-induced hazards (forest fires and industrial accidents) on the basis of data obtained from a mix of primary and secondary sources and overlays the same on GIS layers on physiography (topography and hydrology, watersheds etc.), critical facilities (roads, schools, hospitals, police and fire stations, hydro power plants, helipads, telecom towers etc.), and administrative boundaries of State, districts and blocks. The Atlas further analyzes the socio-economic vulnerabilities in general and building vulnerabilities in particular of Himachal Pradesh and generates maps on annualized composite risks, hazard-wise and sector-wise.

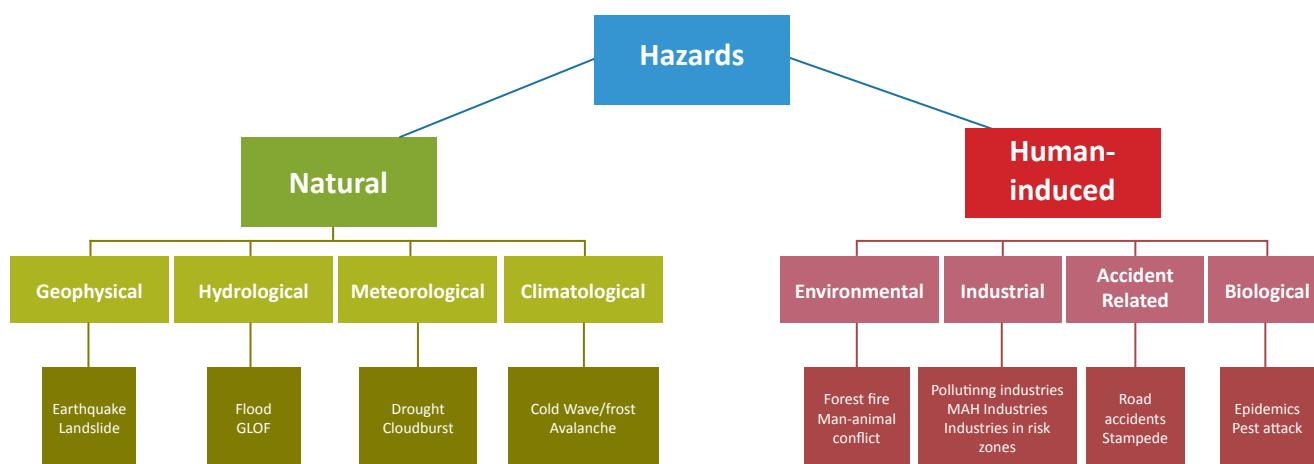
Based on this HVRA Atlas, the Vulnerability Atlas of India and various other studies were conducted and broad overview of hazards, vulnerabilities and risks of disasters in Himachal Pradesh is presented in this chapter.

2.2 Hazard Profile of Himachal Pradesh

Disasters are triggered primarily by natural or human-induced hazards, or a combination of both. The UN Inter-Governmental Panel on Climate Change (IPCC) has shown that human-induced climate change has significantly increased both the frequency and intensity of extreme weather events. However, considering the primary source and characteristics the hazards may broadly be classified in two main types: natural and human-induced. These may be further classified in various sub-types in the specific context of Himachal Pradesh, as shown in Figure-2.1.

This classification follows international standards and practices that are accepted in the National Plan on Disaster Management. However, often these hazard types do not remain exclusive and combine elements of various types of hazards. For example, flood is often triggered by meteorological phenomenon of excessive rainfall, but it always turns into a hydrological hazard when large areas are inundated. Similarly, cloudburst is both meteorological and hydrological and GLOF is hydro-meteorological hazard that is exacerbated by climatic factors. Landslide is both geological when triggered by earthquake and hydrological when caused by incessant rains. Geological hazard of earthquake may cause huge landslide to occur, blocking river and creating dam, and when the dam bursts flood would be the consequence, inundating human settlements and creating conditions of epidemics. A combination of natural and human-induced hazards may create complex cocktail of disasters, as was demonstrated in Japan in 2011 when the Great East Japan Earthquake triggered a tsunami that caused meltdown of the nuclear power plant, resulting in unprecedented loss of lives besides contamination of soil and water in large areas, with further downstream impacts on agriculture, fisheries, human and animal health.

Figure 2.1: Types of Hazards in Himachal Pradesh



Himachal Pradesh faces a few other minor hazards, such as hailstorms and snowstorms, thunder and lightning, land erosions and subsistence, rail accidents and boat capsizing, water contamination and food poisoning, and dam failures and Landslide Dam Outburst Floods (LDOF). These can be variously classified under different types of natural or human-induced hazards.

2.3 Geological Hazards

Earthquake and landslides are the two main geological hazards of Himachal Pradesh.

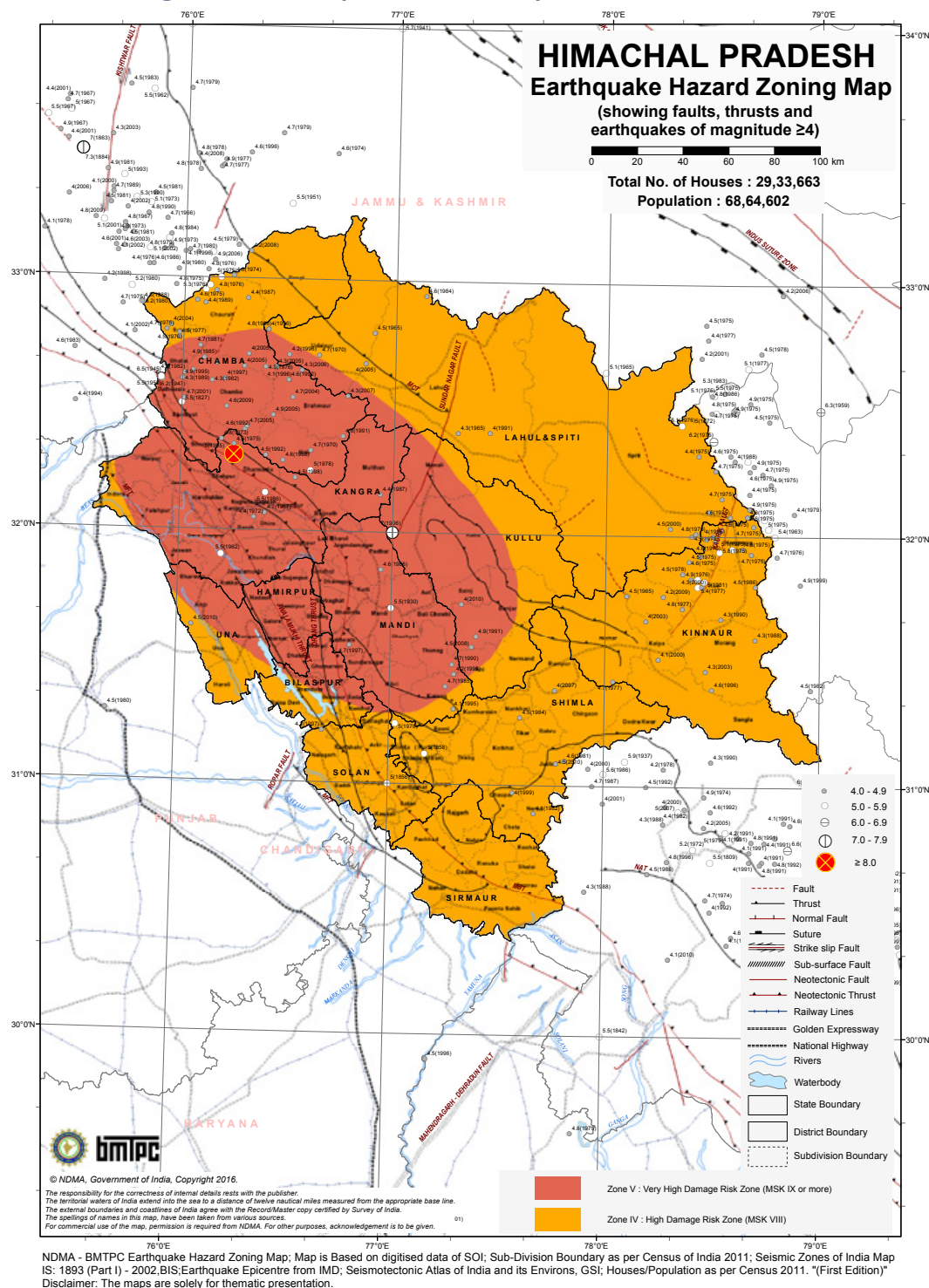
2.3.1 Earthquake

The seismic vulnerability of Himachal Pradesh is attributed primarily to the formation of the Himalayas 50-60 million years ago, due to the collision of the Indian with the Eurasian plate. As a result of this collision, there is,

continuous northward movement of the Indian plate creating active faults lines like Main Central Thrust (MCT) Main Boundary Thrust (MBT) and Main Frontal Thrust (MFT), which run along the entire length of Himalaya. These longitudinal tectonic faults are transversed by large number of parallel faults throughout the State that have made Himachal Pradesh is one of the most active seismic zones of the country.

Mapping these faults, thrusts and occurrences of past earthquake events, the Vulnerability Atlas of India has classified the entire State of Himachal Pradesh as falling in either Very High Risk Zone V (MSK IX or more) or High Risk Zone (MSK VIII). Such classifications are not fixed once for all; these are revised on the basis of new findings of scientific research or occurrences of new events of earthquakes.

Figure-2.2: Earthquake Hazard Map of Himachal Pradesh



Source: Vulnerability Atlas of India, BMTPC, 2016

As per this Vulnerability Atlas, 10 out of 12 districts of Himachal Pradesh have areas that fall in Very High Risk Zone-V. More than 90 percent of the districts of Kangra, Mandi and Hamirpur are in Zone-V, while entire districts of Sirmaur and Kinnaur fall in Zone-IV. The capital city of Shimla is located in Zone-IV. The extent of areas of the districts falling in these two risk zones are shown in Table-2.1.

Table 2.1: District-wise area under Seismic Zones V and IV

No.	District	Area under Zone V (%)	Area under Zone IV (%)
1	Kangra	98.80	01.20
2	Mandi	97.40	02.60
3	Hamirpur	90.90	09.10
4	Chamba	53.20	46.80
5	Kullu	53.10	46.90
6	Una	37.00	73.00
7	Bilaspur	25.30	74.70
8	Lahaul & Spiti	02.14	97.86
9	Solan	01.06	98.94
10	Shimla	00.38	99.62
11	Sirmaur	Nil	100
12	Kinnaur	Nil	100
	TOTAL	32.02	67.98

Source: Earthquake Hazard Zoning Atlas of India, NDMA and BMTPC, 2016

Over the past two centuries, as many as 553 earthquakes have been recorded in the State. District-wise occurrence of these earthquakes is shown in Table 2.2.

Table 2.2: District-wise occurrence of Earthquakes in (1800-2008)

No.	District	Number of earthquakes	Percentage of total
1	Chamba	186	33.63
2	Lahaul & Spiti	99	17.9
3	Kinnaur	93	16.82
4	Mandi	53	9.58
5	Shimla	49	8.86
6	Kangra	39	7.05
7	Kullu	19	3.44
8	Sirmaur	8	1.45
9	Solan	4	0.72
10	Hamirpur	2	0.36
11	Bilaspur	1	0.18
12	Una	0	0
	TOTAL	553	100

Source: Vishwa, B. S. Chandel & Karanjot Kaur Brar

Nearly half of these earthquakes were less than magnitude 4 in Richter scale and 62 earthquakes were magnitude 5 and above. Low intensity earthquakes do not cause damage to lives and assets, but these do have impact on stability of hilly slopes. Ground motions in earthquake tend to loosen bonding of rocks with soil and vegetation and contribute to the long-term process of triggering landslides. At least half a dozen earthquakes were high in magnitude and caused considerable damages to lives and property. A list of damaging earthquakes of Himachal Pradesh during the past 100 years is provided in Table 2.3

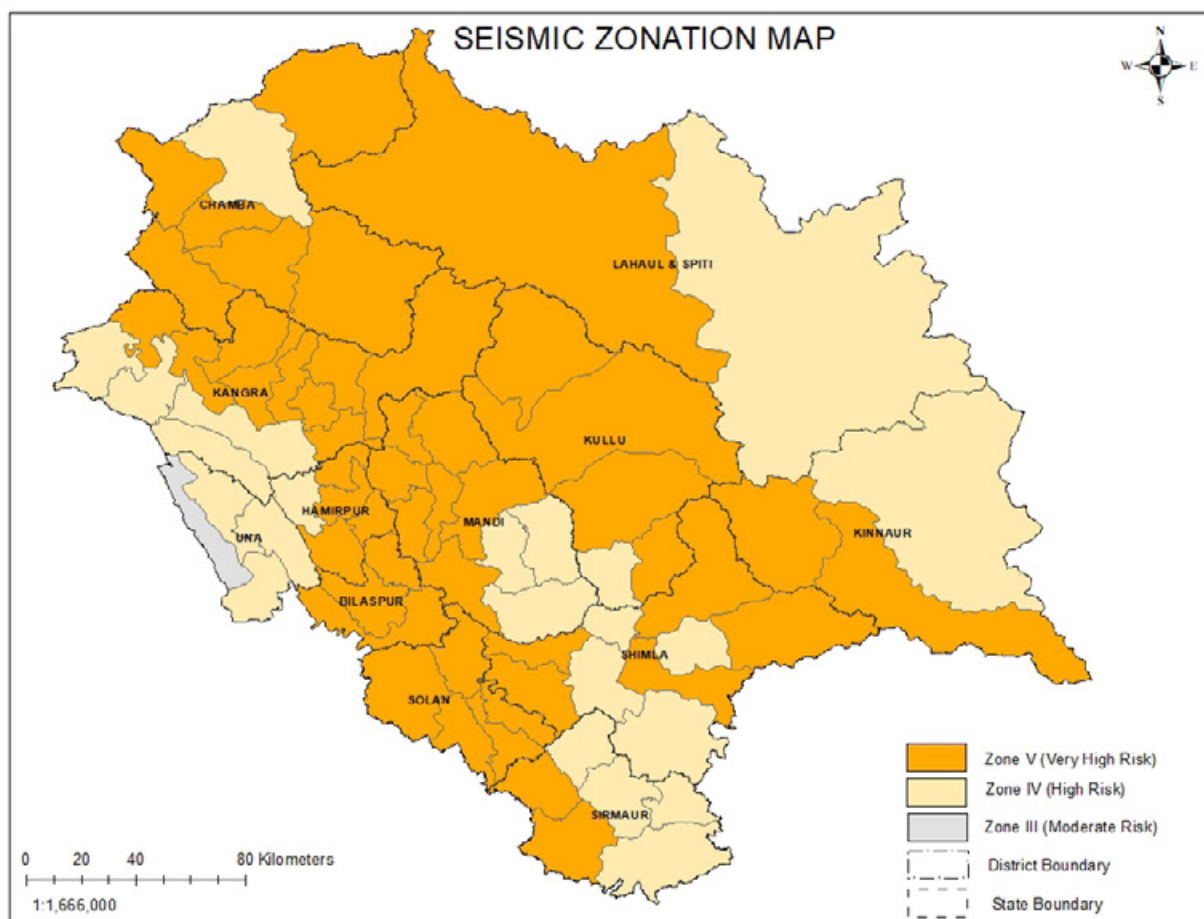
Table 2.3- Damaging earthquakes of Himachal Pradesh (1905-2015)

Date	Location	Magnitude	Damage
April, 1905	Kangra	7.8	19,800 people died, 20000 houses
February, 1906	Shimla	6.5	26 people died, 45 severely injured
January, 1975	Kinnaur	6.8	60 people died, 2000 houses devastated
April, 1986	Dharamshala	5.5	6 people died, extensive damage to houses
March, 1995	Chamba	4.9	More than 70 percent houses faced cracks
July, 1997	Sunder Nagar	5.0	Some part of Sunder Nagar affected

Source: HP State Disaster Management Plan 2017

TARU developed a block-wise seismic hazard zonation map (as per BIS Code IS 1893-Part-1) of Himachal Pradesh, based on their subsurface geophysical investigations in 73 different locations of the State.

Figure-2.3: Seismic Zonation Map of Himachal Pradesh



Source: Hazard Vulnerability Risk Analysis Atlas, TARU 2016

As per this map 56 out of 77 development blocks of the State (26%) fall in Very High Risk Zone-V, 19 blocks are in High Risk Zone-IV, while only one block in District Una located on the foothills of the Himalaya is in Moderate Risk Zone-III. This significantly enhances the seismic risk profile of the State, as compared to the Vulnerability Atlas of India.

TARU has further developed surface level Probabilistic Seismic Hazard Assessment (PSHA) maps of Peak Ground Acceleration (PGA) and spectral acceleration for 22 important towns in HP over a grid of 200m x 200m. These would be extremely useful for designing new constructions and retrofitting existing constructions in these towns.

2.3.2 Landslides

Landslide is the most common hazard in Himachal Pradesh. Almost every year the State is affected by one or more major landslides causing loss of life and damage to houses, agricultural fields, roads and infrastructure. Communication systems are affected, disrupting movement of people, goods and services, with adverse impact on economy.

Landslides are triggered by both natural and anthropogenic factors. Among the natural factors, the most important are rock vibrations due to earthquakes, steepness of slopes, saturation by heavy rains, melting snow and ice, frost, excess load from embankments, toe cutting by rivers and streams and change in vegetation cover. The anthropogenic factors include deforestation, unscientific construction of roads, terracing, water intensive agricultural practices, and encroachment on steep hill slopes etc.

Landslide prone areas of the districts of Himachal Pradesh have been zoned according to the severity of the risks of landslides - severe to very high risk, high risk, moderate and no risk zones.

Table-2.4: District-wise Landslide Vulnerable Areas of Himachal Pradesh

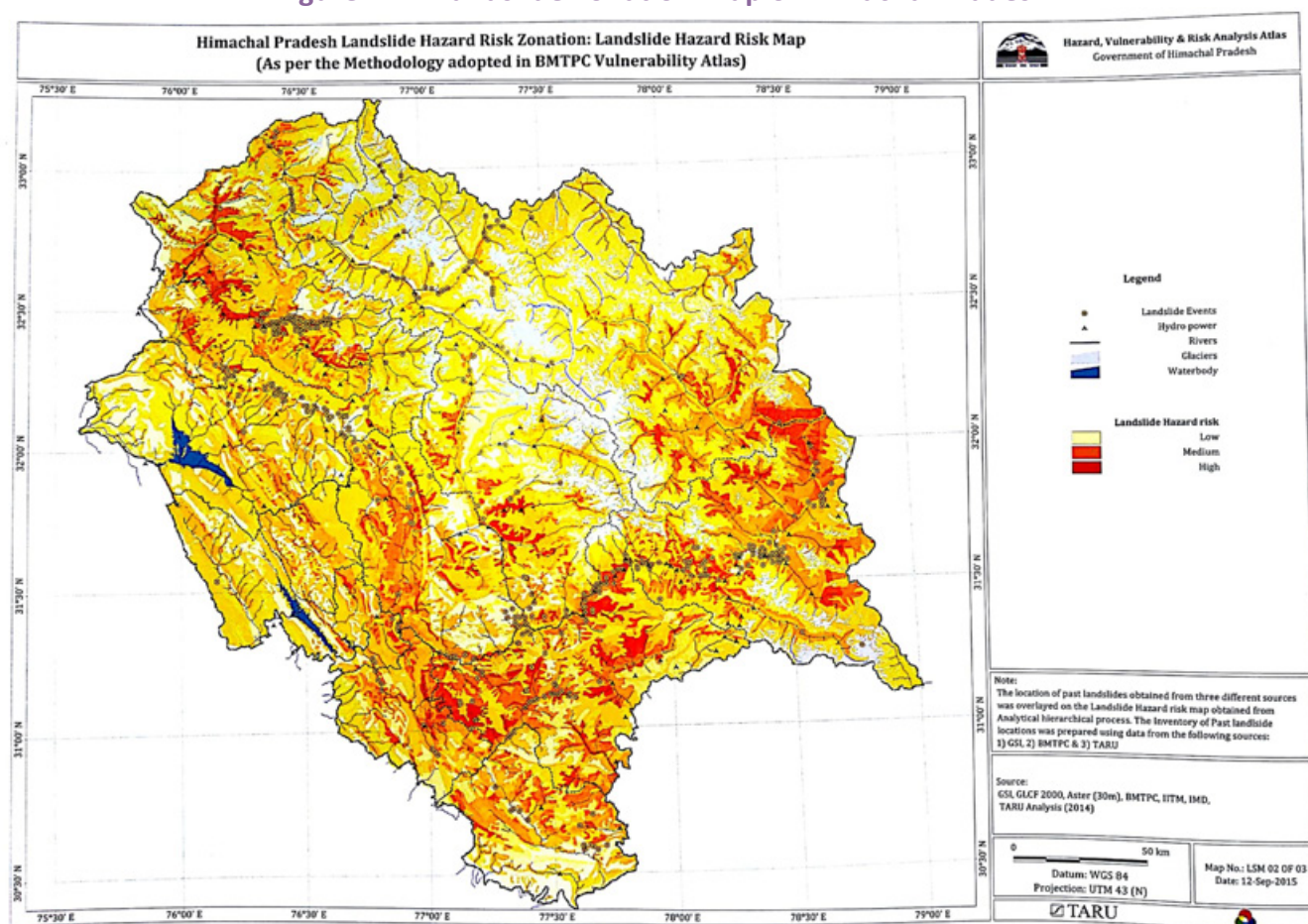
(District area in sq, km)

No.	District	Severe to very high	High	Moderate to low	No risk	Total area
1	Bilaspur	216	842	83	1	1142
2	Chamba	2120	3829	351	70	6370
3	Hamirpur	0	851	204	45	1100
4	Kangra	123	3698	1233	557	5611
5	Kinnaur	868	4956	498	0	6322
6	Kullu	1820	3513	65	3	5401
7	Lahaul & Spiti	127	11637	1825	2	13591
8	Mandi	968	1978	826	98	3870
9	Shimla	893	3345	767	14	5019
10	Sirmaur	95	1805	614	228	2742
11	Solan	556	1118	157	79	1910
12	Una	2	678	517	311	1508

Source: Vulnerability Atlas of India, BMTPC, 2006

TARU has developed a Landslide Zonation Map of Himachal Pradesh using Multi Criteria Analysis based on six thematic layers – slope, land-use land- cover, soil profile, geological profile and pattern of precipitation – and history of past landslide events as available from various databases.

Figure-2.4: Landslide Zonation Map of Himachal Pradesh



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, 2016

Vulnerable roadways, human settlements and hydroelectric power plants are most at risk of landslides. Eight national highways (NHs) pass through Himachal Pradesh with a total length of 1628.377 kms, of which 993.29 kms are in high vulnerable zone, 516.46 kms fall in moderate risk zone and 10.96 kms are in extreme vulnerable zone. The state also has a large network of State highways and village roads with total length of 2178.988 kms, of which 1111.552 kms fall in high vulnerable zone. Most of the tourist spots in Himachal Pradesh are well connected by roads, but many of these roads have recurring problems of landslides which often disrupt flow of tourist traffic.

On the basis of visual and GIS interpretation, TARU found that most of the built-up areas of 866.14 sq. km. in the State fall under the landslide risk zones. Out of a total number of 18,577 villages of the State, 4,065 (22%) are in high risk, 5,883 (32%) in medium risk and 486 (3%) villages in low risk zones. The remaining villages are in no risk zones. Almost all the urban areas of the State are prone to the risks of landslides. Unscientific land use and unplanned expansion of urban areas are overloading and destabilising the slopes. Overloaded slopes may initially cause minor slides, but may at later stage trigger larger landslides, especially after earthquakes.

The capital city of Shimla is particularly vulnerable to landslides as hundreds of constructions have come up on dangerous slopes which may not withstand even moderate ground motion during earthquake. A major landslide in February 1971 had caused a large portion of the northern ridge to collapse threatening safety of the reservoir below. Since then many areas of the town have become prone to landslides and situation worsens during rainy season when vulnerable road sections are washed away, creating serious disruptions of life and economy.

Himachal Pradesh has around 118 mini, small, large and mega hydropower stations. TARU assessed that 67 power stations are located in landslide hazard risk zones, of which 10 mega hydropower stations are in

medium and high risk landslide areas. The hydropower stations of Karcham Wangtu, Nathpa Jhakri and Bhakra are under maximum threats requiring major structural and non-structural interventions for risk mitigation.

2.4 Hydrological Hazards

Three types of floods – riverine floods, flash floods and GLOFs- are the main hydrological hazards of Himachal Pradesh. Riverine floods take days if not weeks to strike but flash floods, as the name suggests, are sudden while GLOFs are mostly triggered by climate change due to global warming.

2.4.1 Flood

Although Himachal Pradesh is at the tail end of the southwest monsoon track, it receives considerable rainfall during the months of July to September. This coupled with snowmelts in high altitudes cause the rivers to swell, sometimes much beyond their capacities to drain out, resulting in floods in low lying settlements. In exceptional circumstances, riverine floods may also be caused by outbursts of dam created temporarily on rivers due to landslides.

Some of the years of excessive rainfall that caused major floods in Himachal Pradesh are listed in Table 2.5.

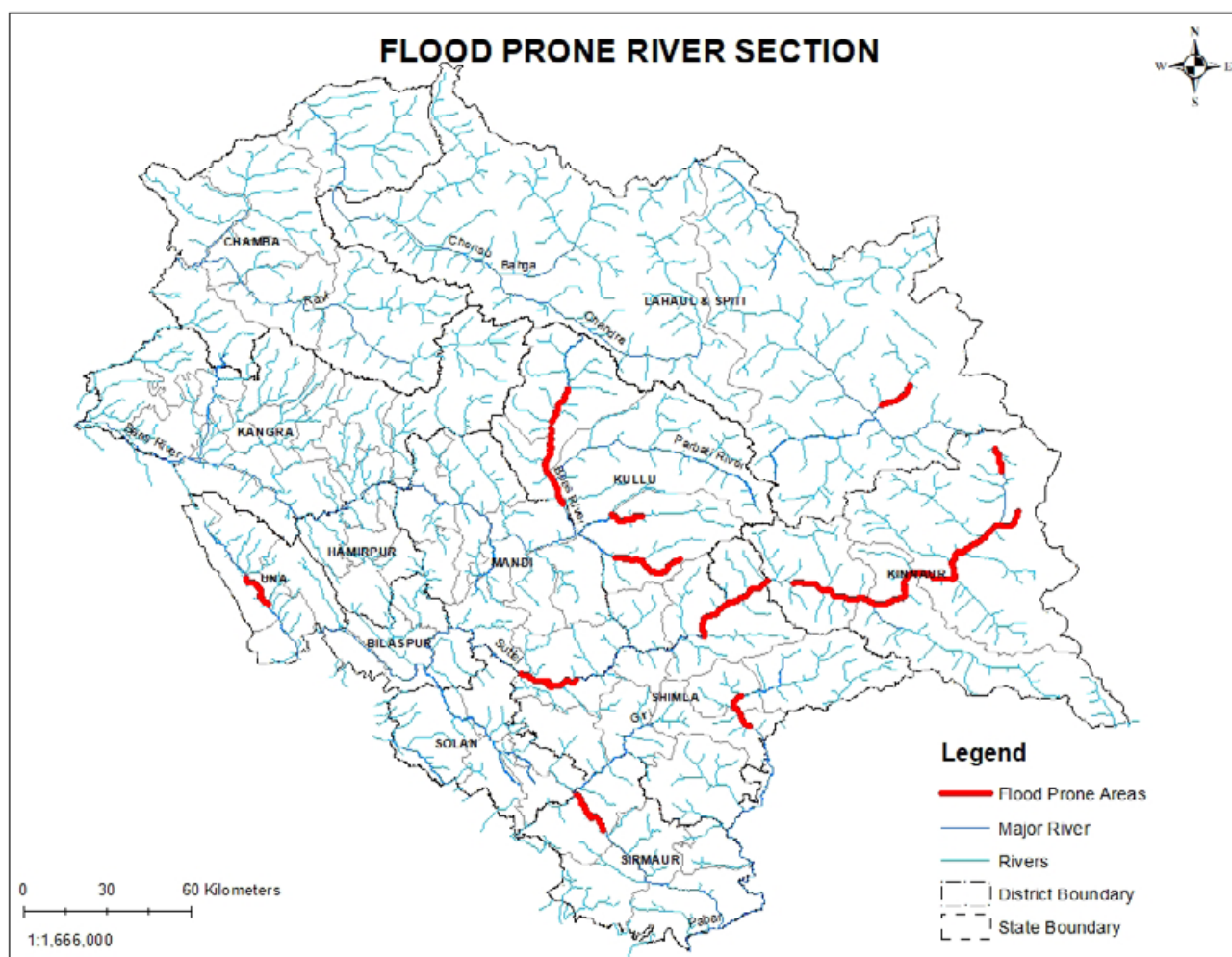
Table-2.5: Years of Excessive Rainfall

No.	District	Years of excessive Rainfall > 125%	Highest rainfall (% of Normal) with year
1	Bilaspur	1973, 1994, 1996, 1998	218.7 cm in 1998 (174 %)
2	Chamba	1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1964, 1976, 1977, 1979, 1988, 1992, 1993, 1994	268.3 cm in 1977 (198 %)
3	Hamirpur	1955, 1961, 1970, 1990	210.6 cm in 1990 (144%)
4	Kangra	1976	233.4 cm in 1976 (126 %)
5	Mandi	1954, 1955, 1963, 1966, 1967, 1988, 1990, 1997	336.4 cm in 1988 (215%)
6	Sirmaur	1959, 1961, 1962, 1963, 1964, 1988	288.8 cm in 1963 (215%)
7	Una	1955, 1988	237.0 cm in (196%)
8	Kinnaur	2013	330.7 cm (4309%)

Source: India Meteorological Department

TARU has developed a map of flood prone river sections based on flood modelling analysis of the river basins of Himachal Pradesh. Although the analysis was constrained by lack of high quality of data on channel geometry, terrain, human settlements and infrastructure, the map clearly identifies the flood risk zones of the State. This would be useful to assess the risks of riverine flood in the districts and blocks of the State

Figure-2.5: Flood prone river sections of Himachal Pradesh



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, 2016

Two rivers that face flood almost every year are Sutlej and Beas. Unlike in the plain areas, riverine floods of Himachal Pradesh are temporary as the overflow is drained out quickly due to the sloppy terrains. Communication network and other lifeline infrastructure such as roads and bridges located in close proximity to high flood level are at risk during floods. Often precious agriculture and horticulture land and forest trees are also damaged or eroded. Hydro power infrastructure of both mega and micro-hydel projects is also at risk. Forty percent of rural houses in Himachal Pradesh that are made up of light weight sloping roof, and over 70 percent houses that are constructed with mud and un-burnt bricks are particularly at risk during floods and heavy rains with gusty winds.

Floods have inflicted considerable damages to life and property in the State and in some years the extent of damages have been considerable.

Table-2.6: Flood Damages in Himachal Pradesh during 2001-2011

Year	Areaaffected (m.ha.)	Population affected (million)	Damage to crops		Damage to houses		Cattlelost Nos.	Humanliveslost Nos.	Damageto publicutilities (Rs. Crore)	Totaldamage (Rs.Crores)
			Area (m.ha.)	Value (Rs.Crore)	Nos.	Value (Rs.Crore)				
12000	0.420	0.876	0.031	46.828	3863	13.08	1411	35	1466.028	1525.941
2001	0.0008	0.405	0.006	20.050	2683	4.223	915	45	113.981	138.254
2002	0.000	0.000	0.000	0.000	0	0.000	0	0	0.000	0.000
2003	0.033	0.303	0.016	17.790	2924	60.06	452	89	87.964	165.822
2004	0	0.022	0	0.673	525	0.864	103	8	29.236	30.772
2005	0.530	0.873	0.048	328.590	2024	9.147	3049	8	222.063	569.800
2006	0	0	0.094	245.490	4379	23.66	846	48	351.568	620.723
2007	0	0	0.180	239.159	10820	96.44	3087	98	933.349	1268.948
2008	0.000	0.000	0.000	0.000	0	0.000	0	0	0.000	0.000
2009	0.000	0.000	0.000	0.000	0	0.000	0	0	0.000	0.000
2010	0.001	0.608	0.204	286.340	6666	7.978	5839	62	1750.710	2044.028
2011	0.030	0.608	0.157	417.390	8467	0.480	2372	51	618.600	1036.470

Source: State Disaster Management Plan 2012

2.4.2 Flash Flood

Flash floods are more frequent and damaging in Himachal Pradesh than riverine flood. Flash floods may occur even in small rivulets or streams when there are excessive rains, cloudbursts or other disturbances in the upper catchment areas. Such floods may occur with little or no warning and may cause immense damage and loss to life and property.

The major causes for flash floods in Himachal Pradesh are:

- ▶ Cloudburst in upper catchments of the river
- ▶ Excessive rainfall in the catchments
- ▶ Melting and bursting of glaciers due to rising temperature
- ▶ Sudden breach or failure of manmade or natural barriers
- ▶ Change of river course
- ▶ Landslides triggered due to slope failure or tectonic movements

Over 40 incidents of flash flood and cloudbursts occurred in Himachal Pradesh in the last 12 years and over 35 people were feared dead. In August 1994, the Manimahesh cloudburst and flash flood washed away almost the entire length of 62 km Chamba-Bharmour road, over 50 people were dead or missing, and 2,000 injured. The estimated loss was over INR 450 crore. The year 1997 again saw a heavy flash flood in Maglad in Rampur tehsil of Shimla district.

The worst flash flood of Himachal Pradesh in the recent past was the Parechu flood in 2005. This flash flood was caused due to huge landslide at Parechu in Tibet that blocked the flow of water of river Sutlej

resulting in the formation of a huge lake. The continuous monitoring of the lake through satellite imageries and pre-emptive measures taken for evacuation of people from low-lying areas all along the banks of the river and its tributaries prevented a major disaster. There were considerable damages to houses, roads, bridges and livelihoods, and disruption of electricity generation and supply in downstream locations.

Some of the major flash floods reported in the State in recent years are listed in Table 2.7.

Table-2.7: Major Flash Floods in Himachal Pradesh

Year	Location	Damage caused
July, 2000	Satluj River, Kullu, Mandi, Kinnaur, Rampur,	140 dead, 400 shifted, 12400 sq. km area affected
August, 2001	Chamba	16 dead, 3010 sq km area affected
July, 2003	Gadsa valley – Kullu	35 dead
August, 2004	Satluj river, Kinnaur, Shimla, Kullu, Bilaspur	3500 people evacuated from 56 villages in affected districts
June, 2005	Parchu lake, Kinnaur, Rampur	5 bridges damaged, and 50 houses submerged

Source: Source: State Disaster Management Plan 2012

2.4.3 Glacial Lake Outburst Floods

The Himalayan region has about 15,000 glaciers which is nature's renewable storehouse of fresh water. In the face of accelerated global warming the glaciers in the Himalayan region are retreating/ melting at a high rate of 30-60 metres per decade leading to accumulation of increasing amounts of water in mountain-top lakes. Such lakes are formed behind moraine or ice 'dams'. Satellite observation of the mountain top lakes in the region have revealed a steady increase in the size and volume of many of these glacial lakes at high altitudes.

Due to the inherent instability of such 'glacial lakes', the potential of sudden outbursts/ breaches is extremely high. Such outbursts can lead to a discharge of millions of cubic metres of water and debris in a few hours which can cause catastrophic devastation and flooding up to hundreds of kilometres downstream. This phenomenon constituting a sudden discharge of a huge volume of water from such glacial lakes is known as Glacial Lake Outburst Flood (GLOF).

Such flooding can lead to serious damage to life, property, agriculture, livestock, forests and ecosystems. The livelihoods of mountain dwelling communities are heavily dependent on mountain ecosystems for sustenance, as well as precious socio-economic infrastructure and assets like hydro-power, electricity, communications, roads and bridges. All of these can induce forced migration and undermine the already meagre sources of livelihood of mountain communities.

Himachal Pradesh has 2,554 glaciers with 229 glacial lakes, 22 of them being potentially dangerous. TARU selected 11 potentially dangerous lakes in Chenab, Ravi and Sutlej basins for detailed investigations and GLOF modelling. In Chenab Basin, the areas falling under the vulnerable zones of Lakes 7 and 8 were found most at risk. In Ravi basin, areas falling under vulnerable zone of Lakes 5 and 6 have maximum threat. The glacial lakes in Sutlej basin are not so vulnerable in terms of lake areas and volume of water, but the number of villages falling within the vulnerable zones is quite high in this basin.

2.5 Meteorological and Climatic Hazards

Drought, avalanche, cold wave and cloudbursts are the main meteorological and climatological hazards of Himachal Pradesh.

2.5.1 Drought

Meteorologically, drought is defined as a situation when the annual rainfall over any area is less than 75 percent of the normal. It is termed as moderate if rainfall deficit is between 25 to 50 percent and severe if the deficit is more than 50 percent. None of the districts of Himachal Pradesh is chronically drought affected but at least five districts of the State have faced drought-like condition in some years and at least two districts have experienced drought in successive years, as shown in Table 2.8. The Spiti Sub-division of the State is the cold desert area of the State.

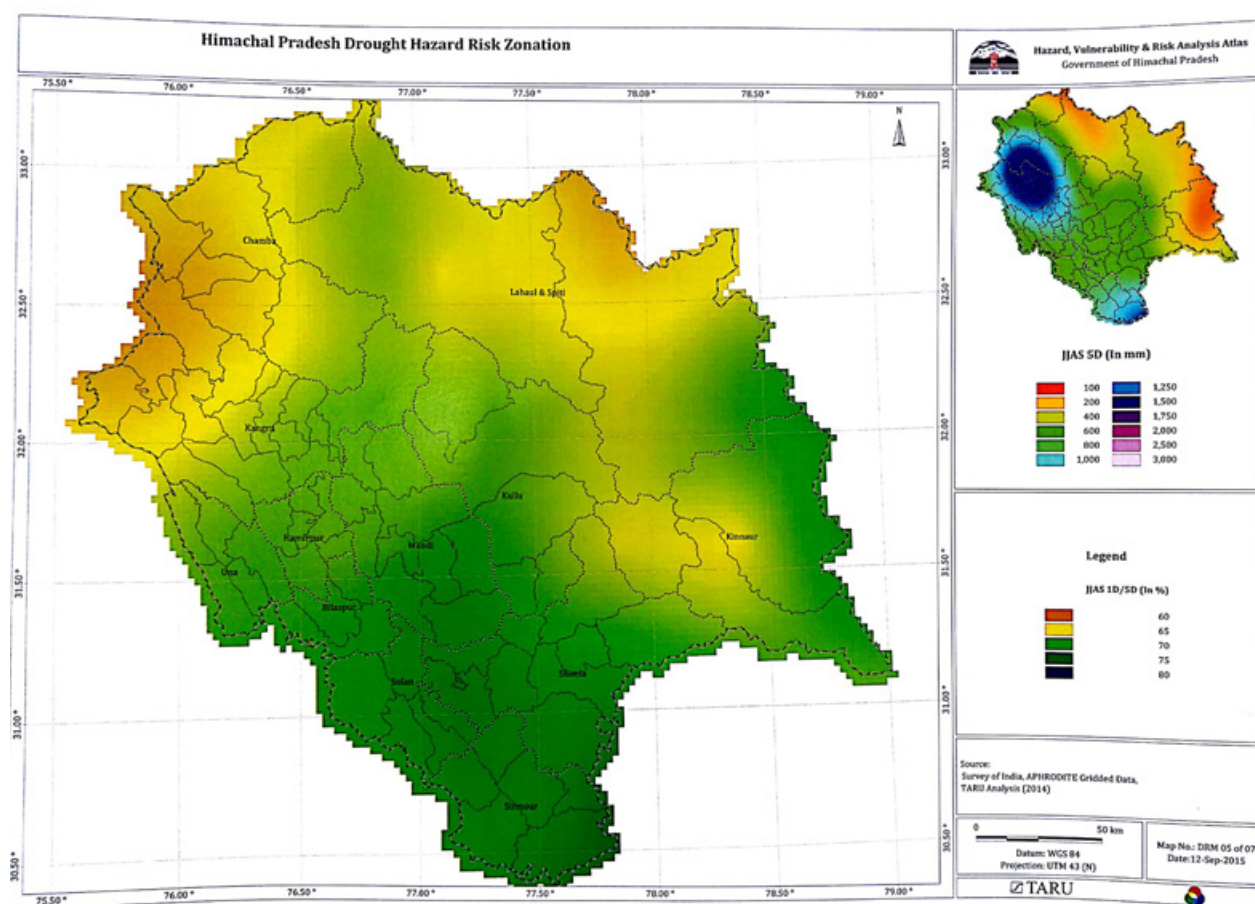
Table-2.8: Drought prone districts of Himachal Pradesh

No.	Districts	Years of successive drought	Years of severe drought >50
1.	Bilaspur	1974-75, 1975-76, 1992-93	1975 (37%)
2.	Kangra	1962-63, 1963-64	1974 (45%)
3.	Mandi	1982-83	1983 (44%)
4.	Sirmaur	1979-80, 1986-87	1979 (43%), 1986 (41%)
5.	Una	1972-73, 1974-75, 1981-82, 1982-83	1975 (43%), 1981 (40%)

Source: India Meteorological Department

In the absence of sufficient rainfall gauges to capture the spatial pattern of rainfall in the State, TARU interpolated the aphrodite precipitation dataset for the past 60years over the rainfall data from available stations to derive annual, monthly and seasonal deciles and developed drought hazard zonation map of Himachal Pradesh.

Figure-2.6: Drought Hazard Zonation Map of Himachal Pradesh



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

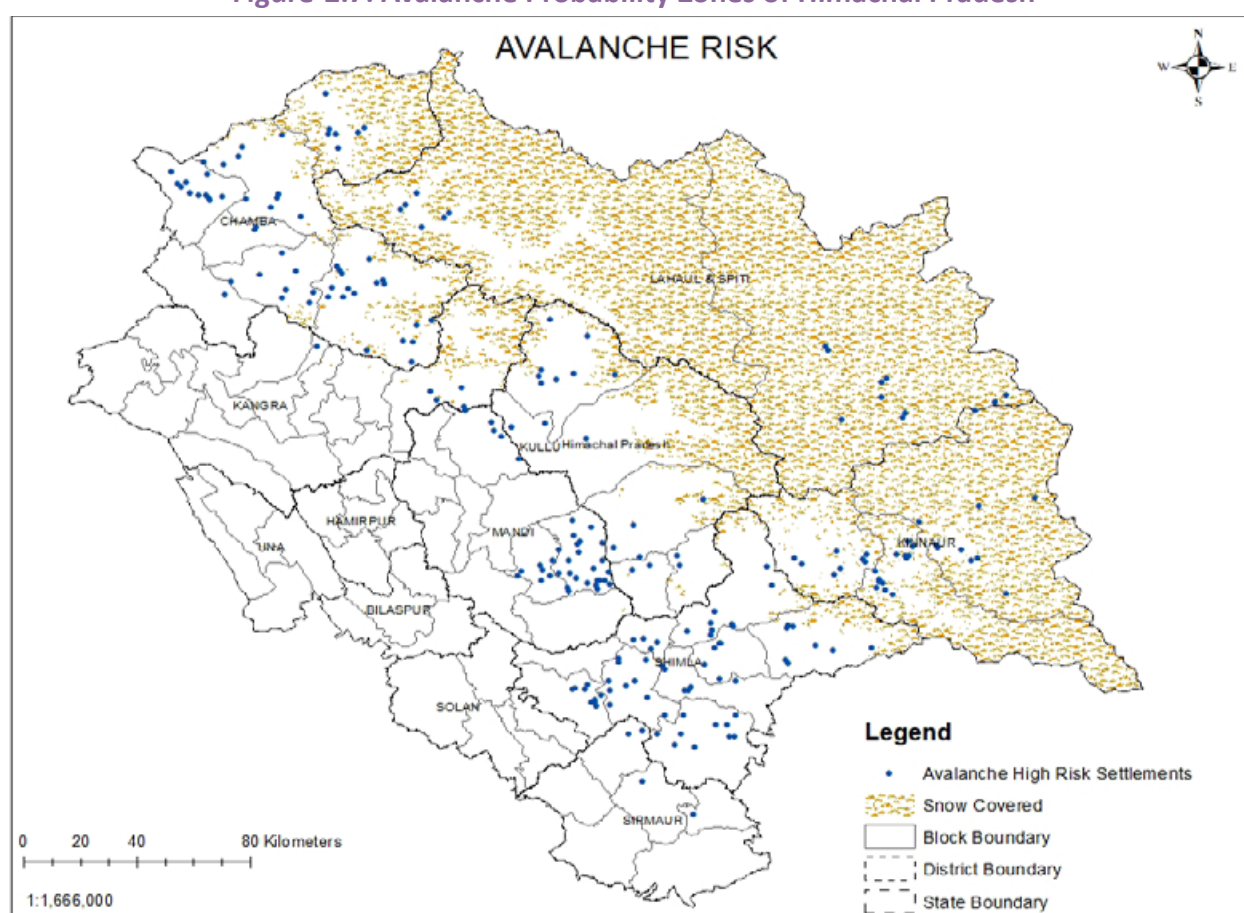
As per this analysis, outside the cold desert regions of Lahaul and Spiti, parts of Chamba and Kangra districts show lowest first and fifth deciles rainfall ratios indicating highest risk of droughts. In high drought risk zones, the once-in-10-years drought may be nearly two third of the median monsoon rainfall, and such droughts can cause severe distress to the rainfed agriculture. Once in a decade horticultural losses can be as high as 50 percent compared to the median values. These results strongly suggest the need for irrigation, pest control as well as mitigating impacts of risks like hailstorm etc.

2.5.2 Avalanches

Snow avalanches are the sudden slide of large mass of snow down a mountain. Several factors may contribute to the occurrence of avalanches. These include temperature, snowfall, wind speed, local weather conditions, terrain, slope, vegetation and general snow pack conditions. Different combinations of these factors can create low, moderate and high intensity avalanches.

Based on primary data collected on these factors, satellite imageries and field investigations, TARU has developed an avalanche probability zone map of Himachal Pradesh.

Figure-2.7: Avalanche Probability Zones of Himachal Pradesh



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

Almost 1.2 percent area of Himachal Pradesh falls under the category of high avalanche probability zone, and 14.5 percent area has moderate probabilities of avalanches. However, 99 percent of avalanches are low-magnitude high frequency mass movement of snows which are part of the natural process of maintaining glacier mass balance. It is the high intensity low frequency avalanches that cause maximum damages to life and property. The Bara Banghal area of Kangra District at an elevation of 8,500 feet above sea level and the areas located at the base of steep slopes on the banks of Ravi River are particularly vulnerable to landslides. Several villages in these areas were devastated by the avalanches in the past. As per the Snow & Avalanches Study Establishment, on an average 30 persons are killed every year due to this disaster in the Himalayas.

2.5.3 Cloudbursts

The geographic configurations of the numerous small valleys of Himachal Pradesh provide a - conducive environment for cloudbursts when highly condensed rain-bearing clouds burst causing sudden torrential rainfall over a small area for a short time. This devastating weather phenomenon occurs when warm air parcel mixes with cooler air of the valleys, resulting in sudden vertical lifting necessary for the formation of cumulonimbus clouds. The clouds get trapped in the valleys and burst with thunderstorms and heavy downpour, usually 100 mm per hour in small areas. If the clouds burst on the hills the inevitable consequences are landslides and flash floods, causing destruction of houses, dislocation of traffic and human miseries on a large scale.

Cloudbursts are local weather phenomenon that is difficult to predict from remotely located weather stations. Himachal Pradesh experiences cloud bursts regularly during the southwest monsoon and the frequency is more during the months of July and August. The areas most vulnerable to cloudbursts are:

- Parts of districts Kullu, Shimla, Kinnaur and Mandi
- Stretch from Bhuntar to Manikaran (Bank of river Parvati) and Kullu to Manali (Banks of river Beas)
- Parts of districts Kangra, Chamba, Sirmaur, Solan and Hamirpur

2.6 Environmental Hazards

2.6.1 Forest Fire

The forests of Western Himalayas are more vulnerable to forest fires as compared to those in Eastern Himalayas due to drier climates and higher population densities. Himachal Pradesh has a recorded forest area of 1,046,900 hectares, of which around 974,800 hectares (93%) are known to be prone to fire. Nearly 50 percent of the forest areas have had history of forest fires, mostly during summer months.

The reasons for such high incidence of fire in the forests of the State are primarily anthropogenic although natural factors such as lightning, rise in temperature and high winds have contributed to the process. Forests in Himachal Pradesh, like in most of the States, are linked with human livelihood. People residing within forests or nearby areas are dependent on forests for their source of income and for day to day requirements of fuel. At times, they ignite forests for collection of forest produce or for improving the productivity. Some forest fires are caused due to poor knowledge or negligence of the people, for instance, throwing burning cigarettes and cooking food in the forest.

The magnitude of forest fires as disaster can be gauged from the number of fire incidents and area affected as given below:

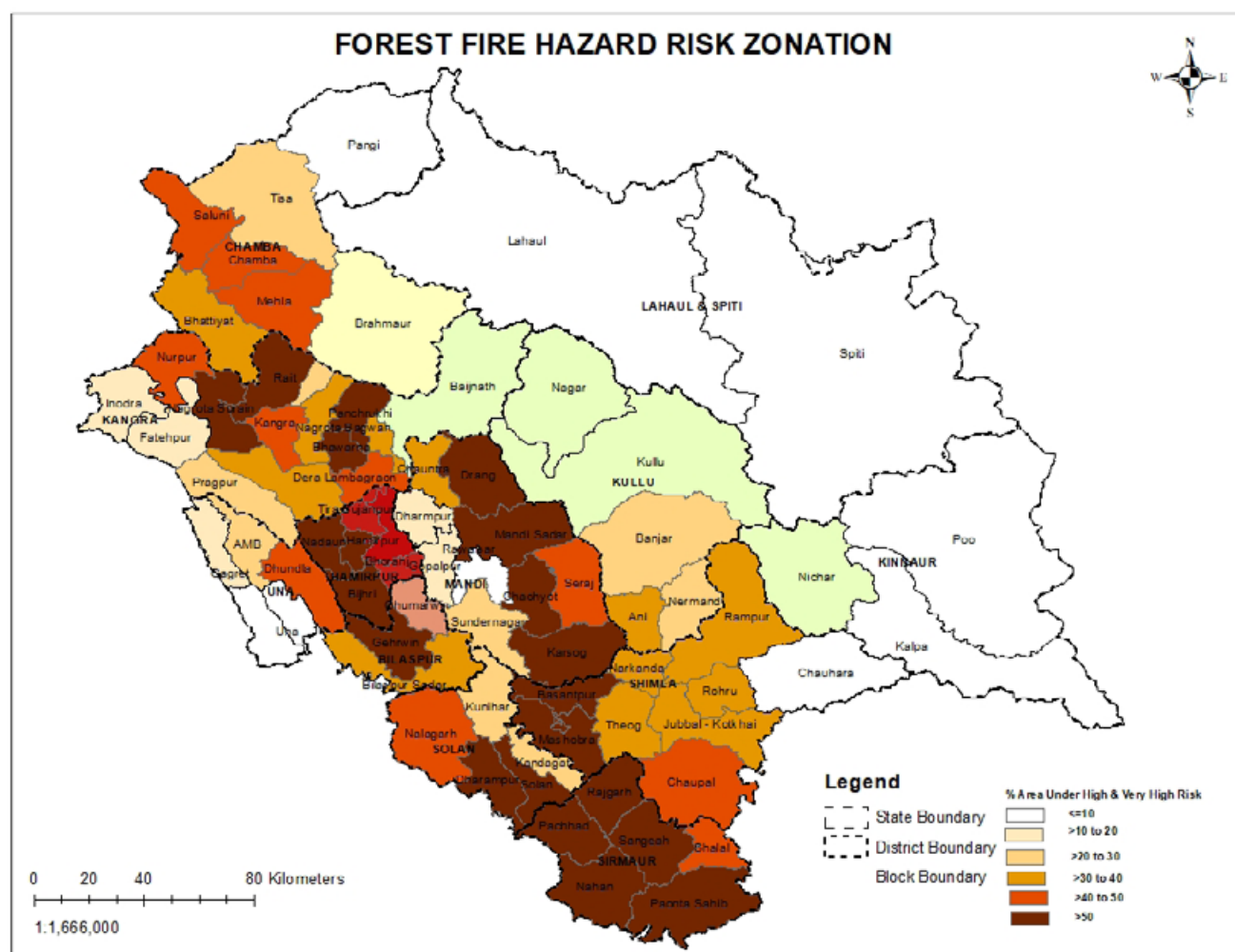
Table-2.9: Forest Fires: Incidents and Areas affected

Year	No of incidences	Areas affected (ha)
2000-01	1900	36887
2001-02	301	5719
2002-03	282	4204
2003-04	550	9896
2007-08	580	7810
2015-16	671	5734

Source: Himachal Pradesh Forest Department

TARU has mapped the potential areas of forest fires in Himachal Pradesh on the basis of multi-criteria analysis that include forest typology, settlement pattern, proximity-accessibility index and incidents of forest fires.

Figure-2.8: Area under High and Very High Risks of Forest Fire



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

Actual areas under very high, high and moderate risk zones of forest fires in the 12 districts of Himachal Pradesh have been quantified on the basis of this analysis.

2.10: District wise Forest Fire Risk Zones (in Sq. Km.)

District	NoRisk	VeryLow	Low	Medium	High	Very High	Total Area
Chamba	27	2,098	926	41	1,302	2,007	6,402
Bilaspur	87	25	214	27	561	247	1,162
Hamirpur	-	2	236	4	615	255	1,113
Kangra	208	872	959	27	2,045	1606	5,718
Kinnaur	10	4,444	1,446	9	56	502	6,468
Kullu	13	2,699	223	49	1,187	1324	5,495
Lahul & Spiti	56	12,702	823	5	72	188	13,845
Mandi	3	242	788	29	1,71	1,419	3,951
Shimla	-	469	826	13	1,658	2,147	5,113
Sirmaur	-	3	377	6	1,092	1,324	2,802
Solan	-	4	819	10	583	507	1,923
Una	44	57	505	14	720	194	1,534

Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

2.6.2 Man, and Animal Conflict

Though the damages and loss caused by wild animals is not yet included in the list of disasters identified in the relief manual yet the issue has now become very serious for the last couple of years. During public consultation, the farmers identified wild animals and monkeys as the dominant threat to their livelihood. The attacks of wild animals and monkeys are considered to be much more damaging as these occur regularly without any warning. Forest Department data for the period 2000-2016 indicate that incidents of attacks of wild animals on humans have been rising, resulting in 82 deaths and 3,513 injuries during the period. Minimising or preventing damage to crops by resolving the man versus animal conflict is emerging as a major challenge. According to media reports, there are about 3.5 lakh monkeys in the State affecting the farming community in about 2,600 Panchayats. Annual damage to crops as a result of this conflict has been estimated to be to the tune of INR500 crore.

2.7 Industrial Hazards

Despite the constraints of its hilly terrain and the restrictions imposed for the protection of its forest and environment, Himachal Pradesh has a fairly large number of industries, mostly utilising its rich mineral and water resources and diverse agro-horticultural products. The State has a total number of 494 medium and large and 39,018 small scale industries, mostly located in three southern districts of Solan, Una and Sirmaur, providing direct employment to 2.75 lakh persons. Many of these industries are located in different hazard zones of the State and generate their own hazards, which either on their own or in combination with natural hazards may create risks of disasters.

Based on the guidelines of the Ministry of Environment, Forests & Climate Change of Government of India, the HP State Pollution Control Board has classified these industries into three main categories according to their pollution potentials: 947 'red' units representing highly polluting industries, 2,443 moderately polluting 'orange' units and 2,652 marginally polluting 'green' units.

Himachal Pradesh has eight Major Accident Hazard (MAH) industries which, as per the provisions of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989, must have their on-site and off-site disaster management plans. TARU has assessed the extent of probable maximum exposure of population and areas within a buffer zone of 5 and 10 km radius of these industries in the event of a major disaster event in these industries.

Table-2.11: Area and population in buffer zones of MAH Industries

Districts	Estimated Population 2011		Estimated area (sq. km)	
	5 km	10 km	5 km	10 km
Bilaspur	-	9,219	1.5	48.9
Hamirpur	-	18,052	1.8	52.5
Kullu	11,208	32,005	53.4	185.4
Mandi	5,599	20,534	24.5	126.3
Sirmaur	44,231	1,02,747	176.5	497.7
Solan	37,499	70,523	107.3	289.5
Una	8,591	47,578	74.8	199.0
TOTAL	1,04,846	2,95,563	439.7	1399.4

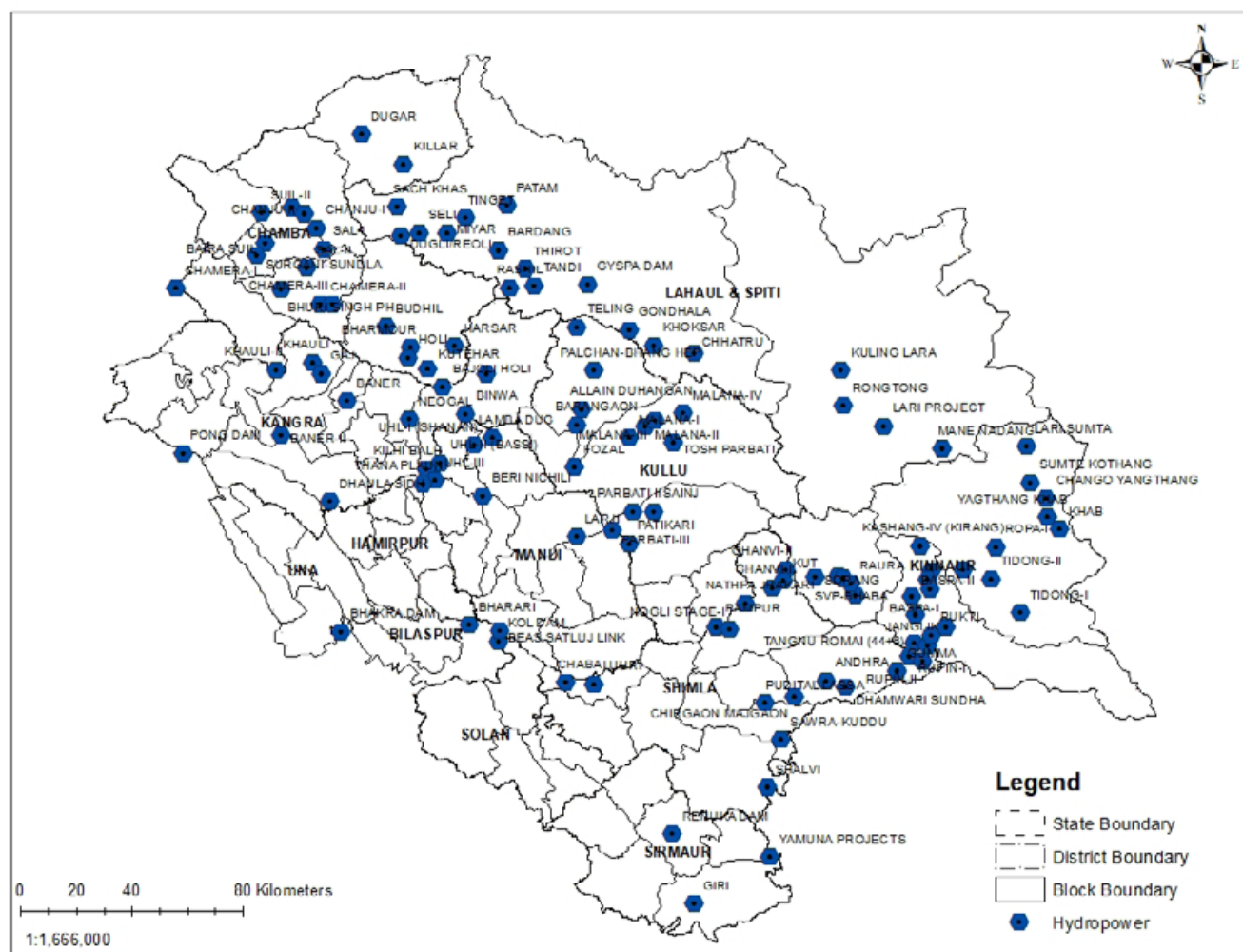
Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

The Himachal Pradesh State Disaster Management Authority has issued Guidelines for On-site and Off-site Emergency Plans for Factories and Industries for preventing the risks of such disasters.

TARU further conducted survey of 143 selected industries to assess the impacts of natural hazards on their operations and activities. Of the 40 industries that responded to the survey, 28 percent reported that their normal operations were disrupted on an average for two days in a year due to natural hazards, the most important being torrential rains and cloud bursts, flood and landslides. No systematic studies on the impacts of such losses have been carried out so far.

Himachal Pradesh has about 196 hydroelectricity related project sites (dams, power houses and downstream discharge sites), out of which 132 sites are located in high risk zones of earthquake, landslide, flash flood and GLOF. The remaining installations are downstream facilities that are located in medium to low risk zones. The following map presents the hydroelectricity related sites in the high-risk zones of the State.

Figure-2.9: Hydro-electric power stations in high risk zones



Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

2.8 Accident Related Hazards

Road accidents and stampedes are human induced hazards that consume large number of human lives in Himachal Pradesh.

2.8.1 Road Accident

Vehicular accidents on road kill nearly 1600 people every year and the number does not show any signs of decline. In fact road accidents, have emerged as the single most important cause of human mortalities in a normal year outnumbering deaths in all natural disasters put together.

Table-2.12: Year-wise Road Accidents in Himachal Pradesh

Year	No. of Road Accidents	Persons Killed	Persons Injured	Vehicles Involved
2003-04	2,794	843	4,293	3,195
2004-05	2,758	920	4,674	3,423
2005-06	2,868	861	4,755	2,868
2006-07	2,737	929	4,886	2,917
2007-08	2,953	921	5,272	3,756
2008-09	2,840	898	4,837	3,583
2009-10	3,023	1,173	5,630	3,705
2010-11	3,104	1,105	5,350	3,810
2011-12	3,063	1,051	5,260	3,775
2012-13	2,867	1,057	5,422	3,461
2013-14	3,008	1,116	4,961	-
2014-15	3,012	1,179	5,522	-

Source: Statistical Outline of Himachal Pradesh 2012-13, Disaster Analysis LR3 2007-2015

The causes for road accidents could be many but statistics reveal that 70 percent of road accidents arise from negligent driving. The other plausible factors contributing to the hazards of road accidents are:

- Inadequate maintenance of vehicles
- Poor visibility due to fog or smog
- Poor or untrained driving
- Lack of emergency services like trauma centres
- Landslides or rock slides due to unstable hilly slopes
- Night time driving
- Over-speeding and overtaking at curves on mountain roads
- Non-use of horns
- Use of mobiles and headphones while driving
- Use of alcohol while driving.

2.8.2 Temple Stampedes

The State of Himachal Pradesh has more than 2,000 Hindu temples, some of them attracting large number of pilgrims from the State and outside, especially during religious fairs. Temples like Sri Naina Devi in Bilaspur, Baba Balaknath in Hamirpur, Jawala Mukhi & Baijnath in Kangra, Chintpurni in Una, Bijli Mahadev in Kullu, Tarna in Mandi, Renukaji in Sirmour, Laxmi Narayan in Chamba, Bhima Kali in Sarahan Shimla attract large number of visitors and tourists every year.

Unregulated mass gathering of pilgrims during festivals in some of these ancient temples with narrow entry

and exit routes have resulted in stampedes killing hordes of pilgrims. On August 3, 2008, the Naina Devi temple experienced a horrific tragedy when 146 devotees, including 30 children and 38 women were crushed to death and 50 were injured in a stampede. The tragedy took place in the holy month of Sawan when devotees gathered in large numbers to offer their prayers during Navaratra festival. As per media reports there were about 3,000 devotees present at the time of catastrophe. Rumours of landslide and rolling boulders from a nearby hill top spread fear among the people who rushed for safety and were trapped, rolled over and crushed into the nearby nallah by the movement of a large panicking crowd.

The primary factor leading to stampede is the pressure of surging crowds which is multiple of speed variance and density. Such accidents can be avoided with a proper crowd management plan and contingency plan for evacuation and medical preparedness during emergency situations. Every temple should prepare its disaster management plan and update periodically.

2.9 Biological hazards

Himachal Pradesh has made massive investment in its health infrastructure and implemented various public health programmes over the years that have considerably improved the basic health indicators of the State. The State has recorded near 100 percent achievements in immunization. Infant and child mortality as well as maternal mortality rate within the State is among the lowest in the country. Level of malnutrition in the State is also almost at par with the best performing States. Despite a hilly terrain and inhospitable climate, the State has an extensive well-spread network of functional primary health centres that are serviced by qualified and experienced health professionals and accessed regularly by the people. The State has also done well in spreading health awareness among the people. The entire population in rural and urban areas of the State has access to potable drinking water and sanitation facilities. Himachal Pradesh is the second State of India to have achieved the status of being open defecation free (ODF). All these measures and achievements have considerably reduced the risks of health related disasters in the State. Yet the risks of public health emergencies in the State like epidemics and pandemics cannot be ruled out.

2.9.1 Epidemics

Rising temperatures and changing environment impact the disease portfolios of the State. Incidences of malaria have been reported in the hills that had never witnessed the disease. Water borne and respiratory diseases are also on the rise. Parts of the State have seen sporadic outbreak of epidemics like diarrhoea, measles, rubella, pneumonic plague etc. Risks of such diseases increase manifold in the aftermath of floods and flash floods.

The State cannot ignore the threats of avian flu or other pandemic diseases that can take a heavy toll of human and animal lives.

2.9.2 Pest attack

Insects and pests cause considerable damage to agricultural and horticultural crops of Himachal Pradesh. Sometimes pest attacks become so widespread that standing crops over large areas are destroyed. These pose serious threats to the livelihood of the people and economy of the State. In 1995, for example, premature leaf fall due to fungal attack of 'apple blotch' affected more than 40 percent of all apple orchards in Himachal Pradesh. Similarly, apple scab is known to have caused tremendous loss to horticultural production of the State over several years. Although, the State Departments of Agriculture and Horticulture have plans and programmes for insect and pest control under normal situations, it is necessary to have comprehensive risk assessment of pest attacks in the context of natural hazards and climate change and develop contingency plans for dealing with such emergency situations.

2.10 Multi-Hazard Districts

Most of the districts of Himachal Pradesh face natural and manmade hazards, but some of the districts face the brunt of such hazards more than others (Table 2.13).

Table-2.13: Multi-Hazard Districts of Himachal Pradesh

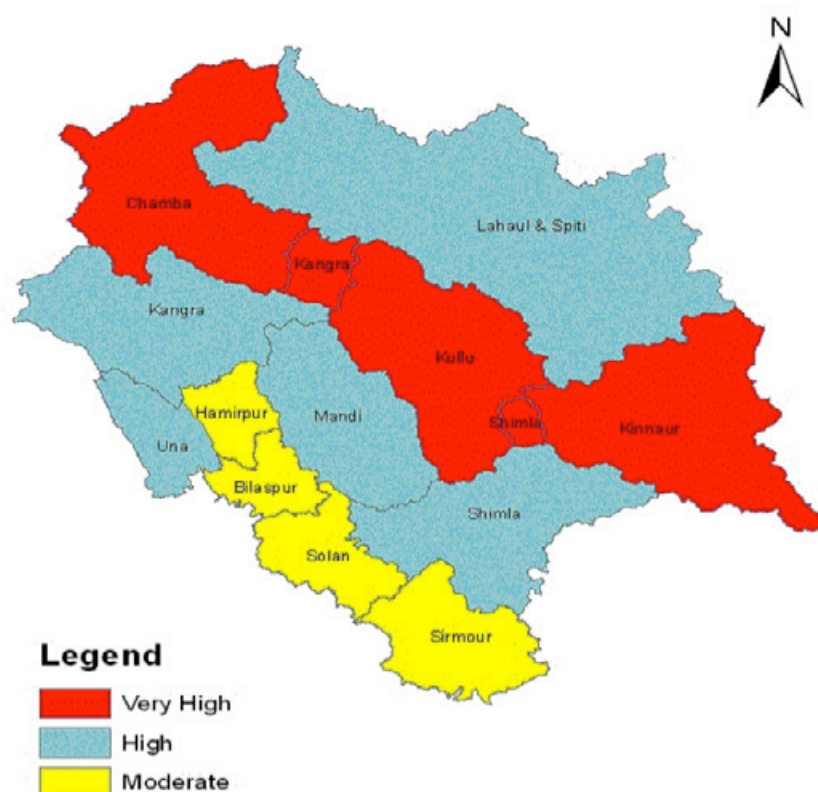
Districts	Earthquake	Landslide	Riverine flood	Drought	Cloudburst	Avalanche	ForestFire	Overall vulnerability
Kangra	VH	L	M	H	M	M	H	H
Chamba	VH	VH	H	M	H	M	H	VH
Hamirpur	H	L	L	M	L	-	VH	M
Mandi	VH	H	H	M	H	-	VH	H
Kullu	VH	VH	H	M	VH	H	H	VH
Bilaspur	H	M	L	M	L	-	VH	M
Una	H	L	H	H	L	-	M	H
Sirmour	H	L	L	M	M	-	VH	M
Sloan	H	M	L	M	L	-	M	M
Kinnaur	H	H	H	M	VH	VH	M	VH
Lahaul & Spiti	M	M	M	M	H	VH	M	H
Shimla	VH	H	H	M	H	M	H	H

Note: Compiled from hazard maps. (VH=Very High; H=High; M=Medium)

Based on these hazard classifications, the Himachal Pradesh State Council of Environment, Science and technology has developed an Overall Vulnerability Map of Himachal Pradesh.

Figure-2.10: Overall Vulnerability Map of Himachal Pradesh

OVERALL VULNERABILITY MAP-HIMACHAL PRADESH



Source: H.P. State Council for Environment Science and Technology

2.11 Impact of Climate Change on Hazards

Climate change impacts most of the natural hazards of Himachal Pradesh, in particular the hydro-meteorological hazards. Various studies have indicated that patterns of temperature and rainfall are changing in the Himalayan State and these are likely to increase the frequency and intensity of extreme climatic events, such as riverine and flash floods, drought, avalanche, cloud bursts, landslide, forest fires etc. while unfamiliar events such as GLOFs may take place disrupting normal life and economy of the State.

The Himachal Pradesh State Action Plan on Climate Change has identified the following trends of climate change and their impact in the State:

- Average mean surface temperature of the State has risen by about 1.6°C in the last century.
- Warming rate of Shimla was higher during the past two decades as compared to earlier decades.
- About 17 percent decrease in rainfall in Shimla was observed from 1996 onwards. The decreasing trend in seasonal snowfall in Shimla is conspicuous since 1990.
- Monsoon discharge in Beas River has shown a significant decrease.
- Winter discharge in River Chenab has shown a significant increase.
- River Satluj shows an increasing trend in winter and spring discharge.
- The glacial deposits in the State are declining. The glaciers in Chenab, Parbati and Baspa basins have retreated from 2,077 to 1,628 sq. km.

- Quality of apple has been affected and the apple line has shifted upwards.
- Area under apple orchards is being diverted to vegetable cultivation due to rising temperature.
- Incidence of pest and disease are becoming more severe.
- Pine forests are showing trends of invading heights. Kikar, Tali (Shisham), Deodar, Ban trees are also on decline.

The State Action Plan has projected that southeastern parts of the State would be facing moderate to extreme drought like conditions, while incidence of floods and flash floods would increase in the northwestern areas. Retreating glaciers would create new risks of GLOF in the alpine regions, while rising temperature would exacerbate the existing risks of forest fires in the Shivalik and mid-mountainous regions.

2.12 Vulnerabilities

Himachal Pradesh has made tremendous progress in economic, social and human development, thereby considerably reducing the vulnerabilities of the people and enhancing the resilience of the communities. These are evident in the inter se position of the State on some of the crucial indicators of development.

Table-2.14: Status of Himachal Pradesh on Key Development Indicators

No.	Indicator	Himachal Pradesh	India (Av. State)	Rank of HP
1.	Total population (million)	6.86	41.753	21
2.	Total geographical area (sq. km)	55,673	1,12,983	17
3.	Density of population (per sq.km)	123	382	25
4.	Growth rate of population: 2001-2011 (%)	12.93	17.7	15
5.	Area under forests (% of total area)	66.52	23.41	4
6.	Urban population (% of total population)	10	31.1	29
7.	Sex ratio (female per 1000 male)	972	943	10
8.	Literacy Rate Male/Female/Total (%)	89.5/76/82	80.9/64.6/73	3/4/3
9.	Life Expectancy at Birth M/F/T (Yrs)	69/73.1/71	65.8/69.3/67.5	3/7/4
10.	Infant Mortality Rate (per 1000 births)	35	40	15
11.	People with Disability (%)	2.6	2.13	27
12.	People above 60 years of age (%)	9.0	7.4	2
13.	Per Capita Income 2014-15 (Rs. current price)	92,300	74,380	6
14.	Below Poverty Line – Rural/Urban/Total (%)	10.7/3.4/10	28.3/25.7/27.5	4/9/2
15.	Overall Human Development Index (2012)	0.652	0.513	2

Note: Compiled from various publications of Governments of India and Himachal Pradesh

Although a hilly State, remotely located, sparsely populated, least urbanized and without a significant industrial base, the State has achieved the distinction of being third highest in literacy, fourth in life expectancy, sixth in per capita income and second in overall human development index among 29 States of India. The State is the second ODF State of India. The all round socio-economic development of Himachal Pradesh has enhanced the capacity of the people and communities to deal with the risks of disasters.

Yet there are significant layers of vulnerabilities that have exposed the people of the State to natural and human-induced hazards. Some of these vulnerabilities are created due to the geophysical peculiarities of the State, such as:

- Physical isolation and tough terrain
- Scattered human settlements in villages and hamlets
- Inadequate road connectivity to villages
- Inadequate network of telecommunication
- Harsh climatic conditions
- Fragile eco-system
- Excessive dependence on subsistence agriculture for livelihood
- Heavy dependence on rains for agriculture and horticulture

Other vulnerabilities are largely embedded in the living conditions of the people. These are physical (unsafe houses, buildings, schools, hospitals, and infrastructure), social (vulnerable social groups like women, children, disabled, and elderly), economic (vulnerable economic groups like rural and urban poor) and environmental conditions (deforestation, environmental pollution, water stress etc.).

TARU has used Sustainable Livelihood Framework based on five capitals to assess vulnerabilities of rural and urban communities of Himachal Pradesh to disasters, which include:

- a) Natural capital (land, water sources, forests, fuel wood and fodder sources etc.);
- b) Physical capital (access to water supply and sanitation, housing, health services, road connectivity, communication, production equipment or tools and goods etc.);
- c) Financial capital (income, disposable assets, savings, production, job security etc.);
- d) Human capital (education, skills, knowledge etc.); and
- e) Social capital (social relationships and institutions).

A total of 6,668 rural households in 71 development blocks and 726 urban households in 12 cities were surveyed in a structured format among poor, middle and upper class families to calculate the vulnerability indices of the five capitals. Natural capital was not taken into consideration for urban households since the livelihoods and well-being in urban areas are not directly linked with natural capital. The survey results were used to develop a composite Socio-Economic Vulnerability Index (SEVI) for each of the surveyed blocks and cities.

In rural areas, the natural capital based vulnerabilities were found highest among all capitals, particularly among the poor households. Physical vulnerability is comparatively low, except for some of the less accessible high altitude regions. There is no significant variation in physical vulnerability between different economic groups except for type of houses owned by them. Risk proofing the physical infrastructure, especially roads and water supply infrastructure, schools and hospitals is critical, especially considering impacts of higher frequency risks like landslides, floods and cloudbursts.

Financial vulnerability across different economic groups shows the highest diversity. A significant proportion of low income groups across the state exhibits high financial vulnerability. The human capital based vulnerability was the least and no significant difference was noticed among various income groups in both rural and urban areas. However, unlike in rural areas, social vulnerability index across all the income groups is quite high in Urban areas.

Analysis of SEVI makes it imperative that reduction of vulnerabilities of physical capital by way disaster proofing of houses and infrastructure should receive the highest priorities of the Government at all levels. This is the most difficult and challenging task of disaster risk management in Himachal Pradesh.

Vulnerabilities of natural capital in rural areas can be reduced by making the agricultural and horticultural practices resistant to the threats of drought and floods and diversification of livelihood options so that overwhelming dependence on agriculture can be reduced. Agriculture and allied sectors are already stressed

as these provide employment to 62.8 percent of the workforce while contributing only 15.4 percent of the State GDP. Therefore, increased productivity by way of better agro-economic practices, value addition through agro-processing and linkages with the markets can make the natural capital more resilient to the shocks to natural hazards.

Weak social capital in urban areas can be strengthened by more inclusive and effective self-governance of the municipal administration of the State and greater involvement of the civil society and resident welfare association for better compliance of land use regulations and building bye-laws.

2.13 Vulnerability of houses and buildings

As per Census 2011, the total number of buildings in Himachal Pradesh is over 2.5 million. Around 55.8 percent of the buildings are occupied for residential purpose and 7.5 percent buildings are used for commercial activities. About 89 percent of census houses belong to rural areas while only 11 percent houses exist in urban areas.

Building Materials and Technology Promotion Council (BMTPC) has developed a methodology of determining the vulnerabilities of buildings by categorizing the buildings according to the type of walls and roofs of the buildings, and further sub-categorizing the wall and roof types according to the type of materials used in rural and urban areas. Similar classifications are used in census classification of buildings. The numbers of buildings as per classification of Census 2001 are superimposed on earthquake and wind velocity zones of the State. The flood prone areas are subsumed under earthquake and wind zones, and therefore, are not enumerated separately. The resultant levels of vulnerabilities of buildings are worked out as provided in Table-2.15.

Table- 2.15: Distribution of Houses by Predominant Materials of Roof and Wall and Level of Damage Risk in Himachal Pradesh

		Census Houses				Level of Risk under						
Wall / Roof		No. of Houses	%	EQ Zone				Wind Velocity m/s				Flood Prone Area in %
				V	IV	III	II	55 & 50	47	44 & 39	33	
				Area in %				Area in %				
				44.2	55.8			0.1	8.7	91.2		
WALL												
A1 - Mud & Unburnt Brick Wall	Rural	640,847	26.6									
	Urban	20,946	0.9									
	TOTAL	661,793	27.5	VH	H			VH	H	M		
A2 - Stone Wall	Rural	982,235	40.8									
	Urban	30,368	1.3									
	TOTAL	1,012,603	42.1	VH	H			H	M	L		
Total - Category - A		1,674,396	69.5									
B - Burnt Bricks Wall	Rural	455,886	18.9									
	Urban	168,730	7.0									
	TOTAL	624,616	25.9	H	M			H	M	L		
Total - Category - B		624,616	25.9									
C1 - Concrete Wall	Rural	10,230	0.4									
	Urban	8,193	0.3									
	TOTAL	18,423	0.7	M	L			L	VL	VL		
C2 - Wood wall	Rural	43,416	1.8									
	Urban	5,218	0.2									
	TOTAL	48,634	2.0	M	L			VH	H	M		
Total - Category - C		67,057	2.8									

X - Other Materials	Rural	35,725	1.5						
	Urban	7,128	0.3						
	TOTAL	42,853	1.8	<i>M</i>	<i>VL</i>		<i>VH</i>	<i>H</i>	<i>M</i>
Total - Category - X		42,853	1.8						
TOTAL BUILDINGS		2,408,922							

ROOF									
R1 - Light Weight Sloping Roof	Rural	534,297	22.2						
	Urban	64,512	2.7						
	TOTAL	598,809	24.9	M	M		VH	VH	H
R2 - Heavy Weight Sloping Roof	Rural	1,076,451	1.8						
	Urban	22,355	0.2						
	TOTAL	1,098,806	45.6	H	M		H	M	L
R3 - Flat Roof	Rural	557,591	23.1						
	Urban	153,716	6.4						
	TOTAL	711,307	29.5	Damage Risk as per that for the Wall supporting it					
TOTAL BUILDINGS		2,408,922							

Source: Vulnerability Atlas of India, 2nd edition, BMTPC 2006

TARU conducted its own sample survey of census building as per its own methodology to classify the buildings into five main types: brick masonry, stone masonry, rammed earth, reinforced concrete (RC) frame and hybrid & others.

Table-2.16: Estimated Number of Buildings in Himachal Pradesh

Districts	Brick Masonry	Stone Masonry	Rammed Earth	RC Frame	Hybrid & Others	TOTAL
Bilaspur	26798	26798	11172	483	570	59372
Chamba	12379	12379	7249	147	1619	68040
Hamirpur	46860	46860	36479	364	904	90429
Kangra	135234	135234	100317	642	2792	253842
Kinnaur	1895	1895	431	765	2546	14160
Kullu	13149	13149	2456	992	5344	62951
Lahaul & Spiti	167	167	2186	15	106	5047
Mandi	42957	42957	17191	1823	2575	160212
Shimla	28852	28852	11004	850	9653	99944
Sirmaur	26598	26598	4545	706	1929	59579
Solan	44552	44552	11199	766	2490	75578
Una	60448	60448	12687	873	2118	78634
Total	439889	439889	216916	8426	32646	1027788

Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

Probable damage to buildings in earthquakes as per NDMA classification of damages of buildings in earthquakes (Table 2.17) was applied.

Table-2.17: Classification of Damage Grade

Grade of Damage	Description of Damage
Grade 1(D1)	Slight damage: fine cracks in plaster, fall of small pieces of plaster.
Grade 2 (D2)	Moderate damage: small cracks in plaster, fall off fairly large Pieces of plaster, pan tiles slip off, cracks in chimneys, parts of chimney fall down.
Grade 3 (D3)	Large and deep cracks in plaster: fall of chimneys.
Grade 4 (D4)	Gaps in walls: parts of buildings may collapse, separate parts of buildings may lose their cohesion; inner walls may collapse.
Grade 5 (D5)	Total collapse of the buildings.

Source: Classification of Damage Grade of Buildings in Earthquake, NDMA

The resultant estimation of probable loss of buildings in earthquake of 475-year return period (most commonly used earthquake level for estimating the maximum probable loss) was worked out as below:

Table-2.18: Probable Damage to Buildings in Earthquake of 475 Year Return Period

District	D1	D2	D3	D4	D5
Bilaspur	66%	0%	1%	19%	14%
Chamba	66%	0%	0%	29%	5%
Hamirpur	19%	27%	5%	41%	8%
Kangra	47%	7%	7%	36%	3%
Kinnaur	94%	3%	0%	3%	0%
Kullu	34%	6%	0%	17%	44%
Lahaul &Spiti	41%	0%	0%	57%	2%
Mandi	33%	12%	0%	11%	44%
Shimla	83%	6%	0%	12%	0%
Sirmaur	47%	1%	0%	52%	0%
Solan	85%	0%	0%	15%	0%
Una	81%	11%	0%	6%	2%

Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

In terms of building typology, the damage scenario for various types of buildings as estimated in the study is shown below:

Table-2.19: Probable Earthquake Damages as per Building Typology

Building Typology	D1	D2	D3	D4	D5
Brick Masonry	84%	13%	2%	1%	0%
Stone Masonry	47%	0%	0%	15%	37%
Rammed Earth	0%	5%	6%	88%	1%
RC Frame	64%	32%	5%	0%	0%
Hybrid & Others	44%	56%	0%	0%	0%

Source: Hazard Vulnerability Risk Analysis of Himachal Pradesh, TARU, 2016

Major conclusions drawn from the study of building vulnerability in Himachal Pradesh are:

- a) Stone masonry and rammed earth buildings are most vulnerable to earthquakes in Himachal Pradesh. These buildings can cause maximum loss of life in earthquake in the State.
- b) Constructions of brick masonry and RC frame structures have been on rise but the quality of construction is poor which resulted in increasing vulnerability.
- c) Increase of one level of earthquake intensity (from VIII to IX) will cause 30 percent increase in numbers of stone masonry buildings affected severely while with an increase of 2 to 3 levels, more brick masonry building will suffer severe damage.
- d) Educational institutes and health facilities constructed in last two decades are more vulnerable in comparison to old structures.
- e) Cowsheds were found most vulnerable due to absence of mud or mortar as binding material for wall constructions.
- f) Traditional construction practices like Dhajji Dewari and Kath Khunni have shown great capability to resist the lateral forces during strong earthquake also.

The policy implications of these findings for the State Plan on Disaster Management are quite obvious. All vulnerable buildings in different seismic zones in the State shall be identified and the owners/ occupiers of the buildings shall be made aware of the dangers inherent in the buildings in the event of earthquakes of various types. A massive campaign shall be launched to educate the people about the traditional earthquake resistant features in non-engineered buildings that should be adopted for new constructions and for retrofitting of existing constructions. Standards and specifications of all engineered buildings shall be strictly enforced. All critical public buildings shall be retrofitted in phases.

2.14 Exposures

Exposures of the vulnerabilities of physical, natural, social, financial and human capitals to the natural and human induced hazards create the risks of disasters. Low density of population of Himachal Pradesh keeps the level of human exposures relatively low, and therefore the risks of disaster mortalities are relatively low as compared to other parts of the country. However, such mortalities may be large if catastrophic disasters strike large areas, including urban areas. Exposure of built up assets such as houses and infrastructure are quite substantial as Himachal Pradesh has a wide spread network of such assets in various hazard zones throughout the State. Therefore, economic damage and loss in disasters in proportion to the State GDP would be quite high in every type of disaster, large and small.

2.15 Average Annual Loss

Systematic time series data on disaster damage and loss are not available in Himachal Pradesh, like in most States of India. Existing damage data typically includes aggregated data on disaster mortalities and injuries, and direct loss of assets like houses, infrastructure and agriculture, but it hardly takes into account the indirect loss or opportunity costs of disasters. Therefore, it is extremely important to calculate the impact of disasters on State GDP.

The Economics and Statistics Department of Government of Himachal Pradesh has recently released, for the first time ever, disaster damage and loss data for the 12 districts of the State during 2007-2015. The consolidated picture of disaster damage and loss, as emerges from this study is provided in Table 2.20.

Table-2.20: Disaster Damage and Loss in Himachal Pradesh (2007-2015)

Districts	Deaths	Minor injuries	Major injuries	Livestock lost (Numbers)	Agricultural crop lost (Tons)	Horticultural crop lost (Tons)	Cash crop lost (Tons)	Trees uprooted (Nos.)	Kachha houses damaged (Nos.)	Pacca houses damaged (Nos.)
Bilaspur	1016	420	1029	2842	184183	6985	75391	388400	3636	762
Chamba	1090	269	808	8506	4709	248138	2982	29197	3952	217
Hamirpur	662	518	449	2148	134427	8394	43088	67183	3643	618
Kangra	1951	2916	871	7620	55276	139194	44682	53819	7727	558
Kinnaur	1214	364	926	12928	1110	28616	1330	72168	6220	2116
Kullu	880	466	397	4733	107025	284147	116978	105858	3102	302
L&S	249	446	39	7050	3	77	360	12694	2442	1
Mandi	1918	2054	2669	5798	106028	98935	122887	180513	5730	882
Shimla	2181	1534	1170	4207	3335	723697	26567	35436	9739	961
Sirmour	1125	367	1031	3896	24198	4915	6961	8594	6180	317
Solan	898	70	734	1501	18293	6377	19334	30	5237	610
Una	238	85	129	459	105783	42008	6333	0	3362	1055
Total	13422	9509	10252	61688	744370	1591483	466893	953892	60970	8399
AAL	1677.8	1188.6	1281.5	7711	93046.3	198935.4	58361.6	119236.5	7621.3	1050

Source: Disaster Analysis: Loss, Rescue, Relief and Rehabilitation, 2016

This data is quite revealing for a number of reasons. First, even though the State did not face any major natural disaster during 2007-2015, it lost as many as 13,422 lives during these eight years. This works out to annual disaster mortalities of 1,677 lives, which is quite large for a small State like Himachal Pradesh. In the absence of data disaggregation on type of disaster or sex-wise and age-wise classification of victims, it is difficult to assess how hazards and vulnerabilities have contributed to these losses of lives. Number of housing stocks damaged during the period without any earthquake is also quite high. Almost 88 percent of the houses damaged were mud houses in rural areas, which show that economically poorer sections of the people suffered more in disasters. Third, nearly 8,000 livestock were lost every year, mostly grazing cattle in highland pastures, which shows the vulnerability of nomadic mountain communities to unfavourable weather conditions. Nearly 120,000 trees were uprooted/ burnt annually and these demonstrate the heavy environmental costs of disasters in this ecologically sensitive State. Average annual loss of agricultural and horticultural products is also quite high considering that agriculture is the mainstay of livelihood of nearly 69 percent of the rural population of the State.

The Statistical Handbook on Disaster Damage and Losses provides details of damages to infrastructure like roads and bridges, power supply installations, water and sewerage system, irrigation network, dams and reservoirs etc., but it does not quantify the damages in monetary terms. Similarly, losses of houses, agriculture and forest resources are not valued. Therefore, it is difficult to exactly quantify the share of average annual loss of disasters to the State GDP.

It is necessary to undertake detailed analysis of disaster damage and losses every year to assess the impact of disaster on macroeconomic situations. This will provide strong justifications for appropriate public investments for preventing and mitigating such losses.

2.15 Probable Maximum Loss

Average Annual Loss does not provide any indication about the Probable Maximum Loss (PML) that the State may suffer in the event of catastrophic disasters. There are real-time possibilities that such disasters may strike Himachal Pradesh. The last time the State suffered catastrophic disaster was on 4 April 1905 when a 7.9 magnitude earthquake in Kangra killed 19,800 people and devastated houses and infrastructure.

Seismologists have been warning that the average return period of such earthquake is over and an earthquake of similar or higher magnitude is overdue. Noted seismologist Roger Bilham of the University of Colorado has been categorical that “the current conditions might trigger at least four earthquakes greater than 8.0 in magnitude in the region of central to western Himalaya, and if delayed, the strain accumulated during the centuries would provoke more catastrophic mega earthquakes.”

This would be frightening as both population and houses have multiplied several times during the past, but standards and specifications of constructions have not improved much to make these resistant to earthquakes. Based on the Census 1991 data on demography and housing, Dr. Anand Swarup Arya, Professor Emeritus of IIT Roorkee, had estimated that not less than 90,000 human lives would be lost and 400,000 houses completely ravaged if an earthquake like the 1905 Kangra quake recurs. He had calculated that this would lead to direct economic loss of INR 51.04 billion. Damage and loss scenario today would be much more severe as the population has increased by nearly 40 percent during the past two and half decades with a corresponding increase in number of houses.

It is difficult to conjecture the PML in the event of such catastrophe, as the extent of human and material losses would depend on various factors such as magnitude and intensity of the earthquake, epicenter and depth of the rupture, location and time of the event etc. However, it can be anticipated that the impact of such catastrophic disaster would not remain confined to the district of Kangra alone; it would affect almost all the districts of the State and several districts of the neighboring States. It would most certainly severely damage lifeline structures like schools, hospitals, and administrative building besides damaging roads and bridges, hydel power stations and power distribution network and other critical infrastructures like water supply and irrigation systems, telecommunication networks etc. The damages of various types of infrastructure would have long term cascading impact on agriculture, industry, tourism and services sector, besides seriously damaging the gains made by the State in health, education and other social sectors.

It would be extremely difficult to prevent losses in the event of such catastrophic disaster as it would be impossible to retrofit every single house and public building to make these resistant to the shocks of high magnitude earthquake. Therefore, the strategic interventions for reducing loss of lives and livelihoods in such situations would include:

- a) Assessment of the vulnerability of lifeline structures and retrofitting of these structures selectively in a phased manner;
- b) Assessment of the vulnerability of all public infrastructure and taking appropriate structural and non structural measures to make these resilient to disasters in a phased manner;
- c) Strengthening risk governance at all levels to ensure that all future constructions in public or private sectors are compliant to the standards and specifications of disaster resistant constructions;
- d) Development of worst case scenarios of catastrophic disasters and proper contingency plan for disaster response and recovery involving all stakeholders; and
- e) Making regular tabletop exercises and drills to ensure that all concerned agencies remain in operational readiness to respond in such events.

Such worst-case scenarios should also be developed for based on the past history of disasters and probability

of recurrence of such disasters in the present context.

2.16 Action Plan on Risk Assessment

Himachal Pradesh is among the few States of India that have at hand a comprehensive analysis of hazards, vulnerabilities and risks of disasters in the State. This analysis is in a higher resolution on a digitized format based on GIS and is available online for the all the departments of the State Government, district administration, stakeholders and the general public. The State Disaster Management Plan has been prepared on the basis of risk assessment.

Risk assessment is a continuous process. Various scientific and technical agencies of the Government are engaged in assessment of hazards, vulnerabilities and risks of disasters. New observations, findings and assessments, particularly in the context of emerging disaster situations, are communicated to the State Governments.

There are some risks of disasters that are State specific, such as flash floods, GLOFs, cloudbursts, hailstorms etc. on which national level risk assessments do not provide much guidance.

Based on the available risk assessments Worst Case Scenarios (WCS) shall be developed for every major natural and human-induced disaster in the State. The task of development of these scenarios shall be coordinated by the Revenue (Disaster Management) Department in collaboration with Environment, Science and Technology Department and the Disaster Management Centre of HIPA. The WCS shall estimate the PML and the likely impact of disasters on human lives, livelihoods, houses and infrastructure. Based on the PML, Contingency Plans shall be developed to deal with such disasters. Revenue (Disaster Management) shall conduct at least one Mock Drill every year based on WCS.

In order that PML can be developed on a realistic basis, the Economics and Statistics Department shall develop a comprehensive database on disasters, showing the actual loss of lives, livelihoods, houses and infrastructure for each type of hazard, estimate the damage (direct costs) and loss (indirect opportunity costs) of such disasters and assess the impact of disasters on the State GDP. The database shall be disaggregated hazard-wise, district-wise, sector-wise, and age and sex-wise (for disaster mortalities and affected). The Economics and Statistics Department has made a good beginning with their publication on Disaster Analysis and Management (LR3). The methodology of the analysis shall be further broadened to develop the database as suggested above. This activity should be taken on a priority basis for compiling disaster data for the period 2005-2016; subsequently this shall be taken up annually. This baseline data shall be crucial for measuring progress achieved in reducing risks of disasters.

The action plan on risk assessment, agencies responsible for implementation and the time frame for implementation are provided in Table 2.21.

Table-2.21: Action Plan on Risk Assessment

	Action Point	Responsible Agencies	Time Frame
1.	Every department of the State Government shall assess the risks of the department and the sector on the basis of HRVA and accordingly draft the Departmental Disaster Management Plan.	Every Department of State Government	Updating & Continuing every year
2.	Every district shall assess the risks of the districts and sub-districts on the basis of HRVA and draft the respective District Disaster Management Plans accordingly.	DDMA	1 year
3.	New risk information as and when available from the authentic sources shall be communicated to the concerned department, agencies and district administration in a non-technical format for necessary follow action.	Revenue (Disaster Management) Department	As soon as it arises
4.	State Governments should coordinate with concerned scientific and technical agencies of Government of India and involve state level academic and scientific institutions for comprehensive assessment of state-specific risks of disasters such as GLOF, cloudbursts, hailstorm etc.	Revenue (Disaster Management) Department, Environment, Science & Technology Department	immediately
5.	Based on the available risk assessments WCS and PML in disasters shall be developed for every major natural and human-induced disaster in the State.	Revenue, Science & Technology Department, DMC of HIPA	Every Year
6.	Comprehensive database on disasters shall be developed for 2005-2016 and thereafter annually, showing disaggregated loss of lives, livelihoods, houses and infrastructure for each type of hazard, estimating the damage (direct costs) and loss (indirect opportunity costs) of such disasters, and assessing the impact of disasters on the State GDP.	Economics and Statistics Department	Annually



3.1 Introduction

Risks of disasters are created when vulnerable social, economic, environmental or physical conditions are exposed to the natural or human-induced hazards. Creation of new risks of disasters can be prevented ab initio by anticipating risks and avoiding programmes, activities and projects that can lead to creation of new risks or exacerbation of existing risks. Risks can also be prevented by systematic incorporation of measures that would effectively neutralise the creation of risks. Construction of dams or embankments that eliminate risks of flood in an area, land-use regulations that do not permit any settlement in high risk zones, or seismic engineering designs that ensure survival of a critical building or infrastructure in any likely earthquake are examples of measures for risk prevention.

Prevention measures can also be taken in or after a hazardous event or disaster to prevent secondary hazards or their consequences such as measures to prevent contamination of water supplies or measures to eliminate natural dams resulting from earthquake induced landslides and/or rock falls.

Risk mitigation measures are typically designed to reduce or limit the adverse impacts of already existing risks of disasters through various structural or non-structural measures or a combination of both. For example, risks of drought can be reduced through measures of water conservation and drought proofing. Risks of earthquake can be reduced by retrofitting lifeline structures in seismic zones. Risks of all type of disasters can be reduced with proper strategic action plans for risk reduction as well as development of capacities at all levels.

Disaster Management Act 2005 has defined mitigation as ‘measures aimed at reducing the risk, impact, or effects of a disaster or threatening disaster situation’, but the Act has not defined prevention even though the term recurs at several places in the Act. In fact, the terms ‘prevention’ and ‘mitigation’ have been used interchangeably as very often the complete prevention or avoidance of losses in hazardous situations may not be feasible and the task transforms to that of mitigation. Prevention or mitigation are essentially ex-ante measures for reducing risks of disasters that would save lives in the long run, livelihoods and assets of rural and urban communities within the region/State.

Cost Benefit Analysis of various risk prevention and mitigation measures have established that benefits of ex-ante measures for risk reduction far outweigh the costs of disasters and of ex-post response and rehabilitation. Yet prevention and mitigation have not received the kind of attention they should have, due to the initial challenges of setting up disaster management institutions and development of disaster management plans, guidelines and procedures at various levels. As most of these activities have been undertaken, the focus can be expected to shift towards risk prevention and mitigation. As the implementation of SDGs gains momentum, the targets related to disaster resilience in various development sectors would gain prominence. This is likely to provide fillip to mitigation activities across different sectors of development within the State.

3.2 State Policy on Risk Prevention and Mitigation

The State Policy on Disaster Management clearly highlighted the importance of disaster prevention and mitigation for managing the risks of disaster in the State:

Unlike man-made disasters, natural hazards like flash floods, earthquakes, and cloudbursts cannot be avoided. However, with mitigation measures along with proper planning of developmental work in

Unlike man-made disasters, natural hazards like flash floods, earthquakes, and cloudbursts cannot be avoided. However, with mitigation measures along with proper planning of developmental work in the risk prone area, these hazards can be prevented from turning into disasters if we take preventive and mitigation measures in advance. This requires changes in the current development model, practices and priorities. Since disaster is a development problem, prevention and mitigation needs to be built in this process only.

The State Policy laid down a multi-pronged approach for disaster prevention and mitigation:

- i) Incorporating elements of mitigation and risk reduction into all the development projects and programmes.
- ii) Initiating state level mitigation projects in accordance with the guidelines issued by the NDMA for various hazard in high priority areas with the help of Government Departments and Agencies.
- iii) Developing a culture of safety and safe practices in the state.
- iv) Integrating the element of DRR into the development plans, policies and projects.
- v) According high priority to projects contributing to vulnerability reduction of the area.
- vi) Indigenous knowledge on disaster and coping mechanisms adopted by various States and sections of society will be given due weightage.

3.3 State Plan on Prevention and Mitigation

State Disaster Management Plan 2012 prescribed hazard-specific mitigation plans for three main hazards: earthquake, landslide and drought, as follows:

3.3.1 Earthquake Mitigation

- i. Revision and adoption of model building bye-laws for construction both in urban and rural area
- ii. Wide dissemination of earthquake-resistant building codes, the National Building Code 2005, and other safety codes
- iii. Training of trainers in professional and technical institutions such as HIPA and NIT
- iv. Training professionals like engineers, architects, and masons in earthquake resistant construction
- v. Launching demonstration projects to disseminate earthquake-resistant techniques
- vi. Launching public awareness campaigns on seismic safety risk reduction and by sensitizing all stakeholders to earthquake mitigation measures
- vii. Establishing appropriate mechanisms for compliance review of all construction designs submitted to urban local bodies (ULBs)
- viii. Undertaking mandatory technical audits of structural designs of major projects by the competent authorities
- ix. Developing an inventory of the existing built environment
- x. Assessing the seismic risk and vulnerability of the existing built environment by carrying out structural safety audits of all critical lifeline structures
- xi. Developing seismic strengthening and retrofitting standards and guidelines for existing critical lifeline structures
- xii. Undertaking seismic strengthening and retrofitting of critical lifeline structures, initially as pilot projects

- and then extending the exercise to the other structures
- xiii. Preparation of disaster management (DM) plans by schools, hospitals, public buildings visited by large number of people etc., and carrying out mock drills for enhancing preparedness
 - xiv. Strengthening the Emergency Operation Centre(EOC) network and flow of information
 - xv. Streamlining the mobilization of communities, civil society partners, the corporate sector and other stakeholders
 - xvi. Preparing community and village level DM plans, with specific reference to management of earthquakes
 - xvii. Carrying out the vulnerability assessment of earthquake-prone areas and creating an inventory of resources for effective response
 - xviii. Introducing earthquake safety education in schools, colleges and universities and conducting mock drills in these institutions
 - xix. Strengthening earthquake safety research and development in professional technical institutions
 - xx. Preparing documentation on lessons learnt from previous earthquakes and their wide dissemination
 - xxi. Developing an appropriate mechanism for licensing and certification of professionals in earthquake resistant construction techniques by collaborating with professional bodies
 - xxii. Developing appropriate risk transfer instruments by collaborating with insurance companies and financial institutions
 - xxiii. Making operational the local companies of Home Guards and Police for disaster response
 - xxiv. Strengthening the medical preparedness for effective earthquake response, etc.
 - xxv. Enforcement and monitoring of compliance of earthquake-resistant building codes, town planning bye laws and other safety regulations

3.3.2 Land Slide Mitigation

- i. Revision of town planning bye-laws and adoption of model land use bye-laws in the State
- ii. Wide dissemination of model land use practices in hilly areas
- iii. Training of trainers in professional and technical institutions
- iv. Training of professionals like engineers and geologists for landslide mapping, investigation techniques, analysis, and observational practices
- v. Launching public awareness campaigns on landslide hazard and risk reduction, and sensitizing all stakeholders on landslide hazard mitigation
- vi. Establishing appropriate mechanisms for compliance reviews of all land use bye-laws
- vii. Preparing an inventory of existing landslides, active or inactive, in the State
- viii. Developing an inventory of the existing built environment in areas around existing landslides and in high hazard zones as per the LHZ maps and along strategic roads
- ix. Assessing the status of risk and vulnerability of the existing built environment
- x. Preparation of DM plans by educational and health institutes/organizations, government offices, etc., and carrying out mock drills for enhancing preparedness in vulnerable areas
- xi. Strengthening the EOC and communication network
- xii. Streamlining the mobilization of communities, government agencies, the corporate sector, and other stakeholders
- xiii. Preparing community and village level DM plans, with specific reference to the management of landslides

3.3.3 Drought Mitigation

- i. A Drought Management Cell (DMC) will be established in the Agriculture Department.
- ii. Drought management plan for the entire season will be prepared by the Agriculture Department well in advance in the month of May, based on the long season forecast issued by the India Meteorological Department (IMD) in April and also the previous season's rainfall.
- iii. Drought management plans will be prepared block wise.

- iv. As the season progresses from June onwards, the DMC will review the plans prepared earlier at the onset of the monsoon and revise the strategy if required.
- v. Weekly monitoring of the season and crop condition will be undertaken from June onwards till the end of the season and necessary mid-season corrections will be made, as and when required.
- vi. Agriculture Department will make use of remote sensing and GIS technology while providing the inputs to the State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA).
- vii. A database will be created and updated regularly on weather, crop conditions, input supply, credit, insurance and market information, fodder supply etc. in order to assist the DDMA for drought declaration and management.
- viii. Awareness will be generated among the farmers on drought regulations and enforcement.
- ix. The techniques of rainwater harvesting technology will be popularized on priority.

3.4 Prevention and Mitigation in National Plan

The National Disaster Management Plan 2016 has laid considerable emphasis on disaster prevention and mitigation. Chapter 3 of the Plan on Reducing Risk, Enhancing Resilience provides a comprehensive plan of action on disaster risk mitigation of 11 natural and manmade hazards, of which the following seven hazards are relevant for Himachal Pradesh:

- 1) Floods
- 2) Earthquake
- 3) Landslides and Snow Avalanches
- 4) Drought
- 5) Cold Wave and Frost
- 6) Chemical (Industrial) Disasters
- 7) Fires

For each hazard, the National Plan incorporates the four priorities enunciated in the Sendai Framework under the following five thematic areas for action:

- i) Understanding Risks
- ii) Inter-Agency Coordination
- iii) Investing in DRR – Structural Measures
- iv) Investing in DRR – Non-Structural Measures
- v) Capacity Development

For understanding disaster risk, the major themes for action are: a) Observation Networks, Information Systems, Research, Forecasting; b) Zoning / Mapping; c) Monitoring and Warning Systems; d) Hazard Risk and Vulnerability Assessment (HRVA); and e) Dissemination of Warnings, Data, and Information.

Inter-agency coordination is a key component of strengthening the disaster risk governance - Priority-2 of the Sendai Framework. The major themes for action required for improving the top-level interagency coordination are: a) Overall disaster governance; b) Response; c) Providing warnings, information, and data; and d) Non-structural measures.

Undertaking structural and non-structural measures form the core of disaster prevention and mitigation. The structural measures mainly consist of various physical infrastructure and facilities required to help communities cope with disasters. The non-structural measures comprise laws, norms, rules, guidelines, and techno-legal

regime that empowers the authorities to mainstream DRR and disaster resilience into development activities.

Capacity to implement, enforce, and monitor various disaster mitigation measures is central for all thematic areas. Capacity development includes training programs, curriculum development, large-scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises.

The National Plan has prescribed a responsibility matrix for each of the five thematic areas for action for each of the 11 natural and manmade hazards. These matrices, to the extent that these are relevant for the State of Himachal Pradesh, are provided in Annexure-II.

Based on the findings of the HVRA, guidelines of the State Policy on Disaster Management, review of the progress made in the implementation of the State Disaster Management Plan 2012, and the prescriptions of National Disaster Management Plan, the State Action Plan on Prevention and Mitigation is drawn up for implementation by all concerned departments and agencies of the State Government, district administration and other stakeholders.

The Action Plan is formulated for the following natural and manmade hazards of Himachal Pradesh:

- a) Earthquake
- b) Landslide
- c) Floods
- d) Drought
- e) Industrial (Chemical)
- f) Fire

Keeping in conformity with the Disaster Management Act, the State Policy and National Plan, the term 'mitigation' has been used in a generic sense to include both prevention and mitigation. The Action Plan on each hazard has two components: structural and non-structural mitigation. Unlike in the National Plan, the issues regarding 'understanding risks', 'inter-agency coordination' and 'capacity development' are not included in the Action Plan on Prevention and Mitigation, as these are discussed in relevant chapters. Similarly, unlike in State Plan 2012, issues regarding disaster preparedness, such as early warning or disaster response such as search and rescue, are not included in mitigation as there are exclusive chapters on disaster preparedness and disaster response.

3.5 Action Plan on Earthquake Risk Mitigation

The entire State of Himachal Pradesh is prone to earthquake and most parts of the State are prone to very severe earthquake. Earthquake may not happen regularly, but once earthquake strikes it would cause widespread destruction of lives, houses and infrastructure over a wide range of areas. A major earthquake in the State which is highly probable would most certainly provide a very big jolt to the economy of the State and it may take years before the State is able to recover completely. It is not possible to prevent earthquakes, but it is possible to mitigate the risks of earthquakes through sustained structural and non-structural measures. Such measures may not provide immediate economic gains to the State, but it can provide long term benefits to the society and economy by reducing the losses from future catastrophic earthquakes.

A. Structural Measures

Structural measures for earthquake risk mitigation mean seismic strengthening of all existing and future constructions of houses, buildings and infrastructure in seismic zones as per the standards and specifications laid down by the competent authorities. This involves two tasks:

- a) Ensuring that all new structures conform to earthquake resistant standards and specifications; and
- b) Ensuring that all existing structures are retrofitted to withstand the shocks of disasters.

If these two tasks are accomplished, earthquakes would not cause much damage to buildings and structures and loss of lives and economy can be prevented to a large extent. But these tasks are not easy by any means and even the most developed countries have not been able to prevent damages due to earthquakes altogether.

a) Earthquake resistant new constructions

The first task of ensuring that constructions of all new structures conform to earthquake resistant standards and specifications is relatively easier to accomplish at least for the constructions undertaken in the public sector. The Public Works Department is the main construction agency in the public sector, but there are many other departments and agencies of the Government that are engaged in construction works of various types, such as Department of Energy, Electricity Department, Irrigation & Public Health Department, Urban Development Department, Rural Development Department etc. All these Departments must ensure that constructions undertaken by the departments and agencies under their control strictly comply with the standards and specification prescribed by the Bureau of Indian Standards and further included in the National Building Code for earthquake resistant constructions. Wherever necessary the standards may be adapted according to the specific context of the State with the approval of competent technical authorities. The standards shall be followed in all respects – layout, architectural plans, structural designs and actual constructions on ground.

Some of the constructions undertaken by the Rural Development Department such as village roads, water conservation structures, earthen embankments etc. may be undertaken for providing wage employment. These may not comply with standards of engineered constructions. However, in all such cases the exemptions shall be specifically laid down by the concerned agencies with the approval of competent technical authority.

Such exemptions shall not be applicable for structures that are vital for the safety of human lives, such as school buildings, dispensaries, community halls, panchayat ghars etc. All such constructions must necessarily comply with earthquake resistant standards and specifications, even if these involve higher costs than provided in central or centrally sponsored schemes and programmes. Additional funds required for earthquake resistant features must be provided in the budgets of the respective departments.

Constructions undertaken with assistance or subsidies from government, such as Social Housing Schemes of Indira Awas Yojana etc. must also have earthquake resistant features built into the standard designs and specifications. The additional costs involved can either be subsidized or met out of beneficiary contributions.

Constructions undertaken in the private sector would be much more difficult to monitor and control. The agencies of urban and rural local bodies, such as municipalities and panchayats, have the authority to regulate such constructions through mechanisms such as building permissions, completion certificates etc. These mechanisms shall be used effectively to ensure that all new constructions are undertaken as per earthquake resistant standards and specifications.

Many private constructions in rural areas such as kachha houses, cowsheds etc. are non-engineered and are constructed as per traditional wisdom without any approved standards and specifications. Most of such constructions have collapsed in major earthquakes, while some of these structures have survived. The Environment, Science & Technology Department should commission a study to examine traditional designs of non-engineered constructions and suggest measures for seismic strengthening of such constructions. These measures can be pilot tested before being disseminated through training, publicity and other measures.

b) Seismic retrofitting of existing structures

Seismic retrofitting of all existing structures, even in the public sector, is not practically feasible. Therefore, the approach should be to selectively retrofit lifeline structures and buildings on the basis of priorities to be fixed by the Government.

The lifeline buildings include hospitals, administrative headquarters of State, Divisional and District administration, EOCs etc. that would be critical for disaster management. The lifeline buildings further include other public buildings like schools, colleges, community halls etc., the collapse of which may entail loss of large number of human lives. The seismic safety of all these buildings must be assessed in a time-bound manner to determine the types of retrofitting required for seismic strengthening of the buildings. While major buildings that do not follow any standard type, design must be assessed comprehensively, schools and other buildings that follow type design may be assessed through the Rapid Visual Screening technique. The concerned departments may engage expert civil/ structural engineers from reputed engineering colleges of the State or outside for conducting such assessment. A time-bound schedule may be developed for the purpose of seismic screening of all lifeline structures and buildings.

The next stage in the process would be the selective retrofitting of lifeline structures and buildings. Retrofitting is an extremely difficult task especially when the structures are already in use. In situ retrofitting of serving buildings requires deployment of advanced techniques of construction management. Keeping in mind the importance of the building, existing pattern of use of the building and availability of alternate work space during constructions, the State Government may develop an action plan on retrofitting, identifying the buildings to be retrofitted, selecting the cost-effective method, fixing a timeline and providing resources for the same.

Critical lifeline infrastructure like roads and bridges, dams and power houses, transmission towers and water supply lines must be retrofitted at any cost. Retrofitting of such structures, if not done already, must be part of the maintenance of the infrastructures.

B. Non-Structural Measures

Buildings and structures, particularly lifeline structures have many non-structural elements like false ceilings, air-conditioning ducts, pipelines for utilities like electricity, water, gas etc. which, if not properly fixed, would be the first to collapse due to ground motion during earthquakes. Sometimes decorative elements and furnishing items, if not fixed properly with the main structures, may collapse even during minor earthquakes. Many a times a structurally safe building may cause deaths or injuries due to collapse of these non-structural elements of the buildings. It is, therefore, extremely important that all these non-structural elements of the buildings are properly designed, constructed and aligned with the main structures. Technical guidelines for fixing these elements are provided in National Building Codes and other codes. These should be strictly complied with in all public buildings, especially in lifeline buildings.

Non-structural measures for earthquake risk mitigation further include formulation and notification of codes, rules, regulations, bye-laws for town planning, civil works and public infrastructure. Many of these codes, rules and regulations are developed by agencies of Government of India like Bureau of Indian Standards, Town and Country Planning Organisation etc. but these must be adopted by the States through appropriate amendments of state town planning and building regulations. The Urban Development Department may undertake comprehensive review of all relevant State legislations, rules and regulations and introduce necessary changes as required.

Non-structural measures for earthquake risk mitigation also include capacity building of engineers, architects and masons. This further involves dissemination of the guidelines in simple Dos and Don'ts for disseminating information and increasing the knowledge and awareness level of the general public.

The National Plan has prescribed that engineers should be licensed through appropriate legal framework and institutional mechanism for seismic designing and retrofitting of buildings.

3.6 Action Plan on Flood Risk Mitigation

Himachal Pradesh faces three types of flood – riverine floods, flash floods and GLOFs. The risks of disasters of all these three types of flood can be mitigated through various structural and non-structural measures.

A. Structural Measures

The structural measures for riverine flood typically include construction and maintenance of river embankments and levees, pre-and post-monsoon inspections of dams and reservoirs, desilting or dredging of rivers to improve flows, improvement of drainage systems in towns, floodwater diversion through existing or new channels, removal of encroachment into the waterways and natural drainage systems etc. Not all these structural measures are equally relevant and effective for Himachal Pradesh, where, except in few areas of the foothills, riverine floods do not cause major inundations of human settlements. Each vulnerable area has to be identified and protected with proper embankments and existing embankments maintained through proper inspections and monitoring. Regular inspections of dams and reservoirs are also important for protection of vital installations and downstream settlements.

The structural measures for flash floods are more difficult as such floods are contingent on heavy rains, cloudbursts or glacial melts in upstream locations that are not always easy to predict. Such floods can also take place even in small stream and rivulets and it is not always feasible to protect every area with structural measures. Therefore, the strategic approach for structural mitigation of flash floods should be to identify the vulnerable human settlements, vital installations or religious places that are susceptible to flash floods. The structural measures for flash floods include construction and maintenance protection bunds and retaining walls in appropriate place. Often flash floods with high velocity damages roads, bridges or culverts disrupting communication systems. Such areas should be identified and the bridges and culverts strengthened to withstand the on slaughts of such floods.

Responsibilities for structural measures to mitigate the risks of flash flood would lie with three main agencies. First, responsibility for protection of vital installations would be vested with the agencies owning these installations. Second, responsibilities for structural measures to protect roads and bridges would lie with the Public Works Department. Third, protection of human settlements in rural and urban areas would be the responsibility of the respective local authorities. All these agencies shall assess the risks, prioritize the works and implement them in a phased manner according to the availability of resources.

Structural measures for mitigating the risks of GLOFs would be the same as flash floods as the downstream settlements and infrastructure have to be protected through bunds and other protection works. Volume of waters and stones descending on downstream locations during GLOFs would in all likelihood be much more severe than flash floods. These can be worked out on the basis of risk modelling of GLOFs in identified locations and accordingly appropriate cost effective structural measures can be designed. The Environment, Science & Technology Department, in collaboration with concerned scientific and technical agencies of the Government of India may conduct such exercise before deciding strategic interventions for mitigating the risks of GLOFs.

B. Non-Structural Measures

The non-structural measures for mitigating the risks of floods include preparation, updating and implementation of flood management plans of vulnerable towns of the State, and enforcement of laws, rules, regulations, guidelines, manuals and standard operating procedures for flood management. Implementation of watershed

management including catchment area treatment and afforestation programmes can also mitigate the risks of flood significantly. Early warning of floods can also significantly reduce loss of lives by timely evacuation of people from the probable submergence areas.

3.7 Action Plan on Landslide Risk Mitigation

Roads, vital installations and human settlements in vulnerable areas are most at risk due to landslides. Based on HRVA and incidents of past events of landslides, these vulnerable zones are well identified. Most of the critical landslide spots are near the National Highways that are maintained by the Government of India. The State Government is responsible for protecting the State Highways and district roads besides infrastructure projects like power stations, water treatment plants etc. from the threats of landslides. Like earthquake and floods, the risks of landslides can be mitigated through a combination of structural and non-structural measures.

A. Structural Measures

The structural measures for landslide risk mitigation include various techniques for stabilizing the slopes that are sliding. Such techniques can be:

- a) Geometric, in which the geometry of the hillside is changed by cutting the slopes in terraces;
- b) Hydrological, in which the moisture content of the slope is reduced through drainage;
- c) Mechanical, in which shear strength of the rock is reinforced through metallic nails and cement grouting;
or
- d) Chemical, in which synthetic materials are used for slope stabilization.

The type of techniques or combinations of techniques to be applied for landslide risk mitigation would depend on factors like site conditions, frequency of slides, value of assets to be protected, cost-benefit ratio of protection measures etc.

It is not possible to mitigate all the risks of landslides; however, based on the analysis of risks, a list of priority mitigation projects can be drawn up by the Public Works Department, Department of Energy, and Irrigation & Public Health Department to protect the roads, buildings and other vital installations from the recurring incidents of landslides. Detailed Project Reports may be prepared using the most cost-effective techniques to mitigate the risks of landslides. The benefits of such investments should outweigh the costs of recurring landslides and the damage such slides cause to the economy by way of loss of lives and assets, disruption of communication etc. The concerned department shall provide budgetary allocations for implementing the projects in a phased manner.

B. Non-Structural Measures

The non-structural measures for landslide risk mitigation include plantation of trees and shrubs for slope stabilization, land use planning and regulations to discourage constructions on dangerous hill slopes, early warning systems for landslide prediction and measures to pool and transfer the risks of landslides through insurance etc. Plantation measures are usually undertaken alongside structural measures for slope stabilization. The task of plantation in defined areas may be entrusted to the Forest Department. Land use planning and regulations should be developed by the Town & Country Planning Department. The early warning of landslides and risk transfer and insurance are discussed separately in this Plan.

3.8 Action Plan on Drought Risk Mitigation

Variations in temperature and precipitation make parts of Himachal Pradesh susceptible to the risks of drought. The districts of Bilaspur, Kangra, Mandi, Sirmaur and Una and are identified as drought prone districts while parts of Lahaul & Spiti district are cold desert areas. Climate change is likely to aggravate the risks of drought in the State. The risks can be mitigated by various structural and non-structural measures.

A. Structural Measures

Risks of drought have three main aspects: meteorological, hydrological and agricultural. Drought starts as a meteorological phenomenon due to scarcity of rainfall which is a natural phenomenon. Impact of inadequate rainfall on hydrology can be mitigated by water storage and conservation measures, while the adverse impact on agriculture can be reduced by improved agronomic practices. The structural measures for drought mitigation are essentially related to augmenting water resources through building storage and conservation measures. Some of these structural measures include building:

- a) Reservoirs and other water harvesting and storage structures;
- b) Community based micro irrigation channels;
- c) Check dams to arrest run offs from streams and drainage channels;
- d) Rain Harvesting structure; and
- e) Groundwater recharge augmentation system in lower Shivalik regions.

B. Non-Structural Measures

The non-structural measures for drought risk mitigation include better planning, coordination, monitoring and drought proofing of agriculture to reduce the impact of drought on agriculture and horticulture. As prescribed in the State Disaster Management Plan 2012, the Drought Management Cell in Agriculture Department should be activated and further strengthened during the onset of droughts. Drought management plan for the entire season shall be prepared by the Agriculture Department well in advance, based on the long season forecast issued by IMD in April and also the previous season's rain fall. Block-wise drought management plans shall be prepared. Weekly monitoring of the season and crop condition shall be conducted from June onwards till the end of the season and necessary mid-season corrections shall be made as and when required. A sound database shall be created and updated regularly on weather, crop conditions, input supply, credit, insurance and market information, fodder supply etc. in order to assist the DDMA for drought declaration and management. Need-based agricultural inputs like drought resistant seeds, fertilisers and credits should be provided. Agricultural extension services shall be strengthened to facilitate the farmers to take full benefits of crop insurance scheme. Benefits of National Rural Employment Programmes shall be extended to agricultural labourers and other rural poor to enable them to earn their livelihood during drought seasons. Drinking water sources shall be augmented, wherever necessary, through tanker services and essential supplies shall be made available through fair price shops. Fodder banks shall be established to meet the shortage of fodder for cattle. Awareness will be brought among the farmers on drought regulations and enforcement.

3.9 Action Plan on Mitigation of Chemical (Industrial) Risks

Industrial hazards have three aspects: industrial pollution, minor industrial accidents and major industrial accidents. The legal and institutional mechanisms for dealing with industrial effluents that pollute water, air and soil are provided in the Environment Protection Act 1986 enacted in the aftermath of the Bhopal gas tragedy of 1984. Minor accidents in industries are taken care of in the Factories Act and other related legislations. Major accidents in industries using hazardous chemical materials create disasters affecting the workers within the

plants and the communities outside. In order to prevent and mitigate the occurrence of such disasters, the Ministry of Environment & Forests notified the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989, which provide stringent regulations for manufacturing, storage and transportation of hazardous chemicals, including oil, petroleum and natural gas. Industries manufacturing and storing hazardous chemicals that may cause major accident hazard(MAH) are required to prepare both on-site and off-site management plans for preventing and mitigating disasters. On-site management plan includes appropriate structural and non-structural measures for on-site safety and protection of workers. These measures are required to be taken by the industrial units and the State Government and district administration has the responsibility to ensure that these mandatory requirements are complied with. The off-site management plan has to be prepared in consultation with the administration so that all the probable impacts of disasters are fully factored for mitigating the harmful effects on the communities living in the vicinity of the hazardous industries.

Himachal Pradesh has eight MAH industries besides critical facilities of the oil companies. The State Pollution Control Department, Environment, Science & Technology Department and the district administration has the responsibility to ensure that the provisions of Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 are fully complied with by the concerned industrial units and oil companies in the State.

The Ministry of Environment, Forests & Climate Change of Government of India has issued a Red Book on Chemical Hazard Alert System 2016 which provides for constitution of Central, State, District and Local Level Crisis Groups for management of industrial (chemical) disasters. Activation of these groups can also be an important measure toward non-structural mitigation of industrial disasters in the State.

3.10 Action Plan on Fire Risk Mitigation

Himachal Pradesh, like most of the States in India, faces three types of fire: forest fires, rural fires and urban fires. All three types of fire are human-induced, although prolonged spell of dry weather with high temperature during summer months create conditions for forest fires. Forest fires and rural fires can be prevented and mitigated with better education, awareness and enforcement which are essentially non-structural measures. Forest areas prone to fires can be mapped and communities living close to fire prone areas can be targeted for special awareness programmes regarding Dos and Don'ts for fire prevention. Strict enforcement of rules and regulations on forest protection can also prevent recurrence of practices like burning of dead wood or forest floors for better growth of minor forest products like herbs and shrubs. Structural measures for mitigation of forest and rural fires include adequate firefighting equipment's and vehicles including deployment of helicopters and air-tankers for fighting fire in remote strategic locations.

Urban fires can be prevented to a large extent by better building regulations and enforcement. Every public building and every high-rise building must be designed, constructed and maintained in such a manner that do not create conditions for fires to break out, such as through electrical short-circuits or use of excessive combustible materials like wood and pulp. Such buildings must have provisions for firefighting built into the design, such as conduits for hose pipes, emergency exit staircase etc. Other structural measures for urban fire risk mitigation include advanced fighting equipment's, such as fire extinguishers, aerial ladders, compressed air foam system, hydraulic spreader, thermal infrared camera etc.

Most of the cities have downtown and heritage areas with narrow lanes and alleys that do not provide enough space for fire fighting vehicles to negotiate. Evacuating affected people from or carrying fire hose pipes to such locations is a nightmare for fire fighters. Such areas should be properly mapped with detailed contingency plans for cordoning off the area, identifying parking areas, locating water supply points etc. Strengthening and standardizing response mechanisms, regular inspection of public buildings, training of fire fighters and mock

mock drills are effective non-structural measures for fire risk mitigation.

3.11 Action Points on Risk Prevention and Mitigation

The action points for risk prevention and mitigation, the agencies responsible for implementation of the action points and the stipulated time frame are given in Table 3.1.

Table-3.1: Action Points on Risk Prevention and Mitigation

	Action Point	Responsible Agencies	Time Frame
1.	All constructions undertaken by the departments and agencies of the Government shall strictly comply with the standards and specification prescribed for earthquake resistant constructions.	Concerned Departments	Immediate
2.	The Panchayati Raj department may undertake Amendments in Himachal Pradesh Panchayati Raj Act,1994 to construct earthquake resistant infrastructure under various Rural Development Schemes.	Rural Development Department	Immediate
3.	Constructions undertaken with assistance or subsidies from government, such as Social Housing Schemes must have earthquake resistant features built into the standard designs and specifications. Additional costs involved can either be subsidized or met out of beneficiary contributions.	Rural/ Urban Development Department	Immediate
4.	Urban and rural local bodies shall ensure that building permissions for new constructions are given only for earthquake resistant building plans and designs.	Rural/ Urban Development Department	immediately
5.	Science & Technology Department shall commission a study to examine traditional designs of non-engineered constructions and suggest measures for seismic strengthening of such constructions. These may pilot tested and disseminated through training, publicity and other measures.	Science & Technology Department	On Regular Basis
6.	Seismic safety of all lifeline buildings shall be assessed in a time-bound manner to determine the types of retrofitting required for seismic strengthening of the buildings.	Public Works/ Rural/ Urban Development Departments	1 years

	Action Point	Responsible Agencies	Time Frame
7.	State Government shall develop an action plan on retrofitting of lifeline buildings, identifying the buildings to be retrofitted, selecting the cost-effective method, fixing time line and providing resources for the same.	Public Works/ Revenue (DM) Department	2-3 years
8.	Critical lifeline infrastructure like roads and bridges, dams and power houses, transmission towers and water supply lines must be retrofitted at any cost. Retrofitting of such structures, if not done already, must be part of the maintenance of the infrastructures.	Concerned Departments	2 years
9.	Urban Development Department shall undertake comprehensive review of all relevant State legislations, rules and regulations, such as building bye laws, zoning regulations etc. from the point view of earthquake safety (both structural and non-structural) and initiate necessary amendments within a time frame.	Urban Development Department	2 years
10.	All civil engineers and architects working with the State Government shall be trained on earthquake resistant construction plans and designs in a phased manner.	Public Works Department	3 years
11.	Dams, reservoirs, embankments, bridges, culverts, retaining walls etc. shall be strengthened and maintained to withstand the on slaughts of riverine and flash floods.	Public Works, Irrigation & PHE, Power Department	Continuous
12.	A list of priority landslide risk mitigation projects shall be drawn up by the concerned departments to protect roads, buildings and other vital installations from recurring incidents of landslides	Public Works, Power, Irrigation & Public Health Department	2 years
13.	Landslide risk mitigation projects shall be implemented in a phased manner through a new scheme on Landslide Risk Mitigation.	Public Works, Power, Irrigation & Public Health Department	10 years
14.	Drought Management Cell in Agriculture Department shall be activated and further strengthened during the onset of droughts.	Agriculture Department	1 year

	Action Point	Responsible Agencies	Time Frame
15.	Drought management plan shall be prepared block wise on the onset of every drought season	Agriculture Department	Drought season
16.	On-site and Off-site DM Plans shall be prepared and implemented for each identified MAH industry in the State.	State PCB, District administration	1 year
17.	State, District and Local Level Crisis Groups will be constituted and activated for management of industrial (chemical) disasters.	State PCB, District administration	6 months
18.	Forest areas prone to fires shall be mapped and communities living close to fire prone areas should be sensitized and made aware of measures for prevention of forest fires.	Forest Department	2 years
19.	Every public and high rise building shall be designed, constructed and maintained in a manner that in-built provisions are made for fire prevention and protection.	Public Works, Fire Services Urban Development Department	Continuous
20.	The ongoing process of modernization of Fire and Emergency Services shall be completed with provision of equipment's to fight urban fires.	Fire and Emergency Services Department	2 years



4.1 Introduction

Mainstreaming DRR into development means looking critically at each programme, activity and project of every development not only from the perspective of reducing the existing risk of disaster, but also to minimize its potential contribution to creation of new risks of disasters. Therefore, mainstreaming has the dual purpose of ensuring that:

- a) Development is protected from existing and future disaster risks; and
- b) Development does not create any new risks of disasters or exacerbates existing risks of disasters.

The Disaster Management Act has mandated the State Government and its departments and agencies to integrate disaster risk management in development plans and programmes. Section 23(4)(c) provides that the State Disaster Management Plan shall lay down the process of integration of disaster risk mitigation with the development plans and projects of the State. Section 39(c) of the Act stipulates that it shall be the responsibility of every department of the State Government to integrate into its development plans and projects the measures for disaster prevention and mitigation. Section 40(1)(a)(ii) further stipulates that every department of the State Government shall prepare its disaster management plan which shall lay down strategies for the prevention of disaster or the mitigation of its effects or both with the development plans and programmes of the department.

4.2 Mainstreaming in State Policy

The State Policy on Disaster Management has highlighted the importance of mainstreaming disaster reduction for sustainable development in the following words:

The DRR issues would be mainstreamed in development plans, programmes and policies at all level by all the departments, organisations and agencies. It would be ensured that all the development programmes and projects that originate from or funded by Government are designated with evident consideration for potential disaster risks to resist hazard impact. That all the development programmes and projects that originate from or are funded by Government do not inadvertently increase vulnerability to disaster in all sectors: social, physical, economic and environment. It would also be ensured that all the disaster relief and rehabilitation programmes and projects that originate or are funded by Government are designed to contribute to development aims and to reduce future disaster risk.

4.3 Mainstreaming DRR in development programmes

Development plans and programmes of the State Government are either in the central sector or centrally sponsored programmes that are funded partly or fully by the Government of India or these are state sector schemes funded by the State Government from its own resources. The State Disaster Management Plan 2012 had suggested possible entry points for mainstreaming DRR in seven centrally sponsored flagship programmes for development. Some of these programmes have been redesigned and replaced by new flagship programmes. Each of these programmes provides tremendous opportunities for mainstreaming DRR in development. Each department of the State Government shall identify possible entry points in the centrally sponsored programmes for reducing risks of disasters in relevant sectors. These should be incorporated in the Departmental Disaster

Table-4.1: Possible Entry Points for Mainstreaming Disaster Risk Reduction in Central/Centrally Sponsored Flagship Programmes

	Flagship Programme	Department/ Sector	Possible entry points for mainstreaming disaster risk reduction in the programme	
1.	Pradhan Mantri Gramin Awas Yojana (PMGAY)	Rural Development Department	i.	Inclusion of measures like selection of hazard safe zones for construction and application of hazard resistant designs in construction of PMGAY houses
			ii.	Development of model design for hazard resistant houses which could be referred to by DRDAs at district level and used for community awareness depending on the geographical location
			iii.	Capacity building of rural masons on safe construction
			iv.	Capacity building of Panchayati Raj Institutions (PRIs)
			v.	Community awareness
			vi.	Capacity Building Programmes for DRDA officials on DRR issues
2.	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	Rural Development Department	i.	Utilization of MGNREGS funds to mitigate the risks of natural hazards such as landslide, drought, forest fire, cloud burst, flash floods, earthquake etc.
			ii.	Giving priority to works which reduce the vulnerability of area over those which enhance the vulnerability of the area to natural hazards
			iii.	Identification of a shelf of projects which take into account the hazard profile and offer continuous employment opportunities in the event of disasters to ensure livelihood security in the event of disasters

	Flagship Programme	Department/ Sector	Possible entry points for mainstreaming disaster risk reduction in the programme
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iv. Works which reduce disaster risk are given priority in plans-such as local mitigation works etc.

v. Any other location specific measures for DRR within the ambit of the scheme

3.	Pradhan Mantri Gram Sadak Yojana	Public Works Department	i. The Master Plan for rural roads, the district rural road plan and identification of core network under the planning process of this scheme should explicitly address the DRR concerns and accord priority to connect the vulnerable habitations. ii. The technical guidelines should explicitly provide for suitable protection and inclusion of disaster risk concerns such as provisions of cross drainage, slope stabilization, protection works etc. Similarly, guidelines for DRR should include location specific measures such as flash floods, landslides etc. iii. The department will ensure all weather connectivity and restoration during disasters.
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i. Introducing school safety as a part of the guidelines of SSA

ii. Developing models of structurally safe designs for schools in different hazard locations

iii. Introducing School Safety in the Teacher's Training Curriculum

iv. Training of Rural Engineers appointed under SSA Scheme as well as the SSA State Coordinators

v. Training of masons in rural areas

4. Sarva Shiksha Abhiyan (SSA)

Education Department

	Flagship Programme	Department/ Sector	Possible entry points for mainstreaming disaster risk reduction in the programme
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vi. Construction of Technology Demonstration Units

vii. Community Awareness

5.	Smart Cities Mission & Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	Urban Development Department	i. Inclusion of DRR measures at the stage of preparation of detail project report and appraisal of DPR to ensure that infrastructures developed are structurally safe and resilient to the hazards of nature ii. Emphasis on disaster risk audit at every stage of construction iii. Amendment of building byelaws to ensure that structural safety is a mandatory reform in the Mission cities to ensure safe habitat development (both structural and fire safety) iv. Inclusion of disaster management as a function of the ULBs and allocation of resources for the same v. Inclusion of disaster resistant features in the buildings and other infrastructures constructed under the programme vi. Inclusion of strategies for disaster management in the City Development Plans vii. Training and Capacity Building Programmes for municipal officers on DRR
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6.	Pradhan Mantri Awas Yojana	Urban Development Department	i. Ensure that village and district health plans explicitly address DRR concerns in the vulnerable habitations that are prone to disasters like flood, drought, landslides etc.
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	Flagship Programme	Department/ Sector		Possible entry points for mainstreaming disaster risk reduction in the programme
			ii.	Provide training to the Accredited Social Health Activist (ASHA) workers on disaster health preparedness and response
			iii.	Strengthening of Disease Health Surveillance System in rural areas
			iv.	Ensure structural and non-structural safety of the Community Health Centre (CHC)/ Primary Health Centre (PHC) and other health care service delivery centres in rural areas
			v.	Train doctors and hospital staff on mass casualty management and emergency medicine
			vi.	Develop community awareness on post-disaster health and mental health issues and concerns

Similar entry points can be identified in other Central sector or Centrally Sponsored or State sponsored programmes. These entry points shall be included in Departmental Disaster Management Plans of concerned departments.

The guidelines of none of these flagships or other programmes of Government of India contain any general or specific provisions for mainstreaming DRR in development. While there is a pressing need for the development of such guidelines, the absence thereof need not necessarily deter considerations of hazards, vulnerabilities and risk factors for the selection of development activities and projects or for identification of the locations or sites where such projects shall come up. Such considerations do not involve additional costs. On the contrary, these are legitimate imperatives of development. The guidelines provide considerable scope and opportunities to ensure that development activities or projects are not unnecessarily exposed to the hazards of nature or that these do not create new risks of disasters.

Government of India has permitted 10 percent of allocations on Centrally Sponsored Schemes as flexi-fund that can be utilized to address various issues of local concern within the framework of overall objectives and scope of the programme. These include issues of disaster risk mitigation activities related to the scheme. The limits of flexi-fund have been raised to 25 percent as per notification issued in September 2016. This provides windows of opportunities for mainstreaming DRR in development.

Starting from financial year 2015-16, following the recommendations of 14th Finance Commission, there has been compositional shift in the allocation of funds for various Central sector and Centrally sponsored development programmes. While some of the existing Central sector programmes have been discontinued, allocations on some schemes have been reduced. At the same time, higher devolution of funds to the States has

created more space for the State Government to design their own development programmes suited to their specific needs and requirements. This opens up new opportunities for mainstreaming DRR in existing and new development programmes.

4.4 Tools for Mainstreaming Disaster Risk Reduction

Various tools and techniques are available for mainstreaming DRR into development programmes, activities and projects (PAP). Development programmes are the schemes or the channels through which specific projects and activities are conceptualized and funded. Projects are a set of structured interrelated tasks that are executed over a period of time with certain costs for achieving defined objectives, while activities are not structured so rigidly and may be performed on a continuing basis within or outside the programmes. For example, promotion of Education for All may be a programme in education sector under which construction of primary school buildings may be developed as a project, and curriculum development and teachers training may be carried on as activities. Projects are generally hardware of development while activities are mostly soft initiatives, but many development activities may also be taken up as projects.

Development projects, particularly large development projects, provide good opportunities for mainstreaming that may reduce existing risks and prevent creation of new risks of disasters. Conversely, without effective mainstreaming, development projects may exacerbate existing risks or unwittingly create new risks of disasters. Among the various toolkits available for mainstreaming DRR in project cycle management, the following have been applied with varying degrees of success. Some of these tools and techniques can be applied by the Departments for mainstreaming DRR into their respective programmes, activities and projects according to their specific context and needs:

- a) Marginal Investment Analysis
- b) Cost Benefit Analysis
- c) Multi-purpose Development Projects
- d) Disaster Impact Analysis
- e) Check Lists for Disaster Risk Reduction

4.4.1 Marginal Investment Analysis

Incorporation of elements of risk resilience in the concept, design, management and evaluation of existing or new programmes, activities and projects may necessitate additional investments. The tools of marginal investment analysis are useful to determine the effectiveness of such additional investments for DRR. For example, the marginal higher costs in earthquake resistant buildings is estimated to cost 2.5 percent for structural elements and 0.8 percent for non-structural elements, but the benefits are equal or higher than the replacement costs of these structures if these collapse during earthquakes.

There are many development programmes, activities and projects across different sectors that can be calibrated to incorporate elements of DRR for sustainable development. The marginal costs involved in such exercises are generally cost-effective, even though the processes involved may not always be so easy, and may require difficult and cumbersome tasks of reassessment and redesigning of the programmes and projects and development of new standards, codes, guidelines and capacities.

4.4.2 Cost Benefit Analysis

Elements of cost benefit analysis (CBA) are inherent in marginal benefit analysis, but full scale CBA for DRR is usually applied for new and exclusive risk mitigation projects. The tasks involved are not simple and straightforward. The costs of projects can be estimated in terms of projected investments, but the benefits cannot be calculated so easily, as most of the benefits are in the nature of preventing or reducing direct and indirect damage and

losses that did not take place. The future risk patterns are not known clearly due to the dynamic nature of hazards, vulnerabilities and exposures. Further, the way costs and benefits of the projects are distributed among various vulnerable groups cannot be calculated so easily. Data on vulnerabilities and impacts are also not available in many contexts and, more importantly, on many values. Despite these critical limitations, CBA of mitigation projects are finding increasing acceptance as empirical evidences of benefits far outweighing costs of such projects are building up.

4.4.3 Multi-Purpose Development Projects

Projects can be designed in such a manner that long-term benefits of risk mitigation are combined with more short term benefits of priority sectors. Such dual or multi-purpose development projects can reduce the risks of disasters and at the same time provide direct economic benefits that would enhance both cost-benefit ratio and internal rate of return and justify the costs of investments. One of the most common examples of such multi-purpose development projects are large hydroelectric dams that generate electricity, provide irrigation and at the same time protect downstream locations from the risks of floods.

4.4.4 Disaster Impact Analysis

Environmental Impact Assessment (EIA) of development projects has been institutionalized with established norms, procedures and toolkits. Elements of disaster impact assessment can be integrated into the process of EIA.

4.4.5 Check Lists for Disaster Risk Reduction

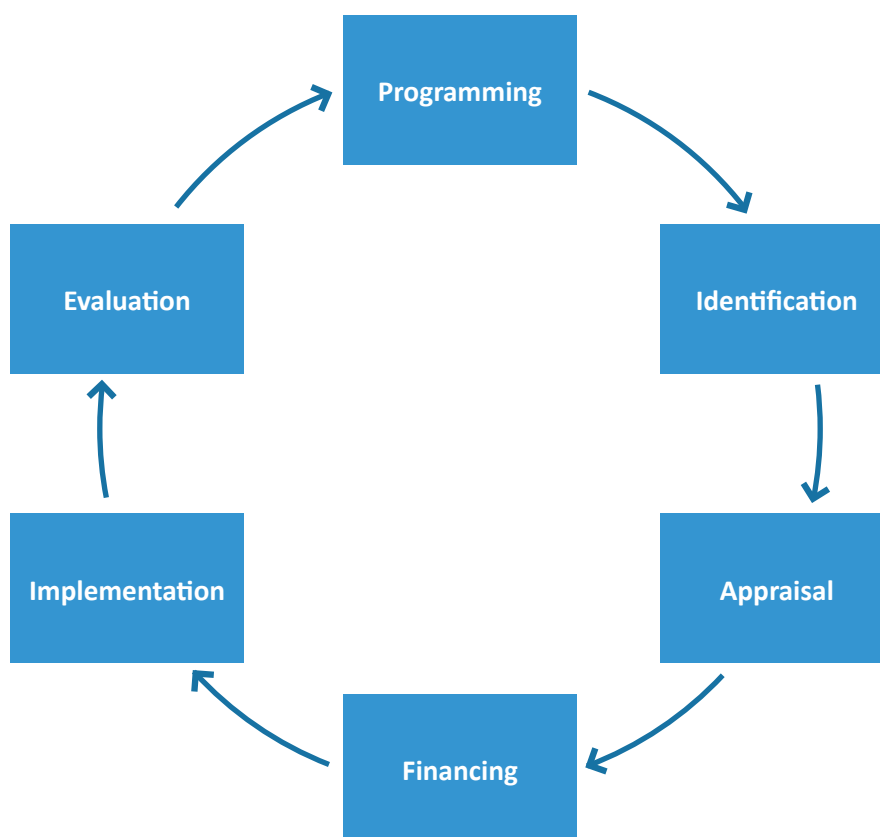
The Government of India issued a notification in 2009 stipulating that any new development project costing more than INR 100 crore must necessarily have a Check List for Natural Disaster Impact Assessment that provides complete information on the hazards, risks and vulnerabilities of the project. This includes the probable effects of natural disasters on the project as well as the possible impacts of the project in creating new risks of disasters. The costs involved in the prevention and mitigation of both types of impacts shall be built into the project costs, and accordingly, its economics and viability of the project shall be worked out. SDMA may issue a similar check list for DRR in development projects.

4.5 Mainstreaming DRR in Project Cycle Management

The best way to ensure that DRR is mainstreamed into the projects is to integrate this component into the Project Cycle Management (PCM). PCM is the process of planning, organizing, coordinating, and controlling of a project effectively and efficiently throughout its phases, from planning through execution, completion and review to achieve the pre-defined objectives or satisfying the project stakeholder by producing the right deliverable at the right time, cost and quality.

There are six phases in PCM: Programming, Identification, Appraisal, Financing, Implementation and Evaluation (Figure 4.1). DRR can be mainstreamed into each of these phases of the project cycle. The first three phases are the initial planning phases of the project which provide key entry points for mainstreaming.

Figure-4.1: - Project Cycle



4.5.1 Programming

No project is taken up in isolation. The objectives of national and sectoral plans provide the rationale of the project, while strategic considerations of resources and economy justify its size, scope and location. Set against this back drop, the project is formulated, defining its goals and objectives and outlining the specific tasks to be taken up in the project. This provides an opportunity of factoring DRR into the objectives and programmes of the project. This may not always be easy as objectives of many projects in different sectors may be remotely connected with the tasks of risk reduction. Risk reduction may be included as a proxy objective of every project irrespective of its primary objectives when the project formulation goes through the analysis of threats and opportunities of the project. Risks of disasters may create potential threats for any project and undermine its objectives. Therefore, measures for risk reduction would be useful for protecting the gains of the project even though it may involve marginally higher investments. Once the strategic goals of risk reduction are factored into the objectives of the project, subsequent tasks of mainstreaming DRR including financial investments become easier.

4.5.2 Identification

Once the project objectives are clearly defined and the tasks outlined, the next phase in the project cycle is to identify the elements of the tasks that need to be performed, design various structural and non-structural elements of the project and analyze the problems, needs and interests of all possible stakeholders, particularly the vulnerable sections of population. This would provide an opportunity for detailed risk analysis of the project and identify the hazards, vulnerabilities, exposures and risks of disasters that may impact the project. This would further provide an opportunity to assess whether the project would have any adverse impact on the communities or on the environment, and accordingly design the specific elements that should be built into the project to minimize such impact.

4.5.3 Appraisal

Once the project objectives are defined, tasks identified and structural and non-structural elements designed, the next phase of the project cycle is the appraisal of the project. In this phase, all relevant aspects of the project are studied, taking into account costs and benefits of the project, views of the stakeholders, feasibility and other issues. Logical or results-based management frameworks, and activity and implementation schedules are developed and the required inputs are calculated. The outcome is a decision to take the project forward, or not. In this phase, CBA is a good entry point for incorporating DRR elements into the project that may enhance project costs but provide longer term benefits to the society.

4.5.4 Financing

Once a decision has been taken to go ahead with the project, various options for financing the project, such as budgetary support, equity, market borrowing, bonds, external assistance etc. are explored and decisions as deemed appropriate are taken. Financing is not always a separate stage in project cycle as financial decisions may be taken at different points in the cycle – e.g., at the end of the identification or appraisal phases – depending on the particular procedures being followed. This provides an entry point for mainstreaming DRR into the project cycle management in as much as it opens up considerations of various options of risk financing and risk transfer that may reduce the immediate burden of investment while incorporating elements of risk reduction into the project.

4.5.5 Implementation

The implementation phase is important as in this phase the project managers have to ensure that all the designed standards and specifications are complied with and that there is no let up or compromise in the agreed parameters and processes. This is also the phase to closely monitor the progress, to adjust to changing circumstances and to do mid-course corrections, if these are necessary to achieve the objectives of the project.

4.5.6 Evaluation

The project cycle ends with evaluation and auditing of the results achieved and the lessons learned from the project, which are useful for deciding extension or replication of the project. Every project has its logical framework with inbuilt input, process, output and outcome indicators which should measure the progress achieved at every stage. Assessing the impacts of the project is more difficult as the impacts are felt over a longer time frame. Tools of anticipatory impact analysis such as EIA and Disaster Impact Analysis (DIA) can also be applied for analyzing the possible impact of the project at the stage of formulation. Concurrent evaluations can be conducted during the course of project implementation, while performance auditing and result framework analysis may be undertaken after the conclusion of the project.

4.6 Integrating and Mainstreaming of CCA with DRR

More than 80 percent of disasters in Himachal Pradesh are climate related. Every projection of disaster risks in the State indicate that climate change is likely to increase the frequency and intensity of extreme climate events like flood, flash floods, cloudbursts, hailstorm, drought, cold wave, avalanche etc. and create new climate risks like GLOFs. These events will have severe impact on the life and economy of the State. The State Government has already developed a State Strategy and Action Plan on Climate Change that has prescribed various measures for CCA in diverse sectors like agriculture, horticulture, animal husbandry, forests, health, tourism, urban planning and disaster management. One of the strategic approaches is to mainstream CCA in existing programmes, activities and projects of the concerned departments of the State, in the same manner that DRR is mainstreamed in development. In order that the mainstreaming processes in CCA and DRR can take

place simultaneously without duplicating efforts, initiatives and funding, there is a need for integrating CCA and DRR in every sector. Every concerned department shall analyze the entry points for mainstreaming CCA and DRR irrespective of sector and try to integrate these in their process of planning, funding and implementation. Similarly, the exclusive risk mitigation projects shall integrate the climate concerns and exclusive climate adaptation projects shall integrate the disaster concerns in their projects.

4.7 Action points for Mainstreaming Disaster Risk Reduction

The following action points for mainstreaming DRR in development shall be implemented by the concerned Departments and agencies of the Government as per the timeline prescribed in Table 4.2.

Table-4.2: Action points for Mainstreaming DRR in Development

	Action Point	Responsible Agencies	Time Frame
1.	HPSDMP 2012 had suggested possible entry points for mainstreaming in seven flagships Centrally sponsored programmes. These shall be pursued by the concerned departments. Similar entry points shall be identified in other existing or new Central/Centrally sponsored/ state sponsored programmes. These shall be incorporated in the Departmental DM Plans.	All concerned Departments	Continuous
2.	State Governments shall approach concerned Ministries/ Departments of Government of India for issuing guidelines for mainstreaming DRR in the flagship programmes keeping in view the provisions of Disaster Management Act for integration of DRR in development plans and programmes.	Planning Department in consultation with concerned development departments	1 year
3.	Mainstreaming DRR may involve additional costs that may not be provided in guidelines of Central sector schemes. State Government may invest additional marginal costs to derive optimal benefits from the projects.	Planning Department in consultation with concerned development departments	2 years
4.	Various tools and techniques for mainstreaming DRR into development programmes, activities and projects shall be applied by the Departments according to department specific needs and context.	All concerned development departments	Continuous
5.	DRR shall be mainstreamed into PCM through the phases of programming, identification, appraisal, financing, implementation and evaluation	All concerned development departments	Continuous

	Action Point	Responsible Agencies	Time Frame
6.	Mainstreaming of CCA and DRR shall be integrated in every sector. Entry points for mainstreaming CCA and DRR in respective sector shall be identified and integrated in the process of planning, funding and implementation. Exclusive risk mitigation projects shall address climate concerns and exclusive climate adaptation projects shall address disaster concerns in their projects.	All concerned Departments	Continuous



5.1 Introduction

The risks of disasters that are neither prevented nor mitigated are the residual or 'accepted' risks of disasters for which there is no other option but to get prepared for response. The Disaster Management Act has defined disaster preparedness as 'the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof'⁸.

5.2 Disaster Preparedness in State Policy

The HPSPDM has prescribed the following measures for disaster preparedness:

- a) Capacity Development
- b) Development of Disaster Management Plans
- c) Forecasting and Early Warning Systems
- d) Setting up and Strengthening of Emergency Operations Centre
- e) Communications and Information Technology Support
- f) Medical Preparedness and Mass Casualty Management
- g) Training, Simulation and Mock Drills
- h) Community Based Disaster Preparedness

5.3 Capacity Development

Developing capacities across all sectors and at all levels is the most enduring, cost-effective and sustainable method for disaster preparedness. A country or a State is better prepared if all the agencies and stakeholders both within and outside the government clearly understand their roles and have the required capacities to discharge the responsibilities assigned to them. Therefore, the importance of capacity development is not limited to disaster preparedness; it covers all the aspects for disaster risk management (natural as well as manmade hazards), cycles (pre-disaster prevention, mitigation and preparedness and post-disaster response, recovery and reconstruction), levels (national, state and local) and sectors (all relevant sectors of development) of disaster management.

UNISDR has defined 'capacity' as 'the combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals'⁹. Hence, there are some capacities already inherent in communities and organizations, which should be assessed critically, the gaps in capacities identified clearly and strategies for capacity development developed through systematic processes of education, research, training and awareness generation.

5.3.1 Training Need Assessment

The Government of Himachal Pradesh has conducted a comprehensive Training Need Assessment (TNA) on DRR

8. Section 2(m), Disaster Management Act 2005

9. UNISDR Terminology on Disaster Risk Reduction, 2009



and CCA. The TNA identified the strengths and weaknesses of the existing capacities and recommended a strategic capacity development action plan as follows:

- a) Capacity development across all relevant sectors shall be guided by the following principles:**
 - i) Capacity development requires ownership, collaborative agreements, information for effective decision-making, incentives and resources;
 - ii) Capacity development should be part of early project design; it should be built on existing structures and mechanisms; and it needs baselines as well as benchmarks;
 - iii) Capacity development needs to be specific and attributable; and
 - iv) Capacity development is a continuous process.
- b) Five focus areas of capacity development would include:**
 - i) Capacities for stakeholder engagement
 - ii) Capacities to generate, access and utilize information and knowledge
 - iii) Capacities for strategy, policy and legislation development
 - iv) Capacities for management and implementation
 - v) Capacities for performance monitoring and evaluation
- c) Basic training on disaster management shall be given to all new entrants to Government service on the following themes:**
 - i) Basics of Disaster Management and CCA
 - ii) Awareness about the provisions of Disaster Management Act, 2005
 - iii) Preparation of Disaster Management Plans
 - iv) Preparation of Response Plans
 - v) Emergency Support Functions assigned to departments
 - vi) Integration of DRR & CCA into development plans and policies
 - vii) Training on mitigation measures and plans
 - viii) Community awareness and IEC on DRR & CCA
 - ix) Damage and Needs Assessment
 - x) Conducting mock drills
- d) Sector specific training on disaster management shall be imparted to the functionaries at three levels (Level I, II, and III) for each of the following sectors:**
 - i) Policy and Planning (for Policy Makers)
 - ii) Management and coordination (for District Administration)
 - iii) Construction and Infrastructure Sector
 - iv) Social and Community Sector
 - v) Health and Public Health Sector
 - vi) Agriculture Sector
 - vii) Education Sector
 - viii) Forestry Sector
 - ix) Transport and Tourism Sector
 - x) Water and related Sector
 - xi) IEC and Media
 - xii) Voluntary Sector and Media
 - xiii) Public Representatives
 - xiv) Search and Rescue Teams

The TNA did not quantify the number of Government and non-government personnel required to be trained at various levels nor did it identify the institutional mechanisms, such as the training institutes, trainers, infrastructure and resources required for delivering the training programmes. The methodology and pedagogy

of training is another area that requires attention.

5.3.2 Disaster Management Centre

Disaster Management Centre is located in Himachal Institute of Public Administration. The Centre was set up and sustained with grants-in-aid from the Ministry of Home Affairs (MHA) of Government of India. The State Government shall strengthen the capacity of the Centre to conduct the basic orientation training programmes on disaster programme and advanced training programmes on some of the sectors that cannot be conducted by other training institutes in the State.

The Disaster Management Centre draws up and continue to prepare its annual training calendar for conducting the basic and advanced training programmes on disaster management in accordance with the recommendations of the TNA and in consultation with the Revenue Department (Disaster Management Cell). The training designs and modules shall be developed by adapting the model training modules of the National Institute of Disaster Management to suit the specific context and requirements of Himachal Pradesh.

5.3.3 Sectoral Training Centre

Some of the sector specific training programmes can be conducted by the training institutes/ facilities available with various departments or the agencies under their control. Departments shall suitably enhance the capacities of these training centres to conduct department specific training programmes on disaster management. The training designs and modules shall be developed in consultation with the Disaster Management Centre of HIPA and be further vetted by experts. The trainers of the institutes shall be trained appropriately to deliver the training programmes. The focus of these training programmes shall be on the following:

- a) Assessment of risks of disasters in specific sectors;
- b) Mainstreaming DRR in programmes, activities and projects in respective sectors;
- c) Developing disaster risk mitigation projects in respective sectors; and
- d) Management of Emergency Support Functions of Departments.

5.3.4 Education and Awareness

Training is one among several aspects of capacity development. The other aspects of equal, if not more importance, are education, research and awareness. The State Government has already introduced disaster management in the curriculum of school education. Similar curriculum should be developed for college and university education in accordance with the guidelines of University Grants Commission. The universities and other institutes of higher education in the State should also be encouraged to conduct research on various aspects and issues of disaster management in the State.

The Directorate of Technical Education has a large number of Industrial Training Institutes spread throughout the State imparting skill-based vocational training to the youths. Training programmes on disaster mitigation technologies, particularly earthquake resistant construction techniques, may be included into the training curriculum of masons and architectural assistants.

Creation of awareness among the rural and urban communities in the State is an important aspect of capacity development. The Information and Public Relations Department is already engaged in creating public awareness on disaster management through print, electronic and folk media. Such activities shall be stepped up particularly for the communities in far flung areas that do not have easy access to modern communication system. The voluntary sector and civil society organisations can play an important role in creating awareness among the people about disaster preparedness and develop a culture of prevention that can save lives and livelihoods from disasters.

5.4 Early Warning Systems

Early warning of disasters can significantly strengthen disaster preparedness for effective response. The Government of India has designated specific agencies to monitor the onset of different natural hazards, set up adequate Early Warning Systems, and disseminate necessary warnings/ alerts regarding impending hazards, for which early warning and monitoring is possible with the currently available technologies and methods. These agencies provide inputs to the MHA, which issues alerts and warnings to the State Governments and district administration through various communication channels.

Table-5.1: Hazard Specific National and State Level Agencies/ Department

Hazards	National Level Agencies	State Departments
Flood	Central Water Commission	Irrigation & Public Health
Drought	Ministry of Agriculture & Farmers Welfare	Agriculture
Earthquake	India Meteorological Department	Environment, Science & Technology
Landslide	Geological Survey of India	Industry (Geology Wing)
Cold Wave, Frost	India Meteorological Department	Revenue
Cloudburst, Hailstorm	India Meteorological Department	Revenue
Avalanche	Snow and Avalanches Study Establishment	Environment, Science & Technology
Human Epidemics	Ministry of Health & Family Welfare	Health & Family Welfare
Animal Epidemics	Ministry of Animal Husbandry	Animal Husbandry
Pest attack	Ministry of Agriculture & Farmers Welfare	Agriculture
Industrial (Chemical)	Ministry of Environment, Forest & Climate Change	Labour & Employment & PCB

The Government of Himachal Pradesh has designated the nodal departments for each of these hazards with overall responsibility lying with the Revenue (Disaster Management) Department. These departments shall be responsible for keeping track of developments regarding specific hazards assigned to them, coordinate with the central agencies as required, and inform the designated authorities/agencies at the State and District levels about the impending hazards.

The Indian Meteorological Department (IMD) is the principal agency responsible for all weather and climate warnings and forecasts such as rainfall, temperature, humidity and wind pressures. IMD has established an elaborate network of observatories in the State and issues general weather bulletins twice a day, weather forecasts for next 24 hours and weather warnings for next 48 hours. The information is disseminated through electronic media, radio and print media on a regular basis. Local forecasts for the capital cities and other important cities are provided four times a day with 48 hours' validity. The IMD information is available online at www.imd.gov.in

Early warnings for specific types of hazards are issued by the concerned agencies as stated below.

5.4.1 Flood Forecasting and Early Warning System

The Central Water Commission (CWC) is the nodal agency of Government of India responsible for issuing flood warnings. CWC has developed a network of 175 flood forecasting stations throughout the country to issue Daily Flood Bulletins to all designated Authorities/Agencies of the Central Government and State Governments/ district Administration during the southeast monsoon season (June to October) for all the major river basins. CWC has categorized various flood situations in four different categories, depending

upon the discharge from the river:

- A. **Low Flood:** The river is said to be in low flood situation when the water level of the river touches or crosses the warning level, but remains below the danger level of the forecasting site.
- B. **Moderate Flood:** If the water level of the river touches or crosses its danger level, but remains 0.50 m below the Highest Flood Level (HFL) of the site, the flood situation is called moderate.
- C. **High Flood:** If the water level of the river is below the HFL of the forecasting site but still within 0.50m of the HFL, then the flood situation is called high and “Orange Bulletin” is issued to the user agencies.
- D. **Unprecedented Flood:** The flood situation is said to be Unprecedented when the water level of the river crosses the highest flood level recorded at any forecasting site so far. In such situations, a special “Red Bulletin” is issued to the user’s agencies, providing “special flood message” related to the unprecedented flood.

In addition, Inflow Forecasts are issued for 28 dams/reservoirs/barrages in various river basins in the country. CWC has set up a network of river discharge monitoring stations in the State including two telemetry-based automatic stations along the Parechu river, but it is yet to establish a full-fledged flood forecasting centre in Himachal Pradesh. The State has four major river basins that feed as many as 16 dams, 14 barrages/weirs and 33 hydroelectric projects. The authorities of these projects monitor the level of discharge of rivers and reservoirs and communicate these to CWC, Irrigation & Public health Department and district administration. These are no substitutes for proper flood forecasting and early warning systems.

It is necessary for the State to have advanced flood forecasting and early warning system that monitors the hazards, vulnerabilities and risks of riverine as well as flash floods and GLOFs in the State. The system can be developed on the basis of rainfall, river discharge and glacial melt data collected from ground level and satellite observation stations. The State Government shall seek the assistance of the Ministry of Water Resources, MHA and Department of Space for developing this facility. Till such facility is created, the Irrigation & Pubic Health Department shall continue to monitor the situations and issue appropriate warnings to the Revenue (Disaster Management) Department and district administration.

5.4.2 Early Warning of Drought

IMD monitors rainfall situation throughout India in different spatial (state, districts, subdivisions) and temporal (daily, weekly, monthly, seasonal) scales. Based on the data generated, IMD prepares two most important drought indices viz. Aridity Anomaly Index (AAI) and Standardized Precipitation Index (SPI) to monitor drought in the districts of India on a monthly basis. The National Centre for Medium Range Weather Forecasting, National Remote Sensing Centre and National Rained Area Authority and CWC provide other key inputs that feed into the National Agricultural Drought Assessment and Monitoring System(NADAMS). The NADAMS provides near real-time information on prevalence, severity level and persistence of agricultural drought at State/district/sub-district level.

Himachal Pradesh is not covered under the NADAMS, but it gets inputs on AAI and SPI, which, together with locally gathered information on cropping pattern, provide the basis for assessing the risks of drought in the districts of the State. The Government of Himachal Pradesh shall request the Ministry of Agriculture for including it under NADAMS. This will provide accurate information on early signs of drought and its monitoring, which would facilitate the authorities to issue appropriate advisories for agricultural and horticultural practices in the State.

5.4.3 Early Warning of Landslide

Advanced system of landslide early warning system based on geological, meteorological, hydrological and land use data is yet to be developed in the country. The Geological Survey of India issues alerts and warnings to all

designated authorities and agencies of the Central Government and State Governments/ district administration for landslides in the following categories:

- A. **Category IV:** Landslides of small dimensions that occur away from habitations and do not affect either humans or their possessions
- B. **Category III:** Landslides which are fairly large and affect infrastructural installations like strategic and important highways and roads, rail routes and other civil installations like various appurtenant structures of hydroelectric and irrigation projects
- C. **Category II:** Landslides that may occur on the fringes of inhabited areas and result in limited loss of life and property
- D. **Category I:** Landslides of large dimensions that are located over or in close vicinity of inhabited areas like urban settlements or fairly large rural settlements -Activity of these slides can result in loss of human lives and dwellings on a large scale.

Such warnings are mostly conjectural on the basis of probable triggers due to incessant rainfall or seismic activities. Various other causative factors that contribute to landslide in different locations have not been modelled to generate real-time, reliable and tested forecasts and warnings. The Geological Survey of India with its focus primarily on geological investigations may not be the appropriate agency for developing early warnings of landslides, which is one of the challenging tasks of disaster preparedness for landslides.

Himachal Pradesh being one of the most landslide prone States of the country shall request Ministry of Earth Sciences/ Ministry of Science & Technology to develop state-of-art real-time early warning system for the State.

5.4.4 Early Warning of Avalanches

Snow and Avalanche Study Establishment (SASE) of the Defence Research and Development Organisation (DRDO) Chandigarh is responsible for issuing alerts and warnings to all designated authorities and agencies of the Central Government and State Governments/ district administration for avalanches. SASE issues avalanche warnings as per following classifications:

- A. **Low:** When conditions are generally favourable and triggering is possible only with high additional loads and on very few extreme slopes -In such situations movement within the valley is safe, but movement on slopes would be risky.
- B. **Medium:** When conditions are partly unfavourable -Triggering is possible on most avalanche prone slopes with low additional loads and may reach the valley in medium size. Movement on slopes can be permitted with extreme care, and movements within valley can take place only with caution.
- C. **High:** When conditions are unfavourable -Triggering is possible from all avalanche prone slopes even with low additional loads and these can reach the valley in large size. All movements should be suspended in such situations.
- D. **All Round:** When conditions are very unfavourable -Numerous large avalanches are likely from all possible avalanche slopes and even on moderately steep terrain. Airborne avalanches are also likely in such situations. All movements must be suspended in such situations.

5.4.5 Hailstorms

Hailstorms create havoc to agriculture and horticulture damaging about 20-30 percent of crop every year in the State. In order to minimize the losses suffered by farmers and growers due to hailstorms, Department of Horticulture has installed anti-hail guns at three locations in the fruit growing belt of Shimla district. Using

Figure-5.1: Flow Chart of Early Warning System

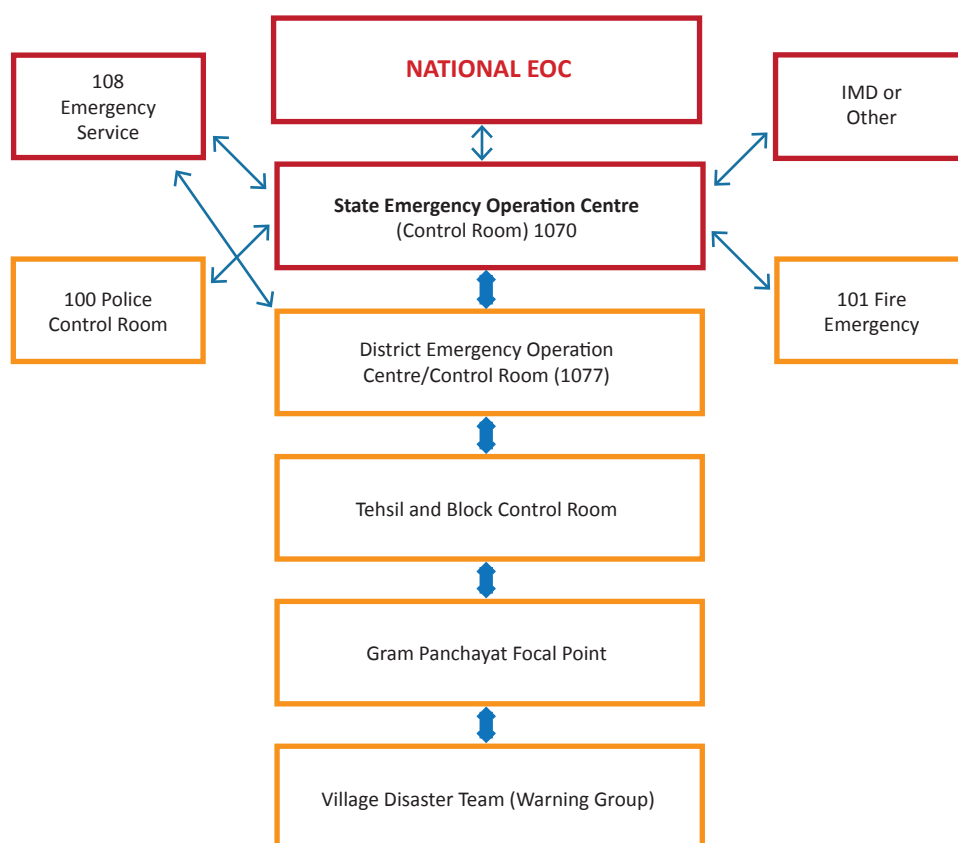
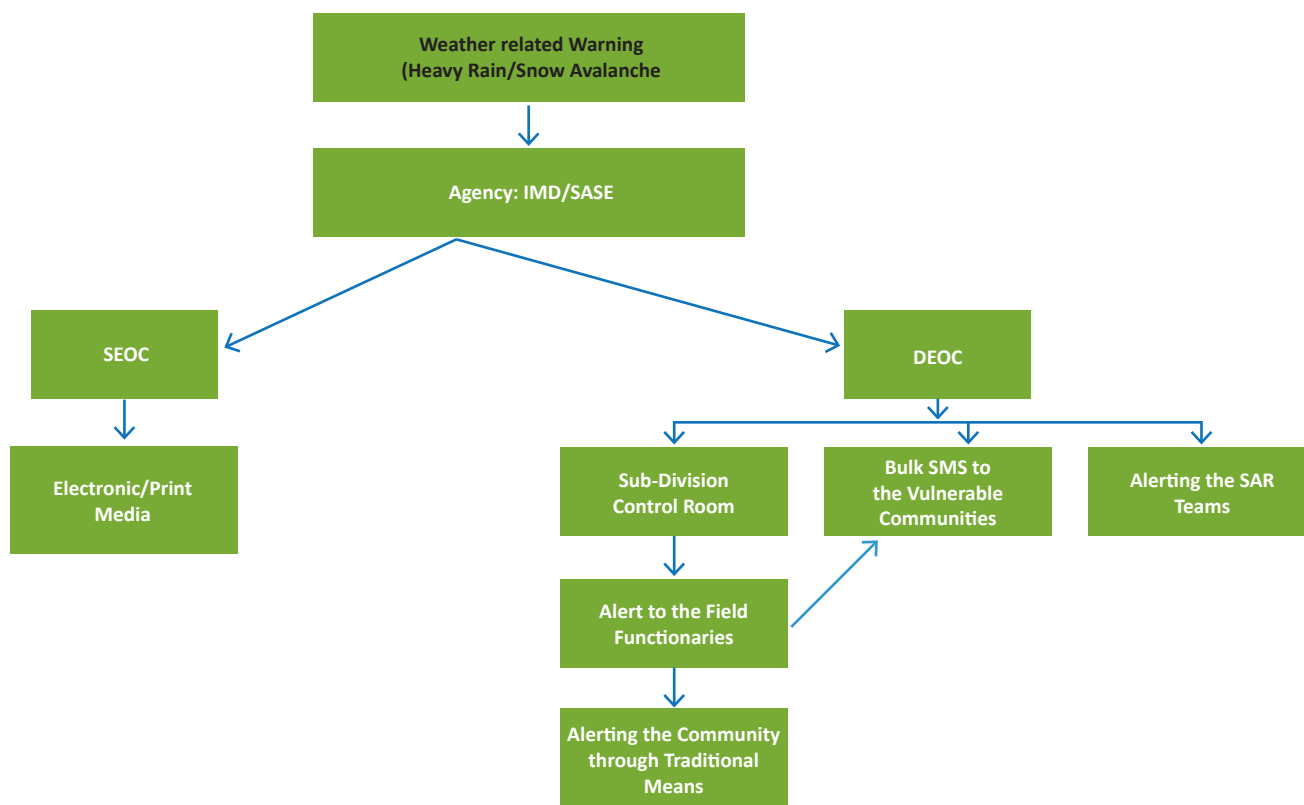


Figure-5.2: A Model of Top Down Flow of Early Warning



weather data from radar installed at high altitude, the anti-hail guns' fire acetylene gas into the clouds to diffuse the hail. A number of private orchardists have installed anti-hail guns at their own costs. There are demands for installation of the facility in other districts. At the same time, the efficacy of the system in diffusing the hail has been questioned by many scientists as well as farmers. A scientific evaluation of anti-hail guns shall be conducted before similar devices are set up in other fruit growing areas of the State.

5.4.6 Earthquake

Early warning or prediction of earthquake is not possible. IMD, which is responsible for monitoring seismic activity, has set up a network of seismic observatories to capture the epicentre, depth and intensity of earthquakes and disseminate the information to all the concerned agencies for necessary follow up action. IMD has four observatories in Himachal Pradesh which are equipped with state-of-the-art broadband sensors, high dynamic range (24-bit) digitizers, GPS time synchronization and facility to access data remotely through satellite communication and telephone mode.

The State Emergency Operation Centre (SEOC) shall set up a communication link with the IMD to obtain data from observatories and the Science & Technology Department will process information thus obtained for further analysis and dissemination.

5.4.7 Other Hazards

IMD issues weather warnings for extreme weather such as heavy rainfall, heat and cold wave, frost and hailstorm as and when the situation develops. At present, there is no facility for forecasting cloud bursts, the most devastating weather hazards of the State. A very fine network of radars may help in development of cloudburst warnings. The State Government shall request the Ministry of Earth Sciences to develop an early warning system for cloudbursts.

Outbreak of diseases affecting human or animal population of the State are known to the agencies of the State Government much before any advisories are issued by Government of India. If the outbreaks take the shape of epidemics, the concerned agencies of Ministry of Health & Family Welfare or the Ministry of Animal Husbandry, as the case may be, shall send specialized teams of experts to investigate the causes and pattern of the epidemics and provide necessary assistance to contain and mitigate the epidemics.

In the case of avian flu, advisories for quarantine shall be received at the early stage from the Ministry of Animal Husbandry. Advisories for pest attacks are issued by the Ministry of Agriculture.

Early signs of industrial disasters are detected by the industry concerned and local administration. Depending on the gravity of the situation, the Central, State or District Crisis Group on industrial disasters shall monitor the situation for appropriate response.

5.5 Emergency Operations Centres

The SEOC, set within the State Secretariat, will be upgraded and strengthened with state-of-the-art communication and other equipment in accordance with the guidelines of the National Disaster Management Authority on National Disaster Management Information and Communication System. Similar EOCs shall be set up at all district headquarters

5.5.1 Objectives of the Emergency Operations Centre

The EOCs at State and district levels will be the nerve centres for coordination and management of disasters in the State. The objectives of the EOCs shall be to provide centralized direction and control of any or all of the

following key functions:

- a) Receive and process disaster alerts and warnings from nodal agencies and other sources and communicate the same to all designated authorities;
- b) Monitor emergency operations;
- c) Facilitate coordination among departments and agencies performing various primary and secondary Emergency Support Functions (ESF) of disaster management;
- d) Issuing disaster/incident specific information and instructions specific to all concerned;
- e) Consolidating information on damage, loss and needs received from various sources; and
- f) Forwarding of consolidated reports to all designated authorities.

5.5.2 Location of EOC

The EOC will be set up at a suitable location and the building should be multi-hazard resistant so as to withstand the impact of disasters and remain functional during the emergency phase.

5.5.3 Communication Network of EOCs

Under the National Communication Plan on disaster management, the EOCs at National, State and district levels shall have a fail-proof communication network with triple redundancy of NICNET of NIC, POLNET of Police and SPACENET of ISRO in addition to the terrestrial and satellite based communication to ensure voice, data and video transfer.

Under these networks, the SEOC will be directly connected with the National EOC (NEOC) of MHA at the National level. The NEOC operates 24x7 from North Block with state-of-the-art equipment and follows a SOP on Issuing Alerts and Electronic Messaging in the Event of Disaster Situations. An alternate NEOC has been established at the premises of NDMA as its mirror image to back-up in the event of the NEOC at MHA becoming non-operational for any reason.

The district EOCs will be connected with the State EOCs. The EOCs shall be provided adequate number of trained manpower to function effectively.

Besides its own toll free number, 1070, the SEOC shall be connected to the existing network of emergency number of Police and Fire Services. The calls received from any quarter regarding disasters will be diverted to SEOC which will process such information as per the SEOC protocol.

5.5.4 Manual on EOC

The Government of Himachal Pradesh has developed a Manual on EOC (available at: www.hpsdma.nic.in) containing SOP/protocol for activation of the SEOC and District EOCs (DEOCs) during emergency/disasters. The Manual shall be reviewed periodically on the basis of experiences gained in its operation.

5.5.5 Functioning of SEOC

The Manual has laid down the procedure to be followed for the operation and maintenance of the SEOC, which are as follows:

- a) Special Secretary Revenue (Disaster Management) shall be overall in charge of EOC;
- b) Nodal officers of all concerned line departments will be members of the EOC and will have authority to quickly mobilize their departmental resources;
- c) The SEOC will have communication facilities with connectivity to block & village level;
- d) SEOC will be equipped with a vehicle mounted with HF, VHF and satellite telephone for deployment in the affected site to provide immediate connectivity with the headquarters and Incident Command

- Post(ICP);
- e) SEOC will have connectivity with NEOC & National & State warning facilities;
 - f) SEOC will have well defined provision and plan for dovetailing the National Disaster Response Force, Armed Forces and communication capabilities with the local communication system. There will be proper plan to ensure that all entities are able to connect with each other in case of large scale disasters or failure of the local communication systems;
 - g) SEOC will have connectivity with State Aryabhata Geo-Informatics Centre for data and information.
 - h) SEOC will have Disaster Management plans of all line departments incorporating the following:
 - i) Directories with contact details of all emergency services and nodal officers;
 - ii) Connectivity with all district headquarters and police stations;
 - iii) Database of NGOs working in different geographical areas;
 - iv) Demographic details of the State and districts; and
 - i) SEOC shall maintain database on resource inventories of all line departments and connectivity with database of India Disaster Resource Network (IDRN), India Disaster Knowledge Network (IDKN) and Corporate Disaster Resource Network (CDRN).

SEOC shall have space and communication facilities to accommodate representatives of all concerned line departments and agencies performing various ESFs of disaster management. This will allow all agencies and departments to share information, make decisions, activate plans, deploy response teams and perform and log all necessary response and relief activities to make the EOC effective.

SEOC shall issue necessary directions and control to the DEOCs regarding the process to be followed to:

- a) Receive and process alerts and warning from nodal agencies and other sources and communicate the same to all designated authorities;
- b) Provide and facilitate coordination between ESF agencies at the district level;
- c) Provide inventory of resources and requisitioning additional resources during the disaster phases;
- d) Provide and issue disaster specific information/data to all concerned;
- e) Consolidate analysis and damage loss and needs assessment data; and
- f) Forwarding of consolidated reports to all designated authorities.

5.5.6 Functioning of DEOCs

DEOCs shall be located in the Office of the Deputy Commissioner and work under his/her immediate supervision but under the overall operational command and control of the SEOC. On receipt of information about any event of disaster from any source, DEOC shall immediately bring this to the notice of the Deputy Commissioner and send First Information Report (FIR) to SEOC, and all designated authorities/agencies as laid down in the SOP. The FIR shall briefly summarize: -

- i) Severity of the disaster;
- ii) Actions being taken locally;
- iii) Local coping capacities (including locally available resources);
- iii) Immediate priorities for external relief required and approximate quantities for the same;
- iv) Best logistic means for delivering relief; and
- v) Forecast of possible future developments including new risks.

Thereafter DEOC shall send a Daily Situation Report as per the standardized format prescribed in the SOP. DEOCs shall have similar fail-proof communication and other facilities as the SEOC and function as the district control room during disaster situations.

5.6 Medical Preparedness and Mass Casualty Management

District Chief Medical Officers of the Department of Health & Family Welfare and Ayurveda will identify the doctors and para-medical teams including mental health and psycho-social service providers at sub-divisional and district levels of all districts that can be deployed for emergency medical response at short notice. Their names, addresses, telephone numbers, mobile numbers, email etc. shall be made available at the SEOC/DEOCs. The list shall be updated half yearly. The stock of medicines, accessories and equipment for each identified team at the district and sub-divisions would be decided in advance as per needs of specific disaster situations.

5.7 Animal Care

Animals, both domestic as well as 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. It is pertinent to note that many communities have shown compassion to animals during disasters, and these efforts need to be formalized in the preparedness plans of the Departments of Animal Husbandry at the State and district level.

5.8 Rules, Regulations, Plans, Manuals and Procedures

Disaster preparedness requires that necessary rules, regulations, plans, manuals and SOPs on all strategic, functional, operational and procedural aspects of disaster management are developed and revised periodically. The Government of Himachal Pradesh has developed several Manuals and SOPs on disaster management. These include:

- a) SOP for Responding to Disasters;
- b) State Disaster Management and Relief Manual;
- c) EOC Manual;
- d) Guidelines for On-Site and Off-Site Emergency Plans for Factories and Industrial Units; and
- e) SOP for Averting Threats Emanating from Landslide Dams on Rivers in Mountainous Regions.

All these SOPs and Manuals should be updated and revised periodically taking into account new developments and the experiences gained and lessons learnt in the past.

Every district of Himachal Pradesh has developed its District Disaster Management Plan. The process of revision and updating of these plans are currently under progress. The process of revision of the plans shall be finalized after the revision of the SDMP so that the District Plans are consistent with the State Plan.

The Disaster Management Act has mandated that every Department of the State Government shall prepare its Departmental Disaster Management Plan. Only five Departments of the State Government have prepared their departmental plans as yet. None of these plans conform to the standards and requirements of plans as provided in the Act. The State Government has recently developed a model template of Departmental Disaster Management Plan. Every Department shall prepare its plan on the basis of this template. These plans shall be finalized after the revision of the SDMP so that the departmental plans are consistent with the State Plan.

5.9 Community Based Disaster Preparedness

Communities are the first responders in any disaster situation, and hence, there is no better alternative to community based disaster preparedness for immediate response. Community participation ensures local ownership, addresses local needs, and promotes volunteerism and mutual help to prevent and minimize damage. The State Policy on Disaster Management had prescribed:

The community participation for DM would be promoted on the moto of “self-help”, “help thy neighbour” and “help thy community”. The needs of the elderly, women, children and differently abled persons require special attention. Hence, the CBDR would integrate these concerns in DM planning, preparedness and response. Women and youth will be encouraged to participate in decision making committees and action groups for management of disasters. Networking of youth and women based organisation would be done and they will be trained in the various aspects of response such as first aid, search and rescue, management of community shelters, psycho-social counselling, distribution of relief and accessing support from government/agencies etc. Community plans will be dovetailed into the Panchayat, Block and District plans.

In order to enhance the communities’ capacity to take action to help themselves till local authorities or district administration respond to disaster situations, it is necessary to create awareness among the rural and urban communities about hazards, vulnerabilities and risks and equip them with basic information, skill and equipments for response. The areas that would be specifically addressed for community preparedness are:

- i) Medical first aid
- ii) Search and rescue extrication from damaged buildings
- iii) Road clearance
- iv) Fire fighting

The village Panchayat shall be provided with basic communication systems such as radio, HAM Radio, TVs and extrication equipment. The Panchayat will be encouraged to establish local early warning systems, particularly in highly vulnerable remote areas, and to hold community level disaster response drills.

5.10 Simulation and Mock Drill

Search and Rescue Teams at the State, district and local Levels will carry out mock drills on various disasters situation annually on the basis of WCS developed on disasters. For floods, etc. these will be carried before the monsoon period, tentatively in June. For earthquakes, landslides, snow avalanche, etc., such drills can be done in the month of October. At the district and State levels, mock exercises will be carried out for testing the effectiveness of the preparedness machinery including manpower and equipment.

As per the decision of the SDMA, mock drills shall be carried out at least four times a year in all educational institutions, hospitals, temples and all other important government buildings where large number of people gather or visit regularly.

5.11 Awareness Generation

State wide awareness campaign shall be continued by the SDMA/Department of Revenue by every available means. The DDMA shall also carry out awareness campaigns in their respective districts right up to village level. Seminars/workshops will be conducted specifically for media personnel and public representatives’ viz. MPs,

MLAs, PRIs, ULBs etc.

Since 2010, HPSDMA has been observing April 4 every year as the Earthquake Preparedness Day to commemorate the devastating Kangra earthquake of 1905. Mock drills shall be carried out to assess the preparedness for earthquakes. Mass awareness programmes shall also be organized throughout the State to enhance the knowledge and understanding about the hazards of nature and the steps to be taken for reducing loss of lives and assets due to the hazards. The United Nations has declared October 13 as the International Day of Disaster Reduction (IDDR). This day shall be celebrated to create awareness about the importance of DRR for saving lives and livelihoods of people.

5.12 Resource Inventory – IDRN

The Government of India maintains the India Disaster Resource Network (IDRN), which is a web enabled resource inventory for disaster management. Deputy Commissioners will ensure that necessary entries of the resources available in the district have been uploaded in the portal and are updated at least once a month by the designated district authorities.

5.13 Improving Accessibility through Network of Helipads

The immediate impact of disasters like earthquakes and landslides in Himachal Pradesh would be the breakdown of road connectivity to the affected areas. The State Government has established a network of helipads throughout the state. DDMA and district administration would ensure connectivity to all helipads and keep them in the state of readiness for emergency situation.

5.14 Action Points for Disaster Preparedness

Actions points for disaster preparedness, departments and agencies responsible for the preparations and the time frame for preparedness is provided in Table 5.2.

Table-5.2: Action Points for Disaster Preparedness

	Action Point	Responsible Agencies	Time Frame
1.	The State Government shall strengthen the capacity of the Centre to conduct the basic orientation training programmes on disaster programme and advanced training programmes on some of the sectors that cannot be conducted by other training institutes in the State.	Revenue (DM) Department/GAD/ HIPA	1 year
2.	DMC shall draw up its annual training calendar in accordance with the recommendations of the TNA and develop State specific training designs and modules.	HIPA	1/2 years

	Action Point	Responsible Agencies	Time Frame
3.	Sector specific training programmes can be conducted by training institutes already available with some departments. The capacity of such institutes shall be enhanced to conduct sector specific training programmes on disaster management.	Concerned Departments	2 years
4.	State Government shall nominate officers to attend training programmes conducted by national institutes.	Concerned Departments	Continuous
5.	State Government shall sponsor officers to attend advanced training programmes in reputed training institutes abroad	Concerned Departments	Continuous
6.	Disaster management shall be included in curriculum of college and university education as per UGC guidelines.	Higher Education Department	2 years
7.	Universities and other institutes of higher education shall be encouraged to conduct research on various aspects and issues of disaster management.	Higher Education Department	Continuous
8.	Information & PR Department shall step up activities to create public awareness on disaster management through print, electronic and folk media.	Information & PR Department	Continuous
9.	Designated nodal departments for each hazard shall keep track of impending hazards, liaise with central agencies and inform concerned agencies at State and district levels.	Concerned Departments	Continuous
10.	Advanced flood forecasting and early warning system for riverine, flash and GLOFs will be set up with assistance of concerned agencies of central government.	Irrigation & PHE/ Science & Technology Department	5 years
11.	State Government shall request Ministry of Agriculture to include HP under NADAMS and follow up with necessary support.	Department of Agriculture	2 years
12.	State Government shall request Ministry of Earth Sciences/ Ministry of Science & Technology to develop state-of-art landslide early warning system for HP.	Revenue (DM)/ other concerned Departments	5 years

	Action Point	Responsible Agencies	Time Frame
13.	The efficacy of anti-hail guns to diffuse hailstorms shall be evaluated before similar devices are set up in other major fruit growing areas of the State.	Department of Horticulture	5 years
14.	SEOC/DEOCs shall be upgraded with state-of-art equipment's as per guidelines of NDMA.	Revenue (DM) Department	2 years
15.	SOP/ Protocol for activation of SEOCs and DEOCs during emergency/disasters shall be reviewed/ revised periodically.	Revenue (DM) Department	2 years
16.	SEOC/DEOC shall provide space and communication facilities to align departments/ agencies for performing ESFs.	Revenue (DM) Department	During disasters
17.	List of doctors and para-medical teams with contact details shall be prepared and updated half yearly for deployment on emergency medical response at short notice. Stock of medicines, accessories and equipment's required for specific hazards shall be kept in readiness.	Health & Family Welfare Department	Continuous
18.	Community based initiatives to protect animals during disasters shall be supported.	Animal Husbandry Department	During disasters
19.	All SOPs and Manuals on disaster management shall be updated and revised periodically taking into account new developments and the experiences gained and lessons learnt in the past.	Revenue (DM) Department	2 years
20.	The process of revision of District Disaster Management Plans shall be finalized after the revision of the SDMP.	DDMA/ Revenue (DM) Department	6 months
21.	Every department shall prepare its Disaster Management Plan in accordance with revised SDMP.	All Departments	6 months
22.	Basic information, skill and equipment's shall be provided to communities for immediate response to disasters.	Revenue (DM) Department	Continuous
23.	State-wide awareness campaign shall be conducted by every available means right up	Revenue (DM) Department	Continuous

	Action Point	Responsible Agencies	Time Frame
	to village level. Seminars/workshops will be conducted specifically for media personnel and public representatives' viz. MPs, MLAs, PRIs, and ULBs etc.		
24.	Earthquake Preparedness Day shall be observed on April 4 every year to commemorate the devastating Kangra earthquake of 1905. Mass mock drills shall be carried across the State to assess preparedness for earthquakes.	Revenue (DM) Department	Every year
25.	International Day of Disaster Reduction shall be celebrated on 13 October every year to create awareness about the importance of DRR for saving lives and livelihoods of people.	Revenue (DM) Department	Every year
26.	Web enabled resource inventory of IDRN shall be updated at least once a month by district authorities.	Deputy Commissioners	Continuous
27.	Connectivity and operational readiness of network of helipads shall be ensured during emergency situations.	Civil Aviation Departments/ Deputy Commissioners	Continuous



6.1 Introduction

Disaster response is the manner in which Government agencies at different levels, along with the communities and other stakeholders, respond to the events of disaster in order to save lives, ensure public safety and meet the basic subsistence needs of the affected people. The types of response would depend on the magnitude of disasters. Disasters of a minor nature are responded to by the local government with or without assistance from higher authorities. Assurances of state or national governments are sought when it overwhelms the capacity of local or state governments respectively. Catastrophic disasters require coordinated response of governments at all levels, and if need be, with international support and assistance.

Disaster response has two dimensions requiring interventions to address these two different but interrelated aspects of disaster management:

- a) **Emergency response** when the focus is to save lives of people affected by disaster -Search, rescue and evacuation of people to safe locations, emergency medical assistance, disposal of dead bodies etc. are the typical activities of emergency response. Emergency response further includes emergency restoration of critical utilities such as telecommunication, electricity, water supply etc. This phase continues for a period of one to 15 days depending on the gravity of situations.
- b) **Humanitarian response** when the focus is to provide short term relief to the affected people such as food, water, shelter, medical assistance, psycho-social counselling etc. - This phase may continue for 15 days to three months or even longer if residential houses of the victims are damaged to the extent that these would require major repairs or reconstruction. This phase is also known as 'early recovery' phase of disaster response.

The division between emergency and humanitarian response is not very clear-cut. There are specialized agencies responsible for these two functions, but the coordinating mechanisms are common. Humanitarian response may follow or start simultaneously with emergency response but it usually continues well beyond the emergency phase.

Responding to disasters is difficult and challenging. The tasks of response are performed well when there is a clearly articulated response plan that defines the institutional mechanisms for response, outlines the functions to be performed by each agency, and prescribes the process to be followed for performing various response functions.

6.2 Responsibility Matrix of Disaster Response

National Disaster Management Plan 2016 has developed a Responsibility Matrix outlining 18 major tasks of disaster response for the State Government. These are as follows:

- a) Early Warning, Maps, Satellite inputs, Information Dissemination
- b) Evacuation of People and Animals
- c) Search and Rescue of People and Animals
- d) Medical care
- e) Drinking Water / Dewatering Pumps / Sanitation Facilities / Public Health
- f) Food & Essential Supplies



- g) Communication
- h) Housing and Temporary Shelters
- i) Power
- j) Fuel
- k) Transportation
- l) Relief Logistics and Supply Chain Management
- m) Disposal of animal carcasses
- n) Fodder for livestock in scarcity-hit areas
- o) Rehabilitation and Ensuring Safety of Livestock and other Animals, Veterinary Care
- p) Data Collection and Management
- q) Relief Employment
- r) Media Relations

Activities to be carried out on each of these tasks of the matrix are detailed in Annexure IV.

Early warning and communication have been discussed in the preceding chapter on Disaster Preparedness. The remaining tasks and other relevant issues are structured on the following six themes in this chapter:

- a) Institutional Mechanisms
- b) Trigger Mechanisms
- c) Incident Response Systems
- d) Emergency Response Functions
- e) Emergency Support Functions
- f) Humanitarian Logistics and Relief

6.3 Institutional Mechanisms

Institutional mechanisms are provided mainly under the Disaster Management Act, but there are significant institutional arrangements for disaster management outside the framework of the Act.

6.3.1 Institutional Mechanisms under Disaster Management Act

Responding to disasters in the State is primarily the responsibility of the State Government, but the Central Government and its agencies have important role to play for responding disasters in the State. The Disaster Management Act 2005 has defined the roles and responsibilities of various agencies of State and Central governments for disaster response as under:

- i. **State Government:** Section 38(2) of the Act provides the State Government is responsible to:
 - a) Ensure that State Government departments and district authorities take appropriate preparedness measures;
 - b) Ensure that in a threatening disaster situation or disaster, resources of different departments are made available to the State Executive Committee or the District Authorities for the purposes of effective response, rescue and relief; and
 - c) Provide rehabilitation and reconstruction assistance to the victims of any disaster.
- ii. **State Disaster Management Authority:** SDMA under the chairpersonship of Chief Minister is responsible for the following response functions:
 - a) Define the State Disaster Management Policy which includes the policy regarding disaster response; and
 - b) Approve the SDMP, which shall define the roles and responsibilities of each department of the State Government in responding to any threatening disaster situation or disaster.

- iii. **State Executive Committee:** State Executive Committee (SEC) under the chairpersonship of Chief Secretary is responsible for the following response functions:
- Evaluate preparedness at all Government or non-governmental levels to responds to any threatening disaster situation or disaster and give directions for enhancing such preparedness;
 - Coordinate response in the event of any threatening disaster situation or disaster; and
 - Give directions to line departments or any other authority or body in the State regarding actions to be taken in response to any threatening disaster situation.
- iv. **District Disaster Management Authority:** DDMA, under the chairpersonship of the Deputy Commissioner of the district, is responsible for the following response functions:
- Prepare disaster management plan including district response plan for the district, and review and update the plan;
 - Ensure the district level departments and local authorities prepare their response plans in accordance with district response plan;
 - 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;
 - Review the preparedness measures and give directions to the concerned departments at the district level or other concerned authorities for bringing the preparedness measures to the levels required for responding effectively to any disaster or threatening disaster situation;
 - Coordinate response to any threatening disaster situation or disaster;
 - Lay down guidelines for, or give direction to, the concerned Department or authorities within the local limits of the district to take measures to respond effectively to any threatening disaster situation or disaster;
 - Identify buildings and places which could, in the event of any threatening disaster situation or disaster, be used as relief centres or camps and make arrangements for water supply and sanitation in such buildings or places; and
 - Establish stock piles of relief and rescue materials or ensure preparedness to make such materials available at a short notice.
- v. **Local Authorities:** Section 41(1) of the Act provides that the urban and rural local authorities in the State shall be responsible to:
- Ensure that resources relating to disaster management are so maintained as to be readily available for use in the event of any threatening disaster situation or disaster; and
 - Carry out relief, rehabilitation and reconstruction activities in affected area in accordance with State Plan and District Plan.

The Disaster Management Act 2005 has defined the roles and responsibilities of various agencies of Central governments for disaster response as under:

- i. **Central Government:** Several provisions of the Disaster Management Act have defined the responsibilities of the Central Government for responding to disasters in the State. These are as follows:
- Section 35(2)(e) of the Act provides that the Central Government shall extend necessary cooperation and assistance to the State Governments, as requested by them or otherwise deemed appropriate by it;
 - Section 35(2)(e) of the Act stipulates that the Central Government shall deploy naval, military and air forces of the Union or any other civilian personnel as may be required.
 - Sections 36(f) and 36(g) provides that it shall be the responsibility of every Ministry of Department of the Government of India to provide assistance to the State Governments for

- a) Carrying out rescue and relief operations in the affected areas;
- b) Providing emergency communication in a vulnerable or affected area;
- c) Transporting personnel and relief goods to and from the affected area;
- d) Providing evacuation, rescue, temporary shelter or other immediate relief;
- e) Setting up temporary bridges, jetties and landing places; and
- f) Providing, drinking water, essential provisions, healthcare, and services in an affected area.

ii. **National Executive Committee:** The National Executive Committee has the following responsibilities for disaster response in the States:

- a) Coordinate response in the event of any threatening disaster situation or disaster;
- b) Lay down guidelines for, or give directions to the State Government and the State Authorities regarding measures to be taken by them in response to any threatening disaster situation or disaster; and
- c) Require any department or agency of the Government to make available to the State Authorities such men or material resources as are available with it for the purpose of emergency response, rescue and relief.

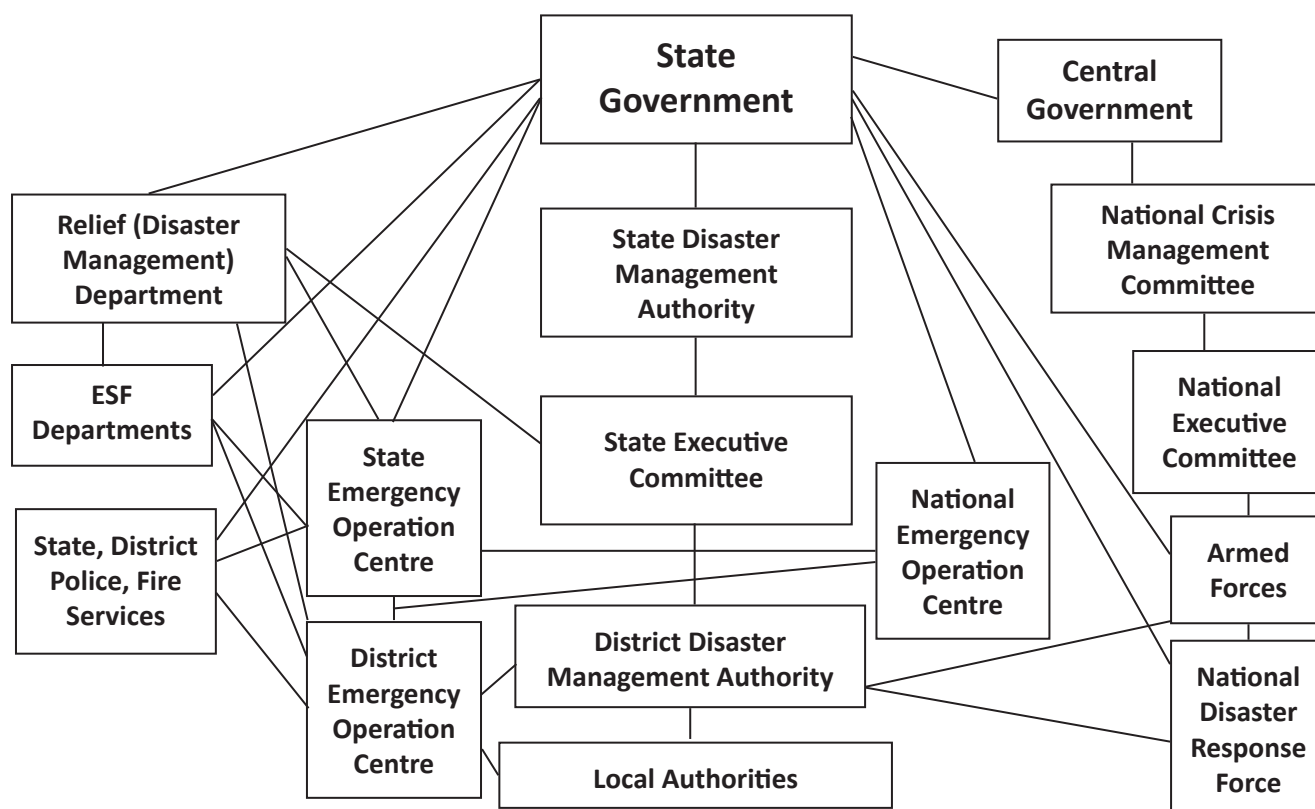
iii. **National Disaster Response Force:** NDRF shall provide specialist response to a threatening disaster situation or disasters.

6.3.2 Institutional Arrangements Outside the Disaster Management Act

Outside the framework of the Disaster Management Act, there are significant institutional arrangements that play an important role during disaster response. Some of these institutional arrangements are as follows.

- a) **National Crisis Management Committee:** National Crisis Management Committee (NCMC) headed by the Cabinet Secretary of Government of India oversees and coordinates the arrangements of disaster response requiring assistance of various agencies of Government of India. Representatives of all concerned Ministries and Departments of Government of India, the Armed Forces and other agencies, as required, are represented in NCMC which plays crucial role during the initial days of emergency and humanitarian response. The Cabinet Secretary reports directly to Prime Minister and takes his/her approval for assisting the States in disaster response.
- b) **Armed Forces:** The State Government can requisition the Armed Forces when the situation is beyond their coping capability. On account of their vast potential to meet any adverse challenge, speed of operational response and the resources and capabilities at their disposal, the Armed Forces play a major role in ESFs. These include communication, search, rescue and evacuation operations, health and medical facilities, and transportation, including airlift and heli-lift operations.
- c) **State Police Forces and Fire Services:** The State Police Forces and the Fire Services are crucial immediate responders to disasters. The Police Forces can be trained and the Fire Services upgraded to acquire multi-hazard rescue capability.
- d) **Civil Defence and Home Guards:** Mandates of the Civil Defence and the Home Guards have been redefined to assign an effective role in disaster management. The personnel of Civil Defence and Home Guards can be deployed for community preparedness and public awareness.
- e) **State Disaster Response Force:** Several State Governments have constituted specialized State Disaster Response Force (SDRF). The State Disaster Management Policy 2012 had proclaimed that “the SDRF will be created as per requirement of the State and this will include women members for looking

FIGURE-6.1: ARCHITECTURE OF DISASTER RESPONSE IN THE STATE OF HIMACHAL PRADESH



after the needs of women and children”. A proposal for setting up SDRF in Himachal Pradesh is already under consideration by the State Government. The decision in this regard shall be expedited. Till the SDRF is set up, one reserve battalion of the State Police shall be equipped and trained for deployment for discharging responsibilities of disaster response such as evacuation, search and rescue. NDRF battalions and their training institutes shall be utilized for training the SDRF/reserve battalion. As stated in the State Disaster Management Policy, ‘adequate mitigation reserves’ shall be placed at strategic locations to augment the resources of the State Police for enhancing their emergency response capabilities.

- f) **National Service Scheme and Nehru Yuva Kendra Sangathan:** These youths based organizations with units in every college, university and district can play an important role in supporting rural and urban communities who are the first responders.

All these institutional mechanisms can be mobilized to effectively respond to any disaster situation in the State.

6.4 Incident Response System

Effective response to emergency situation requires a high degree of coordination among various departments and agencies within and outside Government at different levels for performing multiple tasks in an integrated and time bound manner for achieving specific results. Such types of integration and coordination are usually not available in the normal administrative systems and processes.

6.4.1 NDMA Guidelines on IRS

NDMA has developed an Incident Response System (IRS) as an effective mechanism for performing various tasks

of disaster response irrespective of the complexities of disasters and issued comprehensive guidelines for the same.

As per these guidelines, Responsible Officers (ROs) shall be designated at State and district levels to be overall in charge of incident response management. The RO may delegate responsibilities to the Incident Commander (IC), who in turn will manage the incident through an Incident Response Team (IRT).

IRT has two wings: Command and General. The Command wing consists of Information & Media Officer, Safety Officer and Liaison Officer. They report directly to the IC. The General wing has three sections: (a) Operations Section which is responsible for directing the required tactical actions to meet incident objectives; (b) Planning Section which is responsible for collection, evaluation and display of information, maintaining and tracking resources and preparing the daily Incident Action Plan; and (c) Logistics & Finance Section which is responsible for providing facilities, services, materials, equipment and other resources in support of the incident response. These sections can be expanded or contracted according to the complexities of disasters.

6.4.2 SDMP Stipulations on IRS

Based on the NDMA guidelines, the State Disaster Management Plan 2012 provided a blueprint for introducing IRS for disaster management in the State of Himachal Pradesh. The Chief Secretary was designated as the RO at the State level and Deputy Commissioner as RO at district level.

Coordination of Response at the State Level:

The State Government / CS will designate various officers of line departments for the corresponding IRS positions to perform their duties. Being the administrative head of the State as well as the CEO of SDMA, the CS is designated as the RO of the State. She/he may delegate some of his functions to the Secretary, DM of the State, for the day to day supervision and management of the incident. She/he will however remain fully briefed by SEOC and IC and be aware of all developments and progress of response activities at all times. In case an incident is beyond the control of a District administration or a number of Districts are affected, the RO of the State will consider setting up of an Area Command and designate an Area Commander (AC). He may consider the Divisional Commissioner to act as AC or may deploy appropriate/suitable officer irrespective of seniority. The RO may also deploy some supporting staff to assist him.

Roles and Responsibilities of Chief Secretary as RO of the State:

1. The Chief Secretary who is the head of the State administration and also chairperson of SEC and CEO of SDMA, will perform responsibilities laid down under clause 22 (2) and 24 of the DM Act, 2005;
2. Ensure that IRTs at State, District, Sub-Division, and Tehsil/Block are formed and IRS is integrated in the State and District Disaster Management Plan;
3. Ensure that a reasonable amount of interest fund is sanctioned clearly delineating the procedure for emergency procurement;
4. Ensure funds of 14th Finance Commission for capacity building of administrative machinery in DM is spent appropriately;
5. Ensure that IRS is incorporated in the training syllabus of ATIs and other training institutions of the State;
6. Ensure that effective communication and web based / online Decision Support System (DSS) is in place in the SEOC and connected with District, Sub-Division, Tehsil/Block level IRTs for support;
7. Ensure that toll free emergency numbers existing in the State for Police, Fire and Medical support are linked to the EOC for response, command and control;
8. Activate IRTs at State headquarters when the need arises and issue order for their demobilization on completion of response;
9. Set overall objectives and incident related priorities;
10. Identify, mobilize and allocate critical resources according to established priorities;

11. Ensure that local Armed Forces Commanders are involved in the Planning Process and their resources are appropriately dovetailed, if required;
12. Ensure that when NDRF and Armed Forces arrive in support for disaster response, their logistic requirements like, camping ground, potable water, electricity and requirement of vehicles etc. are taken care of;
13. Coordinate with the Central Government for mobilization of Armed Forces, air support etc. as and when required;
14. Identify suitable nodal officer to coordinate air operations and ensure that all District ROS are aware of it;
15. Consider the need for the establishment of Area Commander, if required;
16. Establish Unified Command if required and get the approval of the Chief Minister;
17. Ensure that telephone directory of all ESF is prepared and available with EOC and IRTs;
18. Ensure use of Global Positioning System (GPS) technology in the vehicles (Police, Fire, Ambulance etc.) to ensure connectivity for their effective utilization;
19. Keep the chairperson of SDMA informed of the progress of incident response;
20. Ensure that the NGOs carry out their activities in an equitable and non-discriminatory manner;
21. Conduct post response review on performance of IRTs and take appropriate steps to improve performance; and
22. Take such other necessary action as the situation demands.

Roles and Responsibilities of Deputy Commissioner as RO:

1. Ensure that IRTs are formed at District, Sub-Division, Tehsil/Block levels and IRS is integrated in the District Disaster Management Plan as per Section 31 of the Disaster Management Act, 2005. This will be achieved by issuing a Standing Order by the RO to all Sub Divisional Magistrates and Tehsildars/ Block Development Officers;
2. Ensure web based / online DSS is in place in DEOC and connected with Sub-Division and Tehsil / Block level IRTs for support;
3. Ensure that toll free emergency numbers existing for Police, Fire and Medical support etc. are linked to the DEOC for response, command and control;
4. Obtain funds from State Government to ensure that a training calendar for IRTs of District is prepared and members of IRTs are trained through HIPA and other training institutions at the District;
5. Delegate authorities to the Incident Commander;
6. Activate IRTs at District headquarter, Sub-Division, Tehsil / Block levels, as and when required;
7. Appoint / deploy, terminate and demobilize IC and IRT(s) as and when required;
8. Decide overall incident objectives, priorities and ensure that various objectives do not conflict with each other;
9. Ensure that IAP is prepared by the Incident Commander and implemented;
10. Remain fully briefed on the IAP and its implementation;
11. Coordinate all response activities;
12. Give directions for the release and use of resources available with any department of the Government, local authority, private sector etc. in the district;
13. Ensure that local Armed Forces Commanders are involved in the planning process and their resources are appropriately dovetailed, if required;
14. Ensure that local Armed Forces Commanders are involved in the planning process and their resources are appropriately dovetailed, if required;
15. Appoint a nodal officer at the district level to organize air operations in coordination with the State and Central Government and also ensure that all ICs of IRTs of the District are aware of it;
16. Ensure that the NGOs carry out their activities in an equitable and non- discriminatory manner;
17. Deploy the District Headquarter IRTs at the incident site, in case of need;

18. Ensure that effective communications are in place;
19. Ensure that telephone directory of all ESFs is prepared and available with EOC and members of IRTs;
20. Ensure provision for accountability of personnel and a safe operating environment;
21. In case the situation deteriorates, the RO may assume the role of the IC and may seek support from the State level RO;
22. Mobilize experts and consultants in the relevant fields to advise and assist as s/he may deem necessary;
23. Procure exclusive or preferential use of amenities from any authority or person;
24. Conduct post response review on performance of IRTs and take appropriate steps to improve performance; and
25. Take other necessary action as the situation demands.

6.4.2.1 Area Command (AC)

SDMP 2012 further provided that various officers of the line departments may be designated for the corresponding IRS positions. The Chief Secretary may delegate some of his functions to the Secretary, Disaster Management of the State for the day to day supervision and management of the incident. In case a disaster affects more than one district, the concerned Divisional Commissioner may be designated as the Area Commander, whose roles and responsibilities may be as follows:

1. Ensure that incident management objectives are met and do not conflict with each other;
2. Allocate critical resources according to identified priorities;
3. Ensure proper coordination in the management of incidents;
4. Ensure resolution of all conflicts in his/her jurisdiction;
5. Ensures effective communications;
6. Identify critical resource needs and liaise with the SEOC for their supply;
7. Provide for accountability of personnel and ensure a safe operating environment; and
8. Perform any other tasks as assigned by the RO.

6.4.2.2 Unified Command (UC):

SDMP 2012 further suggested that a Unified Command headed by the Chief Minister may be established when a catastrophic disaster involving large areas and multiple agencies strikes the State and there is a critical need for single operational command for managing the event. UC will incorporate the following components:

1. A collective approach for developing strategies to achieve incident goals;
2. Improved information flow and inter-agency coordination;
3. Familiarity with responsibilities and constraints of other agencies;
4. Respect for the authority or legal responsibilities of all agencies;
5. Optimal synergy of all agencies for the smooth implementation of the IAP;
6. Elimination of duplication of efforts.

6.4.3 Operationalizing IRS in Himachal Pradesh

Success of IRS requires high degree of understanding of the technical, functional and operational aspects of the system which is possible through training on different aspects of the system. Universal application of the system for management of every type of disaster may not be necessary as most of the disasters in the State can be managed at the local level. Application of IRS would be useful for management of major disasters due to the inherent nature of complexities of the disasters.

Training and Simulation exercises will help in operationalising the IRS as per NDMA guidelines. State, district and sub-district level officials as stipulated in the IRS Guidelines of NDMA in the State shall be trained on all the modules of the IRS so that they have a comprehensive understanding and requisite skills for practising IRS as per the guidelines of NDMA. The National Institute of Disaster Management (NIDM) has developed training

modules on all aspects of IRS and further trained a core group of trainers. NIDM/ core trainers may be asked to conduct series of training programmes in the State to train all the target group of officers. HIPA, Shimla shall also conduct courses in IRS.

6.5 Trigger Mechanism

The Trigger Mechanism prescribes the manner in which the disaster response system shall be activated after receiving early warning signals of a disaster happening or likely to happen or on receipt of information of an incident. The objective of having a trigger mechanism is to have a Suo moto activation mechanism for spontaneous response to set in motion command, control and management of the situation so that no time is lost in response as time is of the essence for saving precious human lives during disasters.

There shall be two types of situation with different trigger mechanisms for disasters:

- (i) Situation I -Where early warning signals are available
- (ii) Situation II- Where disaster occurs without early warning

6.5.1 Where Early Warning Signals are Available

At the national level, Nodal Agencies have been designated for forecasting events of natural disasters. The onset of a disaster shall be indicated by the Nodal Agencies with regard to their respective hazards to NEOC, MHA as per protocol.

Based on the forecasts from Nodal Agencies, NEOC, MHA shall be responsible to issue Watch, Alerts and Warning to SEOC, DEOC, State and district level designated authorities. As soon as the Watch/Alerts/warning has been issued by the NEOC to the SEOC, DEOC and other designated authorities, SEOC and DEOC shall be fully activated.

SEOC and DEOC shall activate State/district/sub-division/block level administrative machinery to respond to the situation with available manpower and resources. The first and foremost task shall be to inform the community likely to be affected by the disaster through a warning system and undertake evacuation. There shall be only one responsible agency/officer designated and authorized to issue the warning in respect of a disaster at State and district levels to avoid miscommunication or indiscriminate warning which may result in non-responsiveness of the people.

Dissemination of warning to common people may range from alarms (fires), sirens (industrial disaster), to public announcement system like radio, television, loud speakers, hoisting of flags (floods, and landslides).

Once the warning is issued it shall be followed up by subsequent warnings and de-warning in order to keep the people informed of the latest situation. The warning protocols shall be designed in simple and local languages easily understandable to the community.

DDMAs/district/local authorities shall take pre-emptive measures of evacuation. A comprehensive Standing Order, listing all necessary pre-emptive measures based on the warning, will be prepared at the district and the State level. Thereafter, follow up action shall be undertaken by all concerned at all levels as envisaged under Response Phase.

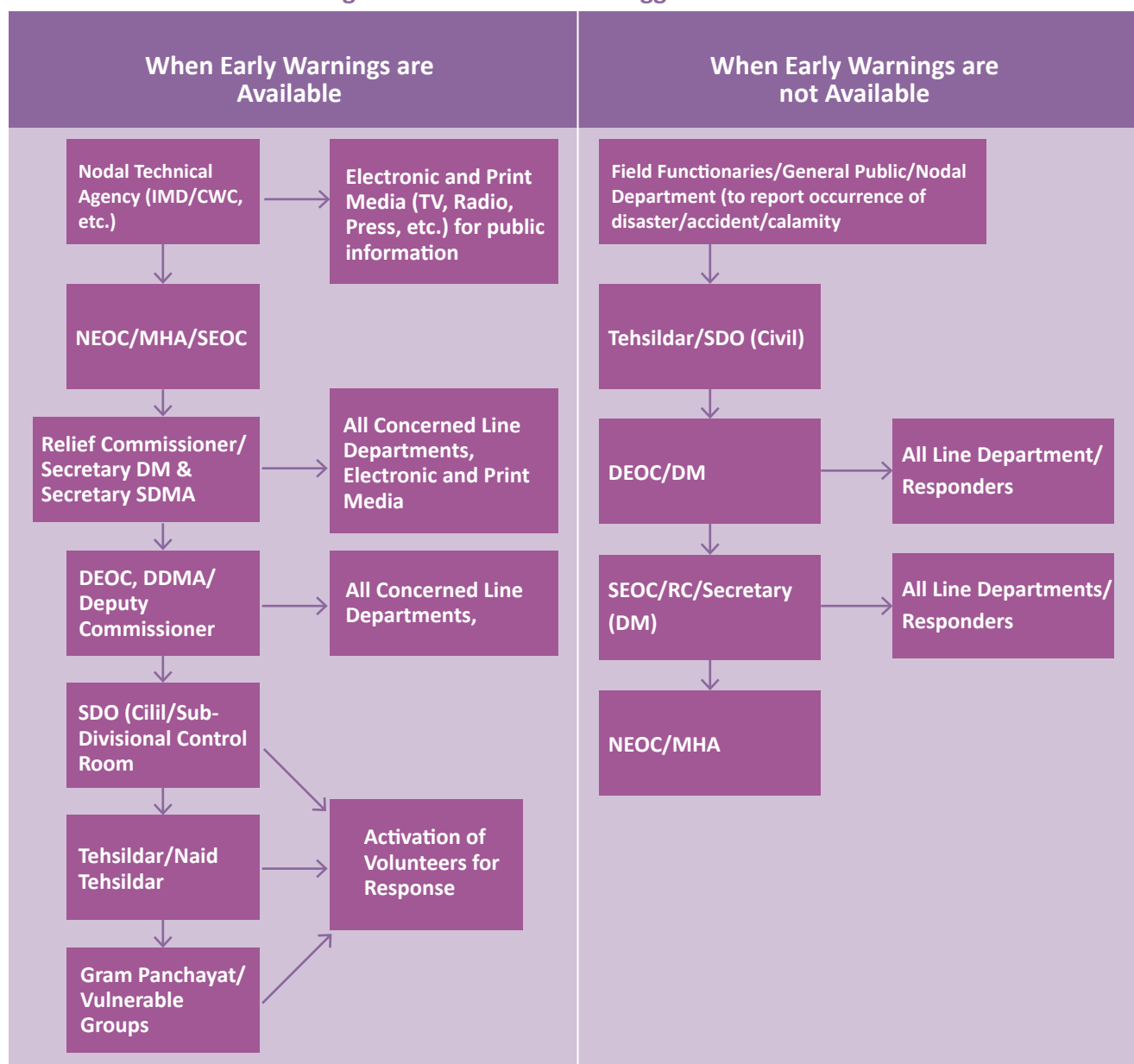
Standing Order will be reviewed annually and widely circulated among all concerned. The evacuation drill with community participation at the sub-divisional and district levels before onset of the monsoon period will be carried out.

6.5.2 Where Disaster Occurs Without Early Warning

In disaster situations where no early warning signals are available, the primary objective of the trigger mechanism shall be to mount immediate rescue and relief operations and set the process rolling as quickly as possible. The following procedure shall be followed in such situations:

- The field functionary at ground zero/nodal departments shall inform the DEOC, District Magistrate, Sub Divisional Officer (Civil) of the incident.
- DEOC shall be fully activated for managing the incident.
- DEOC/District Magistrate shall inform the SEOC/ SDMA and SEC and seek assistance if required.
- SEC will be activated and NEOC will be informed. FIR will be submitted to NEOC.

Figure-6.2: Flow Chart of Trigger Mechanism



Source: Standard Operating Procedure on Disaster Response, 2012

6.5.3 Sequence of Response Action at District level

The following shall be the sequence of response action at the district level:

- a) District Emergency Operation Centre (DEOC):
 - i) On receipt of information either from NEOC/SEOC or from early warning agencies, Nodal Departments or field functionaries from Sub-divisions, Blocks, Tehsils or any other reliable sources, District Emergency Operation Centre shall be activated fully as per laid down protocol.
 - ii) DEOC shall issue alerts/warning to all designated authorities at the District and local level. DEOC shall send FIR to SEOC and thereafter, Daily Situation Report till the situation normalizes.
 - iii) DEOC shall collect all relevant information and appraise the status to the designated decision making authorities.
 - iv) DEOC shall maintain all records and documents related to response.
 - v) DEOC shall activate ESFs of the district if the situation so warrants.
- b) District Disaster Management Authority:
 - i) DDMA shall assess the situation and give directions to the concerned line departments/agencies at the district level regarding measures to be taken by them in response to any specific threatening disaster situation or disaster.
 - ii) DDMA shall take such other action as may be necessary for coordinated response to natural disasters. These may include the following:
 - a. Assessing situations based on reports received from various sources and giving directions to different agencies for immediate response, relief and restoration of critical infrastructure;
 - b. Reviewing the resources and capacities of different agencies to deal with the situations and giving directions for pooling available manpower, equipment, and resources available with different agencies for speedy and effective response;
 - c. Requisitioning assistance from NDRF/ Armed Forces/ other specialized agencies, if necessary;
 - d. Coordinating with civil society and NGOs for supplementing the efforts of Government agencies; and
 - e. Monitoring and reviewing the situations on a regular basis.

6.5.4 Sequence of Response Action at State Level

The following shall be the sequence of action to be taken at the State level by various authorities and agencies if the magnitude of the disaster is such that it is beyond the coping capacity of the district administration.

- a) **State Emergency Operation Centre:**
 - i) On receipt of information either from NEOC/DEOC or from early warning agencies or any other reliable sources, SEOC shall be activated fully as per protocol.
 - ii) SEOC shall issue alerts/warning to all designated authorities at the State level and districts including for public information to All India Radio/Doordarshan/press.
 - iii) SEOC shall send FIR to NEOC, MHA and thereafter Daily Situation Report till situation normalizes.
 - iv) SEOC shall collect all relevant information and appraise the status to the designated decision making authorities.
 - v) SEOC shall arrange meetings of SEC.
 - vi) SEOC shall activate ESFs of State if the situation so warrants.

- b) State Disaster Management Authority:**
- (h) Meeting of the SDMA shall be convened on the direction of the Chief Minister.
 - (i) SDMA will take stock of the situation.
 - (j) SDMA shall give necessary directions to SEC, Department of Disaster Management and other departments/agencies of the State Government and concerned DDMA.
 - (k) SDMA shall decide on inter-state assistance and cooperation.
- c) State Executive Committee:**
- i) Secretary (Disaster Management) shall convene the meeting of SEC.
 - ii) SEC shall assess the situation and give directions to the concerned Departments/agencies of the State Government and DDMA concerned regarding measures to be taken by them in response to any specific threatening disaster situation or disaster.
 - iii) SEC shall coordinate response of various agencies.
 - iv) SEC shall requisition NDRF or Armed Forces if the situation so demands.
 - v) SEC may depute a team of officials to visit the affected districts for on-the-spot assessment of the situation and supervise the response and relief measures.
 - vi) SEC shall mobilize resources and dispatch them to concerned districts.
 - vii) SEC shall monitor and review the situation on a regular basis.
 - viii) SEC shall keep SDMA, NEC and NDMA informed of the situation.
 - ix) SEC shall constantly evaluate its own capabilities to handle the situation and project the anticipated requirements for the Central resources well in time.
 - x) In the event of a calamity of severe nature, the SEC will consider appointment of Senior Officers, delegate powers and assign specific areas for timely and effective, efficient management of disasters.
 - xi) SEC will also take necessary steps to pool the resources for better management of crisis situation. This includes the pooling of food grains funds and other resources available in the districts under various Government schemes. However, these resources will be reimbursed to the respective schemes/Departments once the situation becomes normal.
- d) Role of Other Departments/Agencies:**
- i) On activation of State ESF Plan, the concerned Department/Agency shall depute the designated officials to SDOC for coordination of response measures.
 - ii) Departments/Agencies shall coordinate with their National counterparts and mobilize central assistances, such as specialized manpower, equipment, materials etc. to meet immediate needs in their respective sectors.
 - iii) Departments/Agencies shall provide resources both in terms of manpower and material for assistance to the DDMA.

6.6 Emergency Response Functions

The core emergency response functions during and in the immediate aftermath of disasters include evacuation, search and rescue of people and animals affected by disasters, provision of emergency medical care, food, water and shelter, disposal of dead bodies and animal carcasses, and restoration of critical facilities like communication, electricity and water supply.

6.6.1 Level of Disasters

Emergency response and support functions to be performed during disasters shall depend on the level of disasters. The National Disaster Management Plan 2016 has referred to the classification of disasters into three

levels – L1, L2 and L3, according to the capacity of the authorities to deal with disaster situations.

Level-L1: The level of disaster that can be managed within the capabilities and resources at the district level. However, the State authorities will remain in readiness to provide assistance if needed.

Level-L2: This level signifies the disaster situations that require assistance and active mobilization of resources at the State level and deployment of State level agencies for disaster management. The Central agencies must remain vigilant for immediate deployment if required by the State.

Level-L3: This level corresponds to a nearly catastrophic situation or a very large-scale disaster that overwhelms the State and district authorities.

For Level-L1 disasters, the emergency response functions of search, rescue, evacuation and medical treatment of the affected persons can be handled by the district administration with locally available police, home guards, civil defence, fire and emergency service, hospitals and dispensaries.

For Level-L2 disasters, the district administration shall seek support from the State Government through Revenue (Disaster Management) Department. The State Government shall augment the resources of the district administration or requisition the services of NDRF to assist the State Government in emergency response functions. The Deputy Commissioner can requisition the NDRF directly and inform the State Government.

For Level-L3 disasters, the State Government/ district administration has no other alternative but to depend on the services of the Armed Forces.

6.6.2 Liaison with NDRF, RRC and Armed Forces

It is important that the State Government/ district administration maintains close liaison with the NDRF so that their services can be requisitioned at a very short notice. NDRF Battalion located at Bhatinda, Punjab has been given the responsibility for deployment in Himachal Pradesh.

The Central Paramilitary Forces have set up Regional Response Centres (RRCs) at various strategic locations across the country. The RRCs are equipped with minimum cache of equipment to deal with floods, landslide, earthquakes etc. In emergency situations, the State Government can requisition assistance from these RRCs located in the district headquarter of Kullu, Sarahan in district Shimla and Recong Peo in district Kinnaur.

Being a border and mountainous State, the role of the Armed Forces is very critical in responding to emergency situations in remote and inaccessible pockets of the State. The Deputy Commissioner of the district has the authority to requisition the Armed Forces in specific situations. Liaison meetings shall be held with Army and Paramilitary units located in Himachal every six months to discuss the issues of coordination for emergency response during disasters.

6.6.3 Air dropping of Food in Inaccessible Areas

Airdropping of food and essential commodities shall be undertaken in the inaccessible areas. The State Governments/ district authorities will liaise with Air Force authorities and the NEC, departments and organizations of Home Affairs, Government of India for requisitioning the helicopters.

The agencies for preparing food packets to be air dropped and items as well quantity to be included in the food packets will be communicated by the district administration in advance.

6.6.4 Rapid Damage Assessment

Rescue and relief operations shall be based on ground assessment of damage and losses. Preliminary assessment

shall be carried out immediately within 24 hours for planning the response. Teams shall be constituted of officials drawn from various sectors to make assessment on the basis of on-the-spot visits, aerial surveys and information collected from primary and secondary sources.

6.6.5 Immediate Repair of Infrastructure

The Departments and agencies of the State Government responsible for various infrastructural facilities such as electricity, drinking water, telecommunication etc. shall repair the damage caused by the disaster and will take immediate steps to restore damaged essential services so that rescue and relief operations are conducted smoothly.

6.6.6 Disposal of Dead Bodies

The authorities responsible for disposal of bodies in event of mass casualties shall dispose of dead bodies as per the guidelines issued by the NDMA. The State Government has set up Disaster Victim Identification Cell in State Forensic Science Laboratory, which needs to be further strengthened for mass casualty management. The process of identification and handing over to next of kin shall be followed. Mass burial/disposal of bodies shall be done as a last resort. Local religious and cultural practices shall be honoured while disposing dead bodies.

6.6.7 Disposal of Carcasses

The authorities responsible for disposal of carcass in event of mass casualties shall dispose dead bodies as per the guidelines issued by the NDMA. The process to be followed for mass disposal of carcasses shall be decided by Department of Animal Husbandry.

6.6.8 Information and Media Management

During disaster situations, the dissemination of accurate information through electronic and print media is very important. Regular press releases shall be made by Information & Public Relations Department as a single source of information from Government. If a disaster is localized in a district, Deputy Commissioner of the district shall issue such releases. In order that rumours or wrong information are not floated to create panic among people, quick clarifications shall be made by the spokesperson of the Government. Press briefing by responsible functionary of Government such as Chief Secretary or an appeal on television or radio by Chief Minister shall prove valuable if the situation so demands.

6.7 Emergency Support Functions

Disaster response is a multi-agency function. The Revenue (Disaster Management) Department is the Nodal or Lead Agency which will be responsible for managing and coordinating all the functions of disaster response while other agencies will provide necessary support and assistance in managing the emergency situations. In the specific context of Himachal Pradesh, 17 ESFs have been identified. In order that these functions are performed in smooth, effective and fail-proof manner, there will be one Primary Agency responsible for each ESF, while one Secondary Agency will provide assistance for the performance of the functions. The list of the ESFs, and the Primary and Secondary Agencies is given in Table 6.1.

Table-6.1: Emergency Support Functions, Primary and Secondary Agencies

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency
1.	Communication	Police	Police Units of Armed Forces of the Area
2.	Public Health	Department of Health & Family Welfare	Department of Ayurveda
3.	Sanitation and Sewerage Disposal	Urban Development Rural Development	Irrigation & Public Health Department
4.	Power	HPSEB Ltd.	Himurja
5.	Transport	Department of Transport	HRTC, Civil Aviation, GAD
6.	Search and Rescue	Civil Defence, Home Guards, Fire & Emergency Services	NDRF, SDRF, Armed and Paramilitary Forces, Police, Red Cross, VOs, and 108
7.	Public Works and Engineering	HP PWD	CPWD, National Highways Authority of India, MES, BRO
8.	Information and Communication	Department of Revenue through State EOC	Department of IT NIC
9.	Relief Supplies	Department of Revenue	Department of Food and Civil Supplies
10.	Food Supplies	Department of Food & Public Distribution	Department of Cooperation
11.	Drinking Water	Department of Irrigation & Public Health	Urban Development Department (UDD)
12.	Shelter	Department of Revenue	HIMUDA, HPPWD, UDD, Panchayati Raj
13.	Media	Department of Public Relations	Local Doordarshan and AIR
14.	Helplines	Department of Revenue	Department of Public Relations
15.	Animal Care	Department of Animal Husbandry	Department of Panchayati Raj
16.	Law and Order	Police	Home Guards
17.	Removal of trees and Fuel Wood	Forest	Forest Corporation

The SDMA has issued detailed guidelines for the performance of the ESFs by the primary and secondary agencies. Each agency shall designate the authorities/ officers who would be responsible for the ESFs. SOPs for the functions shall be laid down and incorporated in the Departmental Disaster Management Plans of the respective departments/ agencies. The designated authorities for each ESF shall constitute quick response teams and assign a specific task to each member. An inventory of all the resources required for the functions shall be maintained. The designated authority for each ESF will also enter into pre-contracts for supply of resources, both goods and services to meet the emergency requirements. For this purpose, the designated authorities will be delegated with adequate administrative, legal and financial powers for undertaking the tasks assigned to them.

ESF primary and secondary agencies at State and district levels will operate from the SEOC and DEOCs. Extension teams and workers of each ESF agency will be required to coordinate the response procedures at the disaster affected site.

6.8 Humanitarian Logistics and Relief

In the aftermath of disasters, the affected people must be provided with food, water, shelter, clothing, medical care etc. and looked after for their safety, security and well-being so as to ensure that they are able to live with dignity. The State Government shall be responsible for providing prompt and adequate relief assistance to the victims of disasters. The minimum standards of relief as laid down by the NDMA and the SDMA in terms of Sections 12 and 19, respectively, of the Disaster Management Act shall be complied with.

6.8.1 Food and Nutrition

People affected by disasters may be deprived of food, and therefore food shall be provided to sustain life. The following measures shall be taken:

- i) Where necessary, free distribution of food shall be made to those who need the food most.
- ii) The food distribution will be discontinued as soon as possible.
- iii) Wherever possible, dry rations shall be provided for home cooking.
- iv) Community kitchen for mass feeding shall be organized only for an initial short period following a major disaster, particularly where affected people do not have the means to cook.
- v) While providing food assistance, local food practices shall be kept in mind and commodities being provided must be carefully chosen, in consultation with the affected population.
- vi) Foods must be of good quality, safe to consume, and appropriate and acceptable to recipients.
- vii) Rations for general food distributions shall be adopted to bridge the gap between the affected population's requirements and their own food resources.
- viii) Food distributed should be of appropriate quality and fit for human consumption.
- ix) Food should be stored, prepared and consumed in a safe and appropriate manner at both household and community levels.
- x) Food should be distributed in a responsive, transparent, equitable manner.
- xi) NGOs, community based organizations(CBOs) and other social organizations should be involved for supplementing the efforts of the Government.
- xii) The nutritional needs of the population should be met and malnutrition and micronutrient deficiencies of identified at risk groups addressed.

6.8.2 Water

Water supply is invariably affected during disasters. Safe drinking water might not be available particularly in hydro-meteorological disasters. The following measures shall be taken by the Irrigation and Public Health Department:

- i) The Department shall identify alternative sources of water and make necessary arrangements for supply to the affected population.
- ii) The Department shall ensure that affected people have adequate facilities and supplies to collect, store and use sufficient quantities of water for drinking, cooking and personal hygiene.
- iii) It shall be ensured that drinking water supplied conforms to the prescribed quality standards.
- iv) It shall be ensured that water made available for personal and domestic hygiene should not cause any risk to health.

6.8.3 Health and Medical Response

During post disaster phase, many factors increase the risk of diseases and epidemics. These include poverty, insecurity, overcrowding, inadequate quantity and quality of water, poor environmental and sanitary conditions, and inadequate shelter and food supply. Collapse of buildings and infrastructures, and exposure to flood and avalanche may result critical injuries and other medical conditions. Medical responses to these diseases and injuries have to be quick and effective. The execution of medical response plans and deployment of medical

resources warrant special attention at the State and district level in most of the situations. The following measures shall be taken by the health authorities:

- i) A mechanism for quick identification of factors affecting the health of the affected people shall be established for surveillance and reporting.
- ii) An assessment of the health and nutritional status of the affected population shall be done by experts with experience of emergencies and, if possible, local knowledge.
- iii) The voluntary deployment of the nearest medical resources to the disaster site, irrespective of the administrative boundaries, will be warranted.
- iv) Mobile medical hospitals and other resources available with the Central Government shall be provided to the State.
- v) Adequate supply of medicines, disinfectants etc. shall be made.
- vi) Where necessary, inoculation shall be done.
- vii) Vaccination of the children and pregnant women shall be undertaken.
- viii) Vector-borne diseases are a major cause of sickness and death in many disaster situations. Vector control measures shall be undertaken.
- ix) Water borne diseases may cause sickness and deaths, and therefore, adequate measures shall be taken to prevent such outbreaks.

6.8.4 Mental Health Services

Disasters cause tremendous mental trauma to the survivors. Psychosocial support and mental health services should be made available immediately in the aftermath of disaster so as to reduce the stress and trauma of the affected community and facilitate speedy recovery. The following measures shall be undertaken by Health Department:

- i) A Nodal Mental Health Officer shall be designated for each affected District.
- ii) Rapid needs assessment of psychosocial support shall be carried out by the Nodal Officer/ Health Department.
- iii) Trained manpower for psychosocial and mental health services shall be mobilized and deputed for psychosocial first aid and transfer of critically ill persons to referral hospitals.
- iv) Psychosocial first aid shall be given to the affected community/population by the trained community level workers and relief and rescue workers.
- v) Psychosocial first aid givers shall be sensitized to local, cultural, traditional and ethical values and practices.
- vi) Psychosocial support and mental health services shall be arranged in relief camps setup in the post disaster phase.
- vii) Where large number of disaster victims have to be provided psychosocial support, a referral system for long term treatment shall be followed.
- viii) The services of NGOs and CBOs may be requisitioned for providing psychosocial support and mental health services to the survivors of the disasters.
- ix) Community practices such as mass prayers, religious discourse etc. should be organized with the preventive and promotive mental health services.

6.8.5 Clothing's and Utensils

During disasters, people lose their clothing and utensils. The following measures shall be taken by State/district authorities:

- i) The people affected by the disaster shall be provided with sufficient clothing's, blankets etc. to ensure their dignity, safety and well-being.
- ii) Each disaster-affected household shall be provided with cooking and eating utensils.

6.8.6 Shelter

In a major disaster, a large number of people are rendered homeless. In such situations, shelter becomes a critical factor for survival of the affected people in the initial stages of a disaster. Further, shelter becomes essential for safety and security and for protection from adverse climatic conditions. Shelter is also important for human dignity and for sustaining family and community life in difficult circumstances. The following measures shall be taken by district authorities for providing shelter to the affected people:

- i) Disaster-affected people who have lost their dwelling units or where such units have been rendered damaged/useless shall be provided sufficient covered space for shelter.
- ii) Disaster-affected households shall be provided access to appropriate means and artificial lighting to ensure personal security.
- iii) Disaster-affected households shall be provided with necessary tools, equipment and materials for repair, reconstruction and maintenance for safe use of their shelter.

6.8.7 Relief Camp

The following steps shall be taken for setting up relief camps in the affected areas:

- i) Adequate numbers of buildings or open space shall be identified where relief camps can be set up during emergency.
- ii) The use of premises of educational institutions for setting up relief camps shall be discouraged.
- iii) One member of the IRT of the district trained in running and management of relief camps will be deputed for management of relief camps.
- iv) The requirements for operation of relief camps shall be worked out in detail in advance.
- v) Agencies to supply the necessary stores will be identified in the pre-disaster phase.
- vi) The temporary relief camps will have adequate provision of drinking water and bathing, sanitation and essential health-care facilities.
- vii) Adequate security arrangements shall be made by local police.
- viii) Adequate lighting arrangements shall be made in the camp area including at water points, toilets and other common areas.
- ix) Wherever feasible, special task forces from amongst the disaster-affected families will be set up to explore the possibility of provision of food through community kitchens, provision of education through the restoration of schools and anganwadis.
- x) Efficient governance systems like entitlement cards, identification cards, and bank accounts for cash transfers etc. shall be developed.

6.8.8 Sanitation and Hygiene

Sanitation services are crucial to prevent an outbreak of epidemics in the post disaster phase. Therefore, a constant monitoring of any such possibilities will be necessary. It should be ensured that disaster-affected households have access to sufficient hygiene measures. Soap, detergents, sanitary napkins and other sanitary items should be made available to ensure personal hygiene, health, dignity and well-being. In the relief camps, toilets should be sited, designed, constructed and maintained in such a way as to be comfortable, hygienic and safe to use.

6.8.9 Provision of Intermediate Shelters

In the case of devastating disasters such as earthquake where extreme weather conditions can be life-threatening or when the period of stay in temporary shelters is likely to be long and uncertain, the construction of intermediate shelters with suitable sanitary facilities will be undertaken to ensure a reasonable quality of life to the affected people. Such shelters shall be designed to be cost-effective and as per local needs.

6.8.10 Management of Relief Supplies

Speedy supplies of relief materials shall be ensured in relief operations. A supply chain management system shall be developed. SOPs shall be put in place for ensuring the procurement, packaging, transportation, storage and distribution of relief items. A mechanism shall be developed for receiving donations in cash or kind and their distribution.

6.8.11 Transparency in Relief

SDMA/DDMAs shall take all appropriate measures for transparency in the relief operations. Affected people shall be apprised of the nature and quantum of relief admissible to them. Proper formats will be developed to acknowledge the receipt of relief materials and their further distribution

6.9 Disaster Specific Response

While response to every type of disaster is the same as stated above, specific types of disasters have unique demands that should be taken in consideration for effective response. Disaster-specific response with respect to four major disasters common to Himachal Pradesh, namely earthquake, landslide, flash floods and snow avalanche, are provided in Annexure VII.

6.10 Actions Points for Disaster Response and Relief

The action points for disaster response and relief to be undertaken by various agencies are summarized in Table 6.2. Most of these actions shall be taken during the post disaster response and relief phase and are already detailed in the SOPs of EOC, Guidelines of SDMA on ESFs and Disaster Management and Relief Manual of the State Government. Most of the action on response and relief shall be taken as and when required, but there are several actions on which advance actions are required to be taken by the concerned agencies. The time frame for such actions is mentioned in Table 6.2.

Table-6.2: Actions Points for Disaster Response and Relief

	Action Point	Responsible Agencies	Time Frame
1.	State Government shall expedite constitution of State Disaster Response Force as stated in State Disaster Management Policy 2012.	Revenue (DM)/ Home Department	1 year
2.	SDMA shall issue comprehensive guidelines on adaptation and application of the NDMA guidelines on IRS for the management of disasters in the specific context of the State.	SDMA/Revenue (DM) Department/ Deputy Commissioners	1 year
3.	Officers of the ranks of Deputy Commissioners, Additional Deputy Commissioners and Assistant Commissioners in the State shall be trained on all the modules of the IRS so that they have comprehensive understanding and skills for practising IRS as per the guidelines of NDMA.	Revenue (DM) Department/ HIPA	2 years

	Action Point	Responsible Agencies	Time Frame
4.	As soon as watch/alerts/warning message is issued by the NEOC, SEOC and DEOC shall be fully activated.	Revenue (DM) Department/ NEOC/DEOC	As and when required
5.	Only one responsible agency/officer shall be designated and authorized to issue warning regarding a disaster at State and district levels to avoid wrong or indiscriminate warning.	Revenue (DM) Department/ NEOC/DEOC	As and when required
6.	A Comprehensive Guideline/ Standing Order, listing all necessary pre-emptive measures to be taken for saving human/ animal lives from disasters by evacuation or other measures, based on the warning, shall be issued by the SDMA. Standing Order shall be reviewed annually and circulated widely among all concerned.	SDMA/Revenue (DM) Department/ Deputy Commissioners	1 year
7.	Evacuation drills shall be carried out with community participation at the sub-divisional and district levels before onset of the monsoon.	Revenue (DM) Department/ Deputy Commissioners	Regular
8.	In disaster situations where no early warning is available, immediate rescue and relief operations shall be mounted to set the process rolling as quickly as possible.	Revenue (DM) Department/ Deputy Commissioners	As and when required
9.	Sequence of response actions at State and district levels, as detailed in the HPSDMP shall be followed by all concerned.	All concerned Departments/Agencies at State and district levels	As and when required
10.	State Government/ district administration shall maintain close liaison with NDRF, RRC and Armed Forces so that their services can be requisitioned at a very short notice.	Revenue (DM) Department/ Deputy Commissioners	Regular
11.	Liaison meetings shall be held with Army and Paramilitary units located in Himachal every six months to discuss the issues of coordination for emergency response during disasters.	Revenue (DM) Department/ Deputy Commissioners	Regular
12.	Air dropping of food and essential commodities shall be undertaken in inaccessible areas. State Government/ district authorities shall liaise with Air Force and other agencies for requisitioning the helicopters.	Revenue (DM) Department/ Deputy Commissioners	As and when required

	Action Point	Responsible Agencies	Time Frame
13.	Rescue and relief operations shall be based on ground assessment of damage and losses. Teams constituted of officials drawn from various sectors shall make preliminary assessment on the basis of spot visits, aerial surveys and information collected from primary and secondary sources.	Revenue (DM) Department/ Deputy Commissioners	As and when required
14.	Essential services of electricity, water supply, telecommunication etc. shall be restored by the concerned agencies within earliest possible time.	Concerned agencies of State Govt./district administration	As and when required
15.	In the event of mass casualties, dead bodies shall be disposed of as per the guidelines issued by the NDMA. Recently established Disaster Victim Identification Cell in State Forensic Science Laboratory shall be strengthened suitably.	Home Department/ District administration	As and when required
16.	Mass disposal of animal carcasses shall be carried out under supervision of Animal Husbandry Department as per guidelines of NDMA.	District administration/ Animal Husbandry Department	As and when required
17.	Regular press releases shall be made by Information & Public Relations Department as a single source of information from Government. If a disaster is localized in a district, Deputy Commissioner of the district shall issue such releases.	Information & Public Relations Department/ Deputy Commissioner	As and when required
18.	SDMA has issued detailed guidelines regarding performance of ESFs to be performed by various primary and secondary agencies of the Government. These shall be complied with by all concerned agencies.	All concerned agencies	As and when required
19.	In the aftermath of disasters, the affected people must be provided with food, water, shelter, clothing, medical care etc. and looked after for their safety, security and well-being so as to ensure that they are able to live with dignity. Revenue (DM) Department has issued comprehensive Disaster Management and Relief Manual, which shall be complied with by all concerned.	All concerned agencies	As and when required



7.1 Introduction

Himachal Pradesh has not faced any major catastrophic disaster in the recent past which required large scale post-disaster reconstruction of houses, infrastructure and livelihood of people. However, it has been regularly facing large number of minor disasters in every part throughout the year. The affected people are being provided humanitarian relief as per the norms of the State Disaster Response Fund (previously Calamity Relief Fund). These norms cater to the immediate needs for subsistence but hardly meet the requirements of long term recovery and reconstruction. Therefore, the needs of post-disaster reconstruction remain largely unfulfilled even for minor disasters. In case of catastrophic disasters, the needs for large scale reconstructions would be much more compelling.

HRVA of Himachal Pradesh makes it absolutely clear that the potential risks of catastrophic disasters in the State are very high. Earthquakes of magnitude 8 and above are real-time possibilities and PML in such disasters has been projected to impact severely on the State GDP for several years, affecting the gains achieved for human, social and economic development of the State. This highlights the need for reconstruction of the multi-dimensional damages due to disasters in a planned, systematic and organized manner.

7.2 Strategic Approach for Reconstruction

The State Policy on Disaster Management has laid down the strategic approach for reconstruction.

The approach to the reconstruction process has to be comprehensive so as to convert adversity into opportunity. Incorporating disaster resilient features to 'build back better' will be the guiding principle. This phase requires the most patient and painstaking effort by all concerned. The administration, the stakeholders and the communities need to stay focused on the needs of this phase, as, with the passage of time, the sense of urgency gets diluted. The appropriate choice of technology and project impact assessment needs to be carried out to establish that the projects contemplated do not create any side effects on the physical, socio-cultural or economic environment of the communities in the affected areas or in their neighbourhood. The involvement of community in decision making is important. Systems for providing psychosocial support and trauma counselling need to be developed for implementation during the reconstruction and recovery phase. It is also important that recovery process is linked to livelihood.

Three crucial questions to be addressed for reconstruction are: (a) When shall State government be involved in reconstruction - for all types of disasters or for major catastrophic disasters? (b) What are to be reconstructed – houses and infrastructure or much more than that? (c) How are reconstructions going to take place – who will do it and how will it be financed?

7.2.1 When to Reconstruct

Every disaster – small, medium or large – causes damages to lives and assets, and therefore, there are affected people and communities who need support for rebuilding their lives and livelihoods. However, Government support for reconstruction is not available for every type of disaster. As per the norms of SDRF, such supports are available only for the following:

- a) Gratuitous relief for deaths, injuries, and the old, infirm and destitute
- b) Humanitarian relief for food, water and medical care

- c) Assistance to small and marginal farmers for land reclamation, replacement of animals, fodder and inputs for agriculture and horticulture
- d) Assistance to fishermen for repair and replacement of boat, nets etc.
- e) Assistance to artisans in handicrafts/ handloom sector by way subsidy
- f) Assistance for repair /restoration of damaged houses
- g) Repair/restoration of immediate nature of infrastructure (communication, power, public health, drinking water supply, primary education and community owned assets)

The scales of assistance available under these heads are designed for short term relief for a few weeks/ months and not for long term reconstruction. Therefore, the affected people are expected to use their own savings for reconstruction and the concerned Government agencies have to divert funds from maintenance budget/ other development projects for reconstruction of damaged assets. The State Government can seek central assistance under National Disaster Response Fund, but this does not resolve the issue of reconstruction as this Fund is guided by the same norms as the State Disaster Response Fund and only supplements the State Disaster Response Fund when it is exhausted. Financing post-disaster reconstruction after small and medium scale disasters continues to remain one of the unresolved issues of financing disaster management in India.

The State Government may therefore consider using its own budgetary resources for reconstructing the lives and livelihoods of the affected people who cannot 'build back better' with their own resources. In that case a separate programme can be designed in the State sector for disaster reconstruction and appropriate guidelines developed for implementation of the programme.

In case of major disasters that affect large areas and population threatening the society and economy of the State, there is no other alternative but to seek special Central assistance besides financial and technical support from multi-lateral financial institutions like the World Bank and Asian Development Bank for reconstruction. This step requires comprehensive Post Disaster Needs Assessment (PDNA) to assess the quantum of assistance required for reconstruction. The State government shall be prepared for conducting such assessment in collaboration with the agencies of the Central Government.

7.2.2 What to Reconstruct

The State Policy has made it abundantly clear that reconstruction shall be comprehensive, covering every aspect of the life, economy and society that is affected by disasters. Typically, these would include reconstruction of:

- a) Damaged houses and habitats
- b) Damaged infrastructure which include roads and bridges, power supply system, water supply system, irrigation system etc.
- c) Damaged schools, hospitals and other community infrastructure
- d) Damaged government and non-government offices, complexes and commercial establishments
- e) Damaged means of production in primary, secondary and tertiary sectors.
- f) Damaged monuments, museums and other heritage buildings
- g) Damaged environmental assets such as forests, nurseries, plantations, parks etc.
- h) Lives and livelihoods of affected people and communities
- i) Psychosocial support for individuals and families affected by disasters

Standard guidelines for conducting PDNA and developing a comprehensive post-disaster reconstruction plan, based on experiences gained in major reconstruction initiatives around the world, are available. The Revenue (Disaster Management) Department shall keep in readiness a template for conducting such an assessment and developing reconstruction projects. The Department will share the template with all DDMA's and all concerned development departments so that they can collect necessary information for conducting such exercises immediately after the initial phase of disaster response is over.

7.2.3 How to Reconstruct

There are important issues on how post-disaster reconstruction projects shall be funded and implemented. These issues shall be addressed in a structured and systematic manner, in the following sub-sections.

7.3 Mobilizing Funds for Reconstruction

As the norms of State and National Disaster Response Funds of Government of India do not cover reconstruction, the State Government should request support from multi-lateral financial institutions like the World Bank and Asian Development Bank. Such assistance has obvious advantages. First, the World Bank/ Asian Development Bank shall send their technical teams to assist the State Government in PDNA in a comprehensive manner covering every possible aspect of reconstruction. Second, the banks' technical support of the banks will be available throughout the project implementation period which will be useful for the State Government in addressing key issues in a professional manner and further developing the capacities of the State institutions in the long run. Third, the banks provide finances as soft loans to the Government of India which are passed on to the State as grants.

7.4 Setting up Dedicated Agency for Reconstruction

This organization may be headed by a Chief Executive with necessary support staff who may get the project activities implemented by the departments and agencies of the Government, but under their close supervision and control. Certain common functions such as discussion and negotiation with the bank, development of tender documents, selection of contractors for executing the jobs, monitoring and evaluation, submission of progress reports to the bank and the Central and State government etc. shall be entrusted to this agency.

7.5 Building Back Better

Every activity of reconstruction project shall be designed incorporating the best available standards and specifications of disaster resilience, such as building codes, zoning regulations, safe construction practices etc, so that the reconstructed assets are 'built back better' and do not suffer damages if affected by disasters of similar or higher intensities in future. Reconstruction provides opportunities to ensure that the projects do not either create any new risks of disasters or exacerbate existing risks of disasters. CBA for mitigation and DIA on society and environment shall be built into the process of project formulation and implementation.

7.6 Owner Driven Construction

Reconstruction plans and designing of houses will be a participatory process involving the Government, affected community, NGOs and the corporate sector. There are strong evidences that owner driven construction as per approved standards and specifications have the best chances of success, both in terms of quality and speed of constructions. Government shall not get into reconstruction of private houses, but facilitate such constructions with developed land, construction materials and provision of physical infrastructure facilities like roads, water, electricity and sewerage and social infrastructure like schools, hospitals and community halls.

7.7 In Situ Versus New Sites for Resettlement

One important issue for reconstruction of human settlement is whether the existing towns and villages shall be rebuilt in the same locations or be reconstructed in new areas. The advantages of existing locations are that land is already owned by the people and they need only to be assisted with design, materials and money for rebuilding their houses. In many cases, the existing settlements are located in thickly congested areas or on dangerous hill slopes and reconstruction of houses in the same locations shall only invite disasters in future. In such cases, new locations shall be identified for reconstruction of settlements in a planned manner. Identification of new areas for human settlements in hilly areas is extremely difficult as vacant lands are hardly available. Acquisition of land is even more difficult as the process is cumbersome and time consuming. This further involves dislodging people from their existing houses or occupations. There cannot be any standard solution to this problem and every settlement has to be reconstructed as per its own context and requirements. Various options can be explored in consultation with experts and final decision shall be taken in consultation with the affected communities. NGOs and CBOs can provide support to the Government in finding a solution that serves the standards of resilience without causing inconvenience to the people.

In-situ or new, every housing reconstruction project shall involve intermediary shelters as reconstruction of houses will take time and affected people cannot stay in temporary shelters for long, especially in extreme weather conditions. Intermediary shelters that are safe and cost-effective as per local needs with multi-use potential may be constructed by Government agencies. Pre-planning and testing of such shelters in local conditions will be carried out in advance by SDMA as a part of disaster preparedness activities at the State level.

7.8 Action Points for Reconstruction

Action points on reconstruction for various agencies and time frame is summarized in Table 7.1.

Table-7.1: Action Points for Reconstruction

	Action Point	Responsible Agencies	Time Frame
1.	State Government shall consider designing a separate programme in State sector for disaster reconstruction and appropriate guidelines shall be developed for implementation of programme.	SDMA/Revenue (DM) Department	2 years
2.	A template for PDNA and post-disaster reconstruction projects shall be developed and shared with DDMA and concerned departments.	SDMA/Revenue (DM) Department	2 years
3.	In case of catastrophic disasters, State Government shall ask for support from World Bank/ Asian Development Bank.	SDMA/Revenue (DM) Department	After major disaster
4.	Special agency for reconstruction shall be created for coordinating implementation of reconstruction projects.	SDMA/Revenue (DM) Department	After major disaster

	Action Point	Responsible Agencies	Time Frame
5.	Reconstructed assets shall be 'built back better' for resilience from future disasters.	SDMA/Revenue (DM) Department/ concerned agencies	After major disaster
6.	Government shall not get into reconstruction of private houses, but facilitate such constructions with technical support and inputs.	SDMA/Revenue (DM) Department/DDMA	After major disaster
7.	Reconstruction of settlements can take place in-situ or in new areas or both, depending on situations and requirements, in consultation with affected communities.	SDMA/Revenue (DM) Department/ DDMA	After major disaster
8.	Every reconstruction project shall involve intermediary shelters that are safe and cost-effective. Pre-planning and testing of such shelters in local conditions shall be carried out as a part of disaster preparedness activities at the State level.	SDMA/Revenue (DM) Department/ concerned agencies/ DDMA	After major disaster



8.1 Introduction

The implementation of the SDMP would require funding arrangements. Such funding support shall be available partly through existing mechanisms such as State Disaster Response Fund and National Disaster Response Fund, and partly through budgetary support for existing schemes on disaster management, but these mechanisms alone would not be adequate. Concerned departments shall be required to initiate new disaster mitigation projects for reducing the risks of disasters. Mainstreaming of DRR in development and its integration with CCA shall also provide opportunities for implementing some of the tasks of disaster risk management. Private-public participation, risk insurance and international cooperation and assistance are other potential sources for financing implementation of the plan.

8.2 State Disaster Response Fund

In terms of Section 48 of the Disaster Management Act, Government of Himachal Pradesh has constituted the State Disaster Response Fund (SDRF). The SDRF consists of grants made by the State or Central governments, or external assistance received by the SDMA or contributions received from any person or institution for the purpose of disaster management, including any donation or voluntary endowment.

So far, the grants received from the State and Central governments, as recommended by the Finance Commission, had been the only source of SDRF. The Fourteenth Finance Commission has recommended that the Central and State share to the SDRF of Himachal Pradesh during 2015-16 and 2019-20 shall be as follows:

Table 8.1 Central and State Share to State Disaster Response Fund of Himachal Pradesh

Years	Central Share (INR crore)	State Share(INR crore)
2015-2016	212	24
2016-2017	223	25
2017-2018	234	26
2018-2019	246	27
2019-2020	259	28
Total	1,174	130

SDRF can be spent only for disaster response and relief as per the norms approved by the Government of India.

8.3 National Disaster Response Fund

National Disaster Response Fund (NDRF) is constituted under Section 46 of the Disaster Management Act to meet the expenses of emergency response, relief and rehabilitation in accordance with the guidelines laid down by the Central government. This is a fund of the Central Government which is made available to the States to meet their requirements if the funds available in SDRF are not adequate for the purpose. As per the guidelines issued by the Central Government, NDRF can be allocated to the States only to meet the items of expenditure



permissible under the SDRF.

8.4 State Disaster Mitigation Fund

The State Government had issued a notification dated 9 December 2011 regarding the constitution of the State Disaster Mitigation Fund (SDMF) in terms of Section 48 of the Act. As per this notification, the fund shall consist of grants made by the State or Central governments, or external assistance received by the SDMA or contributions received from any person or institution for the purpose of disaster management, and income generated from assets created from SDMF. The State Government may consider activating the fund for financing mitigation projects that are not covered under the mandate of any department or agency of the Government. For example, landslide risk mitigation projects to protect human settlements, last mile connectivity for early warning of disasters or capacity development of stakeholders for disaster risk management are presently not covered under the mandates of any specific department or agencies of the Government. For a multi-hazard, prone hilly state like Himachal Pradesh where risks of disasters are very high, there is a strong justification for an active SDMF that is already mandated under the Act.

8.5 District Disaster Response and Mitigation Fund

The Disaster Management Act had further mandated constitution of a District Disaster Response Fund (DDRF) and District Disaster Mitigation Fund (DDMF). The State Government constituted these two funds by the same notification of December 2011 but these have not been operationalized as yet. Probably, operationalization of DDRF/DDMF in all the districts may not be justified at this stage when SDRF is meeting all the requirements of the districts for disaster response and relief and SDMF is yet to be functional. Probably at a later stage when SDMF is fully functional and there is strong justification of district level fund for mitigation, the Government may consider activating the DDMF.

8.6 Budgetary Allocations on Disaster Management

The programmes and schemes of the Government on disaster management can be broadly be classified as dedicated and embedded schemes. Dedicated schemes on disaster management are those schemes of the Government that are spent exclusively for disaster management. The embedded schemes are those that are not designed or allocated for disaster management but can be utilized substantially or partly for managing the risks of disasters. The only dedicated scheme on disaster management in the budget of Himachal Pradesh is the scheme of the Revenue Department on Gratuitous Relief (Account Head 2245).

However, there are many programmes, activities and projects of various development and other departments that have strong relevance for disaster risk management. All these programmes shall be identified, and to the extent possible, redesigned so that gains of development are protected from risks of disasters and no new risks are created. A few of these programmes can in fact be utilized for promoting the cause of disaster management in the State.

8.7 Mainstreaming Disaster Risk Reduction in Development

Mainstreaming DRR in development entails that hazards, vulnerabilities and risks of disasters are factored in the programmes, activities and projects. This does not need any additional allocation of funds. Existing allocations are programmed in such a manner that underlying risk factors are considered to protect development activities from the risks of disasters and no new risks of disasters are created knowingly or unknowingly due to development. Every department shall review all programmes, activities and projects and identify those that would require mainstreaming. The mainstreaming exercise shall be undertaken systematically with the guidance of experts in respective sectors.

8.8 Developing New Projects on Disaster Risk Mitigation

While mainstreaming will address the risks of disasters significantly, there would be substantial residual risks in many sectors that would remain unaddressed. Based on the HVRA, every concerned department shall develop appropriate risk mitigation projects with CBA in respective sector and request the planning and finance departments to allocate funds in the budget of respective departments for the implementation of the projects. Some of the illustrative risk mitigation projects could be as follows:

- Retrofitting lifeline buildings from the risks of earthquakes
- Landslide risk mitigation of selected State Highways
- Stabilizing critical slopes of Shimla and other selected major towns/villages.
- Developing mass casualty management capability of major hospitals
- Strengthening civil defence for disaster response
- Developing early warning system for forest fires
- Protecting monuments and heritage buildings from risks of disasters
- Strengthening HIPA for developing capacities on disaster management

8.9 Flexi Funds for Centrally Sponsored Schemes

The Government of India has permitted 10 percent of allocations on Centrally sponsored schemes as flexi-fund that can be utilized inter-alia for undertaking disaster risk mitigation activities related to the scheme. Flexi-fund limits have been raised to 25 percent as per notification issued in September 2016. This provides a window of opportunity for mitigating the risks of disasters inherent in or arising out of specific Centrally sponsored schemes. Risk mitigation activities related to the scheme can be identified and implemented as per the guidelines of the scheme.

8.10 Disaster Risk Insurance

Risk transfer and insurance are market-based mechanisms for risk financing whereby individuals and companies insure their assets from risks of disasters. Houses, business establishments and industries that are not covered by Government gratuitous relief can be protected from the risks of disasters through insurance. Risk insurance has the additional advantage of collateral inspection of the quality of assets which strengthens compliance of safety regulations in constructions and management of assets.

Although penetration of risk insurance in Himachal Pradesh, like in other States, is low, there are good opportunities for widening the scope of insurance through fiscal incentives, and innovative insurance products. Micro-finance and micro-insurance, warranty on newly constructed houses and structures and linking safe construction with home loans are some of the new initiatives of risk insurance that are growing fast. Insurance for agricultural and horticultural crops is another area with substantial scope of expansion. The Government is encouraging weather-based crop insurance through subsidies and other measures including mechanisms for timely inspection of crops and disposal of claims for insurance. Public Liability Insurance is another instrument for providing relief to victims of chemical accidents.

8.11 Public-Private Partnership for Disaster Risk Reduction

With the liberalization of the economy, opportunities for public-private partnership (PPP) have expanded. Various productive, infrastructure and utility projects are coming up on PPP mode. DRR can be integrated and mainstreamed in such projects, which would mitigate the risks of disasters while reducing sovereign liabilities for the same.

8.12 Externally Aided Projects

The State Government can develop pre-disaster risk mitigation and post-disaster reconstruction projects for funding through external assistance. Post-disaster reconstruction projects are particularly suited for funding through multi-lateral financing agencies like the World Bank and Asian Development Bank.

8.13 Actions for Financial Arrangements

Action points for the State Government and its agencies are summarized in Table 8.1.

Table-8.2: Action Points for Financing Disaster Management

	Action Point	Responsible Agencies	Time Frame
1.	State Government shall operationalize State Disaster Mitigation Fund for funding mitigation projects that are not covered under the mandate of any department or agency of the Government.	SDMA/ Revenue (DM) Department	1 year
2.	DRR is embedded in many existing schemes. These schemes shall be identified and to the extent possible redesigned to protect development from risks of disasters and to prevent creation of new risks.	All concerned Departments	1 years
3.	Guidelines shall be issued for mainstreaming DRR in respective sector.	SDMA/ Revenue (DM) Department	1 years

	Action Point	Responsible Agencies	Time Frame
4.	Risk mitigation projects with CBA shall be developed for relevant sectors and provisions made in respective sector.	All concerned Departments	Regular
5.	Flexi-funding permitted in Centrally sponsored schemes shall be used for mitigating the risks of disaster in respective sector as per guidelines of the scheme.	All concerned Departments	Regular
6.	Risk mitigation projects shall be designed in PPP mode as appropriate and risk shall be integrated in existing PPP projects.	All concerned Departments	Regular
7.	State Government shall develop pre-disaster risk mitigation and post-disaster reconstruction projects for funding through external assistance and multi-lateral funding institutions.	SDMA/All concerned Departments	Regular



9.1 Introduction

Disaster management is not the responsibility of the Government alone – it is everybody’s business. It requires active collaboration, support and participation of all stakeholders across all spectrums. This includes scientific and technological institutions, academic and research institutes, civil society and community based organizations, voluntary organizations and NGOs, women’s organizations, philanthropic and faith based organizations, private and corporate sectors, and the media. Each of these stakeholders has important roles to play in different aspects of disaster risk management.

The State Policy on Disaster Management highlighted the importance of mobilizing stakeholder participation for disaster management.

The SDMA and DDMA’s will coordinate with Civil Defence, NCC, NYKS, NSS, sports and youth clubs, women based organizations, faith based organizations and local NGOs, CSO etc. They will be trained in various aspects of DM more particularly in SAR and MFA. They will also be encouraged to empower the community and generate awareness through their respective institutional mechanisms. Efforts to promote voluntary involvement will be actively encouraged.

9.2 Stakeholders in Disaster Management

The State Plan on Disaster Management 2012 listed the academic, scientific and technical organizations that have important functions for disaster management.

Academic Institutions

- State Council of Education, Research and Training (SCERT), Solan
- Government College for Teacher Education, Dharamshala
- HP Board of School Education, Dharamshala
- HPKV, Palampur
- YS Parmar University of Horticulture & Forestry, Nauni Solan
- IIT Roorkee
- IIT Mandi
- Himachal Pradesh University, Summer Hill, Shimla
- National Institute of Technology, Hamirpur

Scientific and Technical Institutions

- India Meteorological Department
- Central Water Commission
- Bureau of Indian Standards
- Geological Survey of India
- Snow and Avalanche Study Establishment
- Wadia Institute of Himalayan Geology
- Building Material and Technology Promotion Council
- Forum of Hydro Power Producers
- Bhakra Beas Management Board
- Atal Bihari Vajpayee Institute of Mountaineering & Allied Sports

These lists are by no means exhaustive. A comprehensive Directory of Stakeholders on Disaster Management in Himachal Pradesh at national, state and local levels shall be developed providing details of their organization, functions, contact details and highlights of their work on disaster management in the State. The stakeholders may be classified as per the following 15 categories:

- a) Scientific and technical organizations
- b) Academic and research institutes
- c) International organizations
- d) Civil society and community based organizations
- e) Voluntary and philanthropic organizations
- f) Faith based organizations
- g) Industrial, trading, hotel and other business associations
- h) Association of professionals like doctors, engineers, architects etc.
- i) Women's organizations
- j) Youth organizations
- k) Resident welfare organizations
- l) Self Help Groups
- m) Trade Unions and other organizations of labourers
- n) Media
- o) Resource persons working on disaster management

Disaster Management Centre of HIPA shall be entrusted with the responsibility of developing the Directory which would be revised periodically. This would provide a good reference material for building a network of stakeholders who can be involved with various tasks for building a disaster-resilient Himachal Pradesh.

9.3 State Platform on Disaster Risk Reduction

The Government of Himachal Pradesh, through a notification issued on 1 March 2016, constituted a State Platform on DRR (SPDRR) to assist the State Disaster Management Authority, State Government departments, district administration, educational institutions, and other stakeholders in the field of disaster management. SPDRR shall be expected to develop a participatory process of decision-making in disaster management and implementation, monitoring and reviewing of the Sendai Framework for Disaster Risk Reduction 2015-2030 to achieve its goals.

The Resolution annexed with the Notification explained the rationale for setting up of the Platform.

The need to reduce the impact of disasters by means of systematic efforts has been gaining recognition and commitment among State Governments, Nationwide. Disaster Risk Reduction is a cross cutting development issue. It requires political and legal commitment, scientific knowledge, careful development planning, and application of technology, law enforcement, community participation, early warning systems and effective disaster preparedness and response mechanisms. There is a need to foster an enabling environment for developing a culture of prevention and to enable concerted measures to facilitate the integration of disaster management into development planning in various sectors. It is therefore desirable that the State Government departments, district administration, Educational Institutions and various other stakeholders in the field of disaster management and people representing different interests in the area should evolve a participatory process of decision making in disaster management, which will not only strengthen the disaster management structure and institutions all over the State but will also enhance the federal structure of our polity.

The State Platform shall be chaired by the Chief Minister. The Revenue Minister shall be Vice Chairman, while Additional Chief Secretary Revenue (Disaster Management) shall be the Convenor and Special Secretary Revenue (Disaster Management) Co-Convenor. The other members of the platform are:

a) Representatives of the Government of Himachal Pradesh

- i) Additional Chief Secretaries/Principal Secretaries/Secretaries of the following departments: Public Works, Irrigation & Public Health, Information & Public Relation, Urban Development, TCP & Housing, Planning, Finance, Forest, Food, Civil Supplies & Consumer Affairs, Environment, Science & Technology, Home, Education, Technical Education, Rural Development & Panchayati Raj
- ii) Director General of Police
- iii) Director General of Civil Defence, Home Guards & Fire Services
- iv) Divisional Commissioners (Shimla, Kangra & Mandi)

b) Ex- Officio Members

- i) All the Deputy Commissioners in the Himachal Pradesh.
- ii) Engineer in Chief (IPH/PWD)
- iii) Principal Chief Conservator of Forest, Himachal Pradesh.
- iv) Advisor, Planning
- v) Municipal Commissioner (Shimla & Dharamsala)

c) Head of Educational Institutions/ Central Universities/Technical Institutions

- i) Vice Chancellor, CSK HP Krishi Vishwa Vidyalaya
- ii) Vice Chancellor, Dr. Y.S. Parmar University of Horticulture and Forestry
- iii) Director, HIPA
- iv) Director, Indian Institute of Technology, Mandi
- v) Director, National Institute of Technology, Hamirpur
- vi) Scientist-'F' & In charge (HU), G.B. Pant Institute of Himalayan Environment and Development, Kullu

d) Persons Representing Industry

- i) Representatives from Hydel Power Projects/Ambuja/ACC/Jaypee /JSW
- ii) Representatives from Confederation of Indian Industry
- iii) Representatives from Federation of Indian Chambers of Commerce and Industry

e) Media Representatives

- i) Station Director, All India Radio, Shimla
- ii) Station Director, Doordarshan, Shimla
- iii) Representatives from print & electronic media/press
- iv) Information Bureau/Press Trust of India etc.

f) International Representatives

- i) United Nations Development Programme Country Director
- ii) United Nations Disaster Management Team Convener
- iii) Director of Cooperation, Swiss Development Cooperation
- iv) Representatives from GIZ
- v) Representatives from United States Agency for International Development

g) Representatives of Civil Society Organizations

- i) Indian Red Cross Society

- ii) SPHERE India
- iii) Other NGOs/community based and civil society organizations working actively in the State

h) Special Invitees

- i) Joint Secretary, Disaster Management, MHA
- ii) Member, National Disaster Management Authority
- iii) Executive Director, National Institute of Disaster Management
- iv) Director, Central Water Commission
- v) Director, Indian Meteorological Department
- vi) Director, Snow & Avalanche Study Establishment, Manali
- vii) Commandant, 7th Battalion, National Disaster Response Force, Bhatinda.
- viii) Representatives from Border Roads Organization/GREF

The platform shall have a tenure of five years from the date of notification and shall meet once a year. Its functions shall be:

- a) To review the progress made in the field of disaster management from time to time
- b) To appraise the extent and manner in which the Disaster Management Policy has been implemented by the State Government, district administration and various other Government departments, and to give an appropriate advice in the matter
- c) To advise regarding coordination between the State Government Departments, district administration, local governments and civil society organizations for development of DRR
- d) To advise suomoto or on a reference made by the Central Government or State government departments and district administration on any question pertaining to disaster management
- e) To review the Disaster Management Policy

9.4 Institutionalizing Stakeholder Participation

Himachal Pradesh is among the few States that have set up state level multi-stakeholder platform on DRR. This is an important step for institutionalizing stakeholder participation in disaster management. The focus of SPD RR is to review the progress made in disaster management to advise better coordination among Government and civil society organizations. In order that the stakeholders can be engaged on a continuing basis with the Government at all levels and across all sectors in the complex and difficult task of disaster risk management, it is necessary to identify the specific tasks for such engagements. For this purpose, the stakeholders can be broadly classified in three main groups:

- a) Scientific, technical and academic organizations
- b) Private sector and corporate entities
- c) Non-governmental organizations
- d) Media

9.4.1 Scientific, Technical and Academic Organizations

Science and technology plays an important role in every aspect of disaster management. The complex dynamics of hazards, vulnerabilities, exposures and risks of disasters, particularly in the context of climate change, can be assessed through scientific research involving mountains, rivers, forests and glaciers and their impacts on human life, economy and society. Communication and dissemination of scientific findings in easily understandable formats to the rural and urban communities living in remote hilly areas further requires application of appropriate technology. Increased science-policy interface is important for informed decision-making. Scientific research can

also contribute immensely to the designing of appropriate programmes and projects on risk mitigation and disaster preparedness and response. Various national level scientific and technical institutions like IMD, CWC, GSI, Snow and Avalanche Study Establishment(SASE), Indian Space Research Organisation, National Remote Sensing Centre etc. play a key role in disaster management. Most of these institutions have State level field units. Besides, there are a number of state level scientific institutions like NIT Hamirpur, IIT Mandi, SCERT Solan, HPKV Palampur, YSPUHF, Nauni etc. that are engaged in scientific and technological research that can contribute to disaster risk management in the State.

9.4.1 Private Sector and Corporate Entities

The private sector and corporate entities have important roles to play for disaster management for several reasons. First, private sector is the backbone of the State economy in agriculture, industry and services. The State does not have large industries, but it does have mega hydro-electric projects that support agriculture and industry. The agri-horticultural products of the State contribute significantly to the economy. Large numbers of small and medium industries process the mineral, agricultural and other resources of the States, adding values to the economy. The tourism and transport industry connect several sectors of the economy to generate employment and livelihood. All these productive activities are exposed to the risks of disasters and suffer damage and losses due to drought, flood, landslides etc. These losses can be reduced through a systematic process of risk assessment, risk mitigation and business continuity plans post-disasters.

Large private entities create value in innovative social investments that can strengthen resilience of the communities. PPP between the Government and private sector can leverage their strengths for disaster management. Corporate sector can further supplement the efforts of government in disaster relief and rehabilitation by discharging their corporate social responsibility (CSR).

Himachal Pradesh may not have many large corporate entities in private sector, but it does have a significant presence of public sector giants like NHPC, Power Grid, BSNL etc. that have always provided support to district administration during disasters. Moreover, CSR does not have any geographical limitation and large corporate houses of the country have always extended their support whenever major disasters have struck the country.

The State Policy on Disaster Management had prescribed that SDMA and DDMA's need to network with the corporate entities to strengthen and formalize their role in the disaster management process for ensuring safety of the communities. Large hydro-power projects, industrial and chemical units shall be asked to set up on-site and off-site emergency to reduce the impact of disasters on the community. The role of corporate sector for awareness generation and local capacity building is also important and efforts shall be made to involve corporate sector on these initiatives.

The Department of Industries, in association with the Revenue (Disaster Management) Department, can set up a small group of representatives of prominent industries of the State to pursue the agenda of business continuity plans, PPP as well as corporate social responsibilities for disaster management.

9.4.2 Non-Governmental Organizations

NGOs cover a wide range of initiatives that include civil society and community based organizations, voluntary and philanthropic organizations, faith based organizations, women's and youth organizations etc. Most of these organizations work at the grassroots level and have an efficient link of communication with the communities. They can play an important role in creating awareness about disaster preparedness as well as providing relief and rehabilitation to the affected people, particularly the vulnerable sections like women and children, organizing community-driven reconstruction work, and further provide valuable monitoring and feedback.

Large national and international NGOs have the capability to extend material, financial as well as technical support to disaster-affected sites. In emergencies, their role is critical in garnering support and resources from

all over the world that can come to the rescue of the affected population almost immediately.

Local NGOs, Rotary and Lion's Club, and professional and occupational groups such as doctors' association, traders' association and Army wives' associations, officers & employee's association etc. can play a major role in resource mobilization, and provision of specialized services to the victims in any emergency situation.

Sections 30 (2) (xix) of the Disaster Management Act mandates that the DDMA shall collaborate with the stakeholder agencies including NGOs for the purpose of improving the effectiveness of disaster management. Similarly, Section 34 of the Act mandates DDMA to ensure that the NGOs carry out their activities in an equitable and non-discriminatory manner. This provides scope for setting up a mechanism for coordinating the engagement of NGOs in an efficient and non-discriminatory manner, utilizing their unique advantages and core competencies by strengthening humanitarian coalitions, alliances and NGO networks.

Constitution of an Inter-Agency Group (IAG) for coordinating the activities of Governmental organizations and NGOs have been useful in many districts in institutionalizing unified response strategy in humanitarian crisis and promoting a culture of "working together" in emergencies and normalcy. This shall be formalized by setting up an IAG in each district that would be activated when an impending or actual disaster strikes a district or a part thereof.

9.4.3 Media

The State Policy on Disaster Management comprehensively sums up the important role that media plays for disaster management:

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 utilised. Effective partnership with the media will be worked out in the field of community awareness, early warning and dissemination, and education regarding various disasters. The use of vernacular media would be harnessed for community education, awareness and preparedness at the local level. The Department of Information and Public Relations in consultation with the SDMA and DDMA's would take appropriate steps in this direction.

The Department of Information and Public Relations, in consultation with the Revenue (Disaster Management) Department shall develop a strategic action plan for engaging with the media for implementation of this policy.

9.5 Action Points for Partnerships with Stakeholders

The action points for stakeholder participation are summarized in Table 9.1.

Table-9.1: Action Points for Partnership with Stakeholders

	Action Point	Responsible Agencies	Time Frame
1.	Comprehensive Directory of Stakeholders on Disaster Management in Himachal Pradesh at national, state and local levels shall be developed providing details of their organization, functions, contact details and highlights of their work on disaster management in the State.	Revenue (DM) Department/ DMC HIPA	2 years

	Action Point	Responsible Agencies	Time Frame
2.	Science & Technology Forum shall be created to identify State-specific research and investigations that can be practically useful for better assessment of risks and their mitigation and management.	Science & Technology/ Revenue (DM) Department/	1 year
3.	Group of representatives of prominent industries shall be set up to pursue the agenda of business continuity plans, PPP as well as corporate social responsibilities for disaster management.	Industries/ Revenue (DM) Department	1 year
4.	IAG shall be constituted in each district for governmental organization-NGO coordination during disasters.	Revenue (DM) Department/Deputy Commissioners	1 year
5.	Strategic Action Plan shall be developed for engaging with the media for implementation of the State Policy in terms of the role of media in disaster management.	Information & Public Relations/Revenue (DM) Department	1 year



10.1 Introduction

Strong and robust mechanisms for implementation, monitoring and review are key to the success of any plan. The Disaster Management Act has laid considerable emphasis on the implementation, monitoring and review of disaster management plans at various levels. The implementation, monitoring and review mechanisms for SDMP, as prescribed by the Act, are as follows:

- a) State Disaster Management Authority shall coordinate the implementation of the State Plan - Section 18(3);
- b) State Disaster Management Authority shall review the measures being taken for mitigation, capacity building and preparedness by the departments as provided in the plan and issue such guidelines as may be necessary -Section 18(2) e;
- c) State Executive Committee shall coordinate and monitor the implementation of the State Plan - Section 22(2) a;
- d) State Government shall make appropriate provisions for financing measures to be carried out under the State Plan- Section 23(6);
- e) District Disaster Management Authority shall coordinate and monitor the implementation of the State Plan - Section 30(2)ii;
- f) District Disaster Management Plans shall be prepared having regard to the State Plan - Section 31(2);
- g) Every Department of the State Government shall take measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the State Plan - Section 39(a); and
- h) Departmental Disaster Management Plans shall be prepared in conformity with the State Plan- Section 40(1).

These provisions make it abundantly clear that (a) SDMP is not a standalone document - it is integrated with the DDMPs and the Departmental Disaster Management Plans; (b) implementation of the SDMP is the responsibility of all the organs of the State Executive - the State Government, the State Executive Committee, departments of the State Government and district administration; and (c) the task monitoring implementation of the plan has been vested with the State Executive Committee, while the State Disaster Management Authority has the responsibility of reviewing the overall performance of the plan in achieving its objectives, goals and targets.

10.2 Implementation

Considering its importance, considerable emphasis has been given in the State Plan on its implementation. Each chapter of the Plan has provided a list of actions to be taken for the implementation of the plan, the agencies responsible for implementation and the time to be taken for implementation. As explained in the introductory chapter, the time frame for implementation has been fixed for short, medium and long terms. The short-term actions shall be completed within a period of two years, while the medium-term action points have a time frame of five years and the long term action areas have a longer time frame of 15 years. Implementation of all the action points shall be reviewed at the time of second revision of the Plan and afresh set of short and medium term actions points shall be drawn up.

The action points for implementation of the SDMP as detailed in various chapters of the plan, the agencies responsible for implementation and the time frame for implementation is consolidated in Table 10.1.



Table-10.1: Consolidated Action Points for Implementation of Himachal Pradesh State Disaster Management Plan

	Action Point	Responsible Agencies	Time Frame
I. RISK ASSESSMENT			
1.	Every department of the State Government shall assess the risks of the department and the sector on the basis of HRVA and accordingly draft the Departmental Disaster Management Plan and update annually	Every Department of State Government	1 year
2.	Every district shall assess the risks of the districts and sub-districts on the basis of HRVA and draft the respective District Disaster Management Plans and update annually.	DDMA	1 year
3.	New risk information as and when available from the authentic sources shall be communicated to the concerned department, agencies and district administration in a non-technical format for necessary follow up.	Revenue (Disaster Management) Department	When available
4.	State Government shall request concerned scientific and technical agencies of Government of India and involve State level academic and scientific institutions for comprehensive assessment of state-specific risks of disasters such as GLOF, cloudbursts, hailstorm etc.	Revenue (DM) Department, Science & Technology Department	5 years
5.	Based on the available risk assessments WCS and PML in disasters shall be developed for every major natural and human-induced disasters in the State.	Revenue, S&T Department, DMC of HIPA	2 years
6.	Comprehensive database on disasters shall be developed for 2005-2016 and thereafter annually, showing disaggregated loss of lives, livelihoods, houses and infrastructure for each type of hazard, estimating the damage (direct costs) and loss (indirect opportunity costs) of such disasters, and assessing the impact of disasters on the State GDP	Economics and Statistics Department	2 years
II. RISK PREVENTION AND MITIGATION			
1.	All constructions undertaken by the departments and agencies of the Government shall strictly comply with the standards and specification prescribed for earthquake resistant constructions.	Concerned Departments	Immediate

	Action Point	Responsible Agencies	Time Frame
2.	The structures that are vital for safety of human lives, such as school buildings, dispensaries, community halls, panchayat ghars etc. shall comply with standards of earthquake resistant features.	Rural Development Department	1 year
3.	Constructions undertaken with assistance or subsidies from the Government such as Social Housing Schemes must have earthquake resistant features built into the standard designs and specifications. Additional costs involved can either be subsidized or met out of beneficiary contributions.	Rural/ Urban Development Department	1 year
4.	Urban and rural local bodies shall ensure that building permissions for new constructions are given only for earthquake resistant building plans and designs.	Rural/ Urban Development Department	1 year
5.	Science & Technology Department shall commission a study to examine traditional designs of non-engineered constructions and suggest measures for seismic strengthening of such constructions. These may be pilot tested and disseminated through training, publicity and other measures.	Science & Technology Department	5 years
6.	Seismic safety of all lifeline buildings shall be assessed in a time bound manner to determine the types of retrofitting required for seismic strengthening of the buildings.	Public Works/ Rural/ Urban Development Departments	2 years
7.	State Government shall develop an action plan on retrofitting of lifeline buildings, identifying the buildings to be retrofitted, selecting the cost-effective method, fixing time line and providing resources for the same.	Public Works/ Revenue (DM) Department	5 years
8.	Critical lifeline infrastructure like roads and bridges, dams and power houses, transmission towers and water supply lines must be retrofitted at any cost. Retrofitting of such structures, if not done already, must be part of the maintenance of the infrastructures.	Concerned Departments	2 years

	Action Point	Responsible Agencies	Time Frame
9.	Urban Development Department shall undertake comprehensive review of all relevant State legislations, rules and regulations, such as building bye laws, zoning regulations etc. from the point view of earthquake safety (both structural and non-structural) and initiate necessary amendments within a time frame.	Urban Development Department	2 years
10.	All civil engineers and architects working with the State Government shall be trained on earthquake resistant construction plans and designs in a phased manner.	Public Works Department Department	3 years
11.	Dams, reservoirs, embankments, bridges, culverts, retaining walls etc. shall be strengthened and maintained to withstand the onslaughts of riverine and flash floods.	Public Works, Irrigation & PHL, Power Department	Continuous
12.	A list of priority landslide risk mitigation projects shall be drawn up by concerned departments to protect roads, buildings and other vital installations from recurring incidents of landslides.	Public Works, Power, Irrigation & Public Health Department, Geological wing of Industry Department	2 years
13.	Landslide risk mitigation projects shall be implemented in a phased manner through a new scheme on Landslide Risk Mitigation.	Public Works, Power, Irrigation & Public Health Department	10 years
14.	Drought Management Cell in Agriculture Department shall be activated and further strengthened during the onset of droughts.	Agriculture Department	1 year
15.	Drought management plan shall be prepared block wise on the onset of every drought season.	Agriculture Department	Drought season
16.	On-site and off-site disaster management plans shall be prepared and implemented for each identified MAH industry in the State.	State PCB, district administration	1 year
17.	State, district and local level Crisis Groups for management of industrial (chemical) disasters shall be activated.	State PCB, district administration	6 months

	Action Point	Responsible Agencies	Time Frame
18.	Forest areas prone to fires shall be mapped and communities living close to fire prone areas made aware of measures for prevention of forest fires.	Every Department of State Government	1 year
19.	Every public and high rise building shall be designed, constructed and maintained in a manner that inbuilt provisions are made for fire prevention and protection.	Public Works, Fire Services Urban Dev. Development	Continuous
20.	The ongoing process of modernization of Fire and Emergency Services shall be completed with provision of equipment to fight urban fires.	Fire and Emergency Services Department.	2 years
III. MAINSTREAMING DISASTER RISK REDUCTION			
1.	HPSDMP 2012 had suggested possible entry points for mainstreaming in seven flagships centrally sponsored programmes. These have been pursued by the concerned departments. Similar entry points shall be identified in other existing or new central/centrally sponsored/ state sponsored programmes. These shall be incorporated in the Departmental Disaster Management Plans and update annually.	All concerned Departments	Continuous
2.	The Central Government has already issued guidelines for mainstreaming DRR in the flagship programmes keeping in view the provisions of Disaster Management Act for integration in development plans and programmes.	Planning Department in consultation with concerned development departments	1 year
3.	Mainstreaming DRR may involve additional costs that may not be provided in guidelines of central sector schemes. State Government may invest additional marginal costs to derive optimal benefits from the projects.	Planning Department in consultation with concerned development departments	2 years
4.	Various tools and techniques for mainstreaming DRR into development programmes, activities and projects shall be applied by the Departments according to department specific needs and context.	All concerned development departments	Continuous

	Action Point	Responsible Agencies	Time Frame
5.	DRR shall be mainstreamed into Project Cycle Management through the phases of programming, identification, appraisal, financing, implementation and evaluation.	All concerned development departments	Continuous
6.	Mainstreaming of CCA and DRR shall be integrated in every sector. Entry points for mainstreaming CCA and DRR in respective sector shall be identified and integrated in the process of planning, funding and implementation. Exclusive risk mitigation projects shall address climate concerns and exclusive climate adaptation projects shall address disaster concerns in their projects.	All concerned Departments	Continuous

IV. DISASTER PREPAREDNESS

1.	State Government shall strengthen the capacity of DMC of HIPA with qualified faculty members to conduct basic orientation on disaster programme and advanced training on some sectors that cannot be conducted by other training institutes in the States.	Revenue (DM) Department/GAD/ HIPA	1 year
2..	DMC shall draw up its annual training calendar in accordance with the recommendations of the TNA and develop State specific training designs and modules.	HIPA	1/2 years
3.	Sector specific training programmes can be conducted by training institutes already available with some departments. The capacity of such institutes shall be enhanced to conduct sector specific training programmes on disaster management.	Concerned Departments	2 years
4.	State Government shall nominate officers to attend training programmes conducted by national institutes.	Concerned Departments	Continuous
5.	State Government shall sponsor officers to attend advanced training programmes in reputed training institutes abroad.	Concerned Departments	Continuous
6.	Disaster management shall be included in curriculum of college and university education as per UGC guidelines.	Higher Education Department	2 years

	Action Point	Responsible Agencies	Time Frame
7.	Universities and other institutes of higher education shall be encouraged to conduct research on various aspects and issues of disaster management.	Higher Education Department	Continuous
8.	Information & Public Relations Department shall step up activities to create public awareness on disaster management through print, electronic and folk media.	Information & Public Relations Department	Continuous
9.	Designated nodal departments for each hazard shall keep track of impending hazards, liaise with central agencies and inform concerned agencies at State and district levels.	Concerned Departments	Continuous
10.	Advanced flood forecasting and early warning system for riverine, flash and GLOFs with assistance of concerned agencies of Central Government.	Irrigation & Public Health /CWC, Science & Technology Department	Continuous
11.	State Government shall request Ministry of Agriculture to include Himachal Pradesh under NADAMS and follow up with necessary support.	Department of Agriculture	Immediate
12.	State Government shall request Ministry of Earth Sciences/ Ministry of Science & Technology to develop state-of-art landslide early warning system for Himachal Pradesh.	Revenue (DM)/ other concerned Departments	Immediate
13.	Anti-hail mechanism should be introduced to diffuse hailstorms in all major fruit growing areas of the State.	Department of Agriculture	Immediate
14.	SEOC/DEOC shall be upgraded with state-of-art equipment's as per guidelines of NDMA.	Revenue (DM) Department	2 years
15.	SOP/ Protocol for activation of SEOC and DEOCs during emergency/disasters shall be reviewed/ revised periodically.	Revenue (DM) Department	Periodically
16.	SEOC/DEOC shall provide space and communication facilities to all line departments/ agencies for performing emergency support functions.	Revenue (DM) Department	During disasters

	Action Point	Responsible Agencies	Time Frame
17.	List of doctors and paramedical teams with contact details shall be prepared and updated half yearly for deployment on emergency medical response at short notice. Stock of medicines, accessories and equipment's required for specific hazards shall be kept in readiness.	Health & Family Welfare Department	Continuous
18.	Community based initiatives to protect animals during disasters shall be supported.	Animal Husbandry Department	During disasters
19.	All SOPs and Manuals on disaster management shall be updated and revised periodically taking into account new developments and experiences gained and lessons learnt in the past.	Revenue (DM) Department	2 years
20.	The process of revision of DDMPs shall be finalized after the revision of the SDMP.	DDMA/ Revenue (DM) Department	6 months
21.	Every department shall prepare its Disaster Management Plan in accordance with revised SDMP.	All Departments	6 months
22.	Basic information, skills and equipment shall be provided to communities for immediate response to disasters.	Revenue (DM) Department	Continuous
23.	State-wide awareness campaign shall be conducted by every available means right up to village level. Seminars/workshops will be conducted specifically for media personnel and public representatives' viz. MPs, MLAs, PRIs, and ULBs etc.	Revenue (DM) Department	Continuous
24.	Earthquake Preparedness Day shall be observed on April 4 every year to commemorate the devastating Kangra earthquake of 1905. Mass mock drills shall be carried out State-wide to assess preparedness for earthquakes.	Revenue (DM) Department	Every year
25.	International Day of Disaster Reduction shall be celebrated on 13 October every year to create awareness about the importance of DRR for saving lives and livelihoods of people.	Revenue (DM) Department	Every year

	Action Point	Responsible Agencies	Time Frame
26.	Web enabled resource inventory of IDRN shall be updated at least once a month by District Authorities.	Deputy Commissioners	Continuous
27.	Connectivity and operational readiness of network of helipads shall be ensured during emergency situations.	Civil Aviation Departments/ Deputy Commissionerst	Continuous

V. DISASTER RESPONSE

1.	SDMA shall issue comprehensive guidelines on adaptation and application of the NDMA guidelines on IRS for the management of disasters in the specific context of the State.	SDMA/Revenue (DM) Department/ Deputy Commissioners	1 year
2.	Officers of the ranks of Deputy Commissioners, Additional Deputy Commissioners and Assistant Commissioners in the State shall be trained on all the modules of the IRS so that they have comprehensive understanding and skill for practising IRS as per the guidelines of NDMA	Revenue (DM) Department/ HIPA	2 years
3.	As soon as watch/alerts/warning is issued by the NEOC, SEOC and DEOC shall be fully activated.	Revenue (DM) Department/ NEOC/DEOC	As and when required
4.	Only one responsible agency/officer shall be designated and authorized to issue warning in respect of a disaster at State and district levels to avoid wrong or indiscriminate warning.	Revenue (DM) Department/ NEOC/DEOC	As and when required
5.	Comprehensive Guideline/ Standing Order, listing all necessary pre-emptive measures to be taken for saving human/ animal lives from disasters by evacuation or other measures, based on the warning, shall be issued by the SDMA. Standing Order shall be reviewed annually and circulated widely among all concerned.	SDMA/Revenue (DM) Department/ Deputy Commissioners	1 year
6.	Evacuation drills shall be carried out with community participation at the sub-divisional and district levels before onset of the monsoon	Revenue (DM) Department/ Deputy Commissioners	Regular
7.	In disaster situations where no early warning is available, immediate rescue and relief operations shall be mounted to set the process as quickly as possible.	Revenue (DM) Department/ Deputy Commissioners	As and when required

	Action Point	Responsible Agencies	Time Frame
8.	Sequence of response actions at State and district levels, as detailed in the HPSDMP shall be followed by all concerned.	All concerned Departments/Agencies at State and district levels	As and when required
9.	State Government/ district administration shall maintain close liaison with NDRF, RRC and Armed Forces so that their services can be requisitioned at short notice.	Revenue (DM) Department/ Deputy Commissioners	Regular
10.	Liaison meetings shall be held with Army and Paramilitary units located in Himachal every six months to discuss the issues of coordination for emergency response during disasters.	Revenue (DM) Department/ Deputy Commissioners	Regular
11.	Airdropping of food and essential commodities shall be undertaken in inaccessible areas. State Governments/ district authorities shall liaise with Air Force and other agencies for requisitioning the helicopters.	Revenue (DM) Department/ Deputy Commissioners	As and when required
12.	Rescue and relief operations shall be based on ground assessment of damage and losses. Teams constituted of officials drawn from various sectors shall make preliminary assessment on the basis of spot visits, aerial surveys and information collected from primary and secondary sources.	Revenue (DM) Department/ Deputy Commissioners	As and when required
13.	Essential services of electricity, water supply, telecommunication etc. shall be restored by the concerned agencies at earliest possible time.	Concerned agencies of State Govt./district administration	As and when required
14.	In the event of mass casualties, dead bodies shall be disposed of as per the guidelines issued by the NDMA.	District administration	As and when required
15.	Mass disposal of animal carcasses shall be carried out under supervision of Animal Husbandry department as per guidelines of NDMA.	District administration/ Animal Husbandry Department	As and when required
16.	Regular press releases shall be made by Information & Public Relations Department as a single source of information from Government. If a disaster is localized in a district, Deputy Commissioner of the district shall issue such releases.	Information & Public Relations Department/ Deputy Commissioner	As and when required

	Action Point	Responsible Agencies	Time Frame
17.	SDMA has issued detailed guidelines regarding performance of Emergency Support Functions to be performed by various Primary and Secondary agencies of the Government. These shall be complied with by all concerned agencies.	All concerned agencies	As and when required
18.	In the aftermath of disasters, the affected people must be provided with food, water, shelter, clothing, medical care etc. and looked after for their safety, security and well-being so as to ensure that they are able to live with dignity. Revenue (Disaster Management) Department has issued a comprehensive Disaster Management and Relief Manual which shall be complied with by all concerned.	All concerned agencies	As and when required

VI. DISASTER RECONSTRUCTION			
1.	State Government shall consider designing a separate programme in State sector for disaster reconstruction and appropriate guidelines shall be developed for implementation of programme.	SDMA/Revenue (DM) Department	2 years
2.	A template for PDNA and post-disaster reconstruction projects shall be developed and shared with DDMA's and concerned departments.	SDMA/Revenue (DM) Department	2 years
3.	In case of catastrophic disasters, State Government shall ask for support from World Bank/ Asian Development Bank.	SDMA/Revenue (DM) Department	After major disaster
4.	Special agency for reconstruction shall be created for coordinating implementation of reconstruction projects.	SDMA/Revenue (DM) Department	After major disaster
5.	Reconstructed assets shall be 'built back better' for resilience from future disasters.	SDMA/Revenue (DM) Department/ concerned agencies	After major disaster
6.	Government shall not get into reconstruction of private houses, but facilitate such constructions with technical support and inputs.	SDMA/Revenue (DM) Department/DDMA	After major disaster

	Action Point	Responsible Agencies	Time Frame
7.	Reconstruction of settlements can take place in-situ or in new areas or both, depending on situations and requirements, in consultation with affected communities.	SDMA/Revenue (DM) Department/ DDMA	After major disaster
8.	Every reconstruction project shall involve intermediary shelters that are safe and cost-effective. Pre-planning and testing of such shelters in local conditions shall be carried out as a part of disaster preparedness activities at the state level.	SDMA/Revenue (DM) Department/ concerned agencies/ DDMA	After major disaster

VII. FINANCING DISASTER MANAGEMENT

1.	State Government shall operationalize SDMF for funding mitigation projects that are not covered under the mandate of any department or agency of the Government.	SDMA/ Revenue (DM) Department	1 year
2.	DRR is embedded in many existing schemes. These schemes shall be identified, and to the extent possible, redesigned to protect development from risks of disasters and to prevent creation of new risks.	All concerned Departments	1 year
3.	Guidelines shall be issued for mainstreaming DRR in respective sector.	SDMA/ Revenue (DM) Department	1 year
4.	Risk mitigation projects with cost-benefit analysis shall be developed for relevant sectors and provisions made in respective sector	All concerned Departments	Regular
5.	Flexi-funding permitted in Centrally sponsored schemes shall be used for mitigating the risks of disaster in respective sector as per guidelines of the scheme.	All concerned Departments	Regular
6.	Risk mitigation projects shall be designed in PPP mode as appropriate and risk shall be integrated in existing PPP projects.	All concerned Departments	Regular
7.	State Government shall develop pre-disaster risk mitigation and post-disaster reconstruction projects for funding through external assistance and multi-lateral funding institutions.	SDMA/All concerned Departments	Regular

	Action Point	Responsible Agencies	Time Frame
VIII. PARTNERSHIP WITH STAKEHOLDERS			
1.	Comprehensive Directory of Stakeholders on Disaster Management in Himachal Pradesh at national, state and local levels shall be developed providing details of their organization, functions, contact details and highlights of their work on disaster management in the State.	Revenue (DM) Department/ DMC HIPA	2 years
2.	Science & Technology Forum shall be created to identify State-specific research and investigations that can be practically useful for better assessment of risks and their mitigation and management.	Science & Technology/ Revenue (DM) Department/	1 year
3.	Group of representatives of prominent industries shall be set up to pursue the agenda of business continuity plans, PPP as well as corporate social responsibilities for disaster management.	Industries/ Revenue (DM) Department	1 year
4.	IAG shall be constituted in each district for Government organizations -NGO coordination during disasters	Revenue (DM) Department/Deputy Commissioners	1 years
5.	Strategic Action Plan shall be developed for engaging with the media for implementation of the State Policy role of media in disaster management.	Information & Public Relations/Revenue (DM) Department	1 years

10.3 Monitoring

The Disaster Management Act has entrusted the responsibility of monitoring implementation of the State Plan on Disaster Management to SEC. In order that the SEC can discharge this function effectively, the Revenue (Disaster Management) Department shall develop a format for submitting the progress achieved in the implementation of the Plan by every department, agency and Deputy Commissioners of the districts on a quarterly basis by the 10th of the month following a quarter starting from January 2017.

SEC shall discuss these progress reports, consider the factors that constrained the implementation and take appropriate decision for expediting implementation plan. SEC shall submit a consolidated progress report to the SDMA bi-annually for their review.

10.4 Review

The Disaster Management Act has entrusted the responsibility of reviewing implementation of the State Plan on Disaster Management to SDMA. Such reviews shall be undertaken on the basis of the following:

- a) Consolidated bi-annual report of the SEC on the status of implementation of SDMP
- b) Status of implementation of Departmental Disaster Management Plan that every department shall submit to SEC as per Section 40(3) of the Disaster Management Act
- c) Biennial progress report on disaster risk management in the State as reflected in the indicators developed for measuring progress



National and Local Level Activities Prescribed Under the Priorities of Action of Sendai Framework for Disaster Risk Reduction 2015-2030

Priority of Action-1: Understanding Risks

- (a) Promote the collection, analysis, management and use of relevant data and practical information. Ensure its dissemination, taking into account the needs of different categories of users, as appropriate;
- (b) Encourage the use of and strengthening of baseline and periodically assess disaster risks, vulnerability, capacity, exposure, hazard characteristics and their possible sequential effects at the relevant social and spatial scale on ecosystems in line with national circumstances;
- (c) Develop, update periodically and disseminate, as appropriate, location - based disaster risk information, including risk maps, to decision makers, the general public and communities at risk to disaster in an appropriate format by using, as applicable, geospatial information technology;
- (d) Systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event -specific hazard-exposure and vulnerability information;
- (e) Make non-sensitive hazard exposure, vulnerability, risk, disasters and loss disaggregated information freely available and accessible, as appropriate;
- (f) Promote real-time access to reliable data, make use of space and in situ information, including geographic information systems (GIS), and use information and communications technology innovations to enhance measurement tools and the collection, analysis and dissemination of data;
- (g) Build the knowledge of government officials at all levels, civil society, communities and volunteers, as well as the private sector, through sharing experiences, lessons learned, good practices and training and education on disaster risk reduction, including the use of existing training and education mechanisms and peer learning;
- (h) Promote and improve dialogue and cooperation among scientific and technological communities, other relevant stakeholders and policymakers in order to facilitate a science-policy interface for effective decision -making in disaster risk management;
- (i) Ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation

- (j) Strengthen technical and scientific capacity to capitalize on and consolidate existing knowledge, and to develop and apply methodologies and models to assess disaster risks, vulnerabilities and exposure to all hazards;
- (k) Promote investments in innovation and technology development in long - term, multi-hazard and solution-driven research in disaster risk management to address gaps, obstacles, interdependencies and social, economic, educational and environmental challenges and disaster risks;
- (l) Promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and non-formal education, as well as in civic education at all levels, as well as in professional education and training;
- (m) Promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;
- (n) Apply risk information in all its dimensions of vulnerability, capacity and exposure of persons, communities, countries and assets, as well as hazard characteristics, to develop and implement disaster risk reduction policies;
- (o) Enhance collaboration among people at the local level to disseminate disaster risk information through the involvement of community-based organizations and non-governmental organizations.

Priority of Action-2: Strengthening disaster risk governance to manage disaster risk

- (a) Mainstream and integrate disaster risk reduction within and across all sectors. Review and promote the coherence and further development , as appropriate, of national and local frameworks of laws, regulations and public policies, which, by defining roles and responsibilities, guide the public and private sectors to:
 - (i) address disaster risk in publicly owned, managed or regulated services and infrastructures;
 - (ii) promote and provide incentives, as relevant, for actions by persons, households, communities and businesses;
 - (iii) enhance relevant mechanisms and initiatives for disaster risk transparency, which may include financial incentives, public awareness-raising and training initiatives, reporting requirements and legal and administrative measures; and
 - (iv) put in place coordination and organizational structures;
- (b) Adopt and implement national and local disaster risk reduction strategies and plans, across different timescales with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience;
- (c) Carry out an assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at local and national level;

- (d) Encourage the establishment of necessary mechanisms and incentives to ensure high levels of compliance with existing safety-enhancing provisions of sectoral laws and regulations, including those addressing land use and urban planning, building codes, environmental and resource management and health and safety standards, and update them, where needed, to ensure an adequate focus on disaster risk management;
- (e) Develop and strengthen, as appropriate, mechanisms to follow -up, periodically assess and publicly report on progress on national and local plans. Promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction;
- (f) Assign, as appropriate, clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks. Undertake comprehensive public and community consultations during the development of such laws and regulations to support their implementation;
- (g) Establish and strengthen government coordination forums composed of relevant stakeholders at national and local levels, such as national and local platforms for disaster risk reduction, and a designated national focal point for implementing the post-2015 framework. It is necessary for such mechanisms to have a strong foundation in national institutional frameworks with clearly assigned responsibilities and authority to, inter alia, identify sectoral and multi sectoral disaster risk, build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, contribute to and coordinate reports on local and national disaster risk, coordinate public awareness campaigns on disaster risk, facilitate and support local multi-sectoral cooperation (e.g. among local governments), contribute to the determination of and reporting on national and local disaster risk management plans and all policies relevant for disaster risk management. These responsibilities should be established through laws, regulations, standards and procedures;
- (h) Empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level;
- (i) Encourage parliamentarians to support the implementation of disaster risk reduction through developing new or amending relevant legislation and setting budget allocations;
- (j) Promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations;
- (k) Formulate public policies, where applicable, aimed at addressing the issues of prevention or relocation, where possible, of human settlements in disaster risk zones, subject to national law and legal systems.

Priority of Action-3: Investing in disaster risk reduction for resilience

- (a) Allocate the necessary resources, including finance and logistics, as appropriate, at all levels of administration for the development and the implementation of disaster risk reduction strategies policies, plans, laws and regulations in all relevant sectors;
- (b) Promote mechanisms for disaster risk transfer and insurance, risk sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on governments and societies, in urban and rural areas;
- (c) Strengthen, as appropriate, disaster resilient public and private investments, particularly through: structural, non-structural and functional disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and physical infrastructures; building better from the start to withstand hazards through proper design and construction, including the use of the principles of universal design and the standardization of building materials; retrofitting and rebuilding; nurturing a culture of maintenance; and taking into account economic, social, structural, technological and environmental impact assessments;
- (d) Protect or support the protection of cultural and collecting institutions and other sites of historical, cultural heritage and religious interest;
- (e) Promote the disaster risk resilience of work places through structural and non-structural measures;
- (f) Promote the mainstreaming of disaster risk assessments into land -use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes;
- (g) Promote the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal flood plain areas, drylands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement and at the same time preserving ecosystem functions that help reduce risks;
- (l) Encourage the revision of existing or the development of new building codes, standards, rehabilitation and reconstruction practices at the national or local levels, as appropriate, with the aim of making them more applicable in the local context, particularly in informal and marginal human settlements, and reinforce the capacity to implement, survey and enforce such codes, through an appropriate approach, with a view to fostering disaster -resistant structures;
- (m) Enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level; developing the capacity of health workers in understanding disaster risk and applying and implementing disaster risk reduction approaches in health work; and promoting and enhancing the training capacities in the field of disaster medicine; and supporting and training community health groups in disaster risk reduction approaches in health programmes, in collaboration with

other sectors, as well as in the implementation of the International Health Regulations (2005) of the World Health Organization;

- (n) Strengthen the design and implementation of inclusive policies and social safety-net mechanisms, including through community involvement, integrated with livelihood enhancement programmes, and access to basic health care services, including maternal, new-born and child health, sexual and reproductive health, food security and nutrition, housing and education, towards the eradication of poverty, to find durable solutions in the post-disaster phase and to empower and assist people disproportionately affected by disasters;
- (o) People with life threatening and chronic disease, due to their particular needs, should be included in the design of policies and plans to manage their risks before, during and after disasters, including having access to life -saving services;
- (p) Encourage the adoption of policies and programmes addressing disaster-induced human mobility to strengthen the resilience of affected people and that of host communities as per national laws and circumstances;
- (q) Promote, as appropriate, the integration of disaster risk reduction considerations and measures in financial and fiscal instruments;
- (r) Strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction;
- (s) Increase business resilience and protection of livelihoods and productive assets throughout the supply chains. Ensure continuity of services and integrate disaster risk management into business models and practices;
- (t) Strengthen the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds;
- (u) Promote and integrate disaster risk management approaches throughout the tourism industry, given the often-heavy reliance on tourism as a key economic driver.

Priority of Action-4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

- (a) Prepare or review and periodically update disaster preparedness and contingency policies, plans and programmes with the involvement of the relevant institutions, considering climate change scenarios and their impact on disaster risk, and facilitating, as appropriate, the participation of all sectors and relevant stakeholders;
- (b) Invest in, develop, maintain and strengthen people -centred multi-hazard, multispectral forecasting and early warning systems, disaster risk and emergency communications

mechanisms, social technologies and hazard -monitoring telecommunications systems. Develop such systems through a participatory process. Tailor them to the needs of users, including social and cultural requirements, in particular gender. Promote the application of simple and low -cost early warning equipment and facilities and broaden release channels for natural disaster early warning information;

- (c) Promote the resilience of new and existing critical infrastructure, including water, transportation and telecommunications infrastructure, educational facilities, hospitals and other health facilities, to ensure that they remain safe, effective and operational during and after disasters in order to provide live -saving and essential services;
- (d) Establish community centres for the promotion of public awareness and the stockpiling of necessary materials to implement rescue and relief activities;
- (e) Adopt public policies and actions that support the role of public service workers to establish or strengthen coordination and funding mechanisms and procedures for relief assistance and to plan and prepare for post -disaster recovery and reconstruction;
- (f) Train the existing workforce and voluntary workers in disaster response and strengthen technical and logistical capacities to ensure better response in emergencies;
- (g) Ensure the continuity of operations and planning, including social and economic recovery, and the provision of basic services in the post -disaster phase;
- (h) Promote regular disaster preparedness, response and recovery exercises, including evacuation drills, training and the establishment of area -based support systems, with a view to ensuring rapid and effective response to disasters and related displacement, including access to safe shelter, essential food and non -food relief supplies, as appropriate to local needs;
- (i) Promote the cooperation of diverse institutions, multiple authorities and related stakeholders at all levels, including affected communities and business, in view of the complex and costly nature of post -disaster reconstruction, under the coordination of national authorities;
- (j) Promote the incorporation of disaster risk management into post-disaster recovery and rehabilitation processes, facilitate the link between relief, rehabilitation and development. Use opportunities during the recovery phase to develop capacities that reduce disaster risk in the short, medium and long term, including through the development of measures such as land use planning, structural standards improvement and the sharing of expertise, knowledge, post -disaster reviews and lessons learned. Integrate post -disaster reconstruction into the economic and social sustainable development of affected areas. This should also apply to temporary settlements for persons displaced by disaster;
- (k) Develop guidance for preparedness for disaster reconstruction, such as on land use planning and structural standards improvement, including by learning from the recovery and reconstruction programmes over the decade since the adoption of the Hyogo Framework for Action, and exchanging experiences, knowledge and lessons learned;

- (l) Consider the relocation of public facilities and infrastructures to areas outside the risk range, wherever possible, in the post -disaster reconstruction process, in consultation with the people concerned, as appropriate;
- (m) Strengthen the capacity of local authorities to evacuate persons living in disaster-prone areas;
- (n) Establish a mechanism of case registry and a database of mortality caused by disaster in order to improve the prevention of morbidity and mortality;
- (o) Enhance recovery schemes to provide psychosocial support and mental health services for all people in need;
- (p) Review and strengthen, as appropriate, national laws and procedures on international cooperation, based on the guidelines for the domestic facilitation and regulation of international disaster relief and initial recovery assistance.

Elements of Disaster Risk Management in Sustainable Development Goals and Targets

Sustainable Development Goals	Sustainable Development Targets
Goal 1. End poverty in all its forms everywhere	Target 1.5 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	Target 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round. Target 2.4 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	Target 3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents Target 3d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

Sustainable Development Goals	Sustainable Development Targets
Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	Target 4a 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 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons Target 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and decrease by [x] per cent the economic losses relative to gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations. Target 11b By 2020, increase by [x] per cent 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, develop and implement, in line with the forthcoming Hyogo Framework, holistic disaster risk management at all levels
Goal 13. Take urgent action to combat climate change and its impacts.	Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

Sustainable Development Goals	Sustainable Development Targets
	Target 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Target 13b Promote mechanisms for raising capacities for effective climate change related planning and management, in least development countries, including focusing on women, youth, local and marginalised communities.
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.2 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	Target 15.3 By 2020, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation-neutral world.



Matrix of Responsibilities of State Government for Mitigating Risks of Flood, Earthquake, Landslide, Snow Avalanche, Drought and Industrial (Chemical) Disaster under National Plan for Disaster Management

I. Flood Risk Mitigation

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Disaster Risk			
1.	Observation, Networks, Information Systems, Monitoring and Forecasting	- Support and cooperate with central agencies - Sponsor state-specific efforts; - Support local efforts	Irrigation Dept., SDMA, DDMA, Panchayats, ULBs
2.	Zoning, Mapping, and classification of flood prone areas	- Support and cooperate with central agencies - Sponsor state-specific efforts; - Support local efforts	Irrigation Dept., SDMA, DDMA, Panchayats, ULBs
3.	Studies and monitoring of rivers flowing from neighbouring countries	- Support and cooperate with central agencies - Carry out state-specific efforts - Sponsor state-specific efforts; - Support local efforts	Irrigation Dept., SDMA
4.	Research and Development	- Support and cooperate with central agencies - Sponsor/ carry out state-specific efforts; - Support local efforts	Irrigation Dept., SDMA, relevant state level technical institutions

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Disaster Risk			
5.	Hazard Risk Vulnerability Assessment	Undertake HRVA as part of preparing and periodic revision of DM plans	SDMA, Irrigation Dept., Revenue Dept.(DM)
6.	Monitoring, Forecasting and Warning Systems	Support, cooperation for data collection and updates	SDMA, Irrigation Dept., relevant state level technical institutions
7.	Dissemination of warnings, data and information	• Inter-state data and information sharing where applicable • Coordination and cooperation with the central agencies • Ensure facilities and infrastructure for the implementation of adequate access to communities at risk • Dissemination of warnings to all, down to the last mile – remote rural or urban; • Regular updates to people in areas at risk • Warnings using all types of options, types of technologies, and media • Monitoring compliance by various network operators and service providers.	SDMA, Irrigation Dept., Revenue Dept. (DM), DDMA, Panchayats, ULBs
Inter-Agency Coordination			
1.	Overall disaster governance	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept. (DM), Irrigation Dept., DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Inter-Agency Coordination			
2.	Response	Organising the immediate response and seeking assistance of central agencies	SDMA, Revenue Dept. (DM), Irrigation Dept., DDMA, Panchayats, ULBs
3.	Warnings, information, Data	Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
4.	Non-structural measures	Adapting the norms/ codes as per State's requirement, enforcement, monitoring	SDMA, Revenue Dept., DDMA, Panchayats, ULBs
Investing in DRR–Structural Measures			
1.	Flood control measures such as construction of embankments and levees	• Identification safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk • Construction of multi purpose shelters in Coastal villages/ habitations prone to frequent cyclone • Proper maintenance of drainage systems and flood embankments	State, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
2.	Social Housing Schemes	Ensure that flood -resistant features are incorporated in the planning and execution of social housing schemes in flood prone areas	State, SDMA, Revenue Dept.(DM), UDD, PRD, DDMA, Panchayats, ULBs,

	Activities	Responsibilities of State Government	Agencies Responsible
Inter-Agency Coordination			
3.	Multi-purpose Flood Shelters	Ensure availability of shelters, undertake proper maintenance, and make arrangements to support the people shifted to temporary shelters	State/UT, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
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	State, SDMA, Revenue Dept.(DM), PWD, DDMA, Panchayats, ULBs
5.	Enhancing the safety of dams and reservoirs	- Carry out measures to increase safety, reduce risks from flooding - Undertake pre- and post-monsoon inspections of dams and reservoirs - Monitor the implementation of safety enhancements in accordance with norms	State, SDMA, Revenue Dept.(DM), Irrigation Dept.,
6.	Desilting/ dredging of rivers to improve flow; drainage improvement; floodwater diversion through existing new channels	Implementation as per norms	Irrigation Dept., SDMA, DDMA, Panchayats, ULBs
7.	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	Collaboration with technical agencies and implementation	State, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs, all relevant Departments/ Agencies.

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
1.	- Regulation and enforcement of laws, norms, regulations, guidelines - Regulation of Reservoirs Integrated Water Resource Management (IWRM)	- Implementing land-use regulation for low lying areas as per flood control norms - Regulation of inhabitation of low lying areas along the rivers, nalas and drains - Implementing flood management action plan - Review and modification of operation manuals for all major dams/ reservoirs - Support and cooperate with central agencies; Sponsor state-specific efforts; support local efforts; Cooperate with central efforts - Prevention and removal of encroachment into the waterways and natural drainage systems	Irrigation Dept., SDMA, Revenue Dept.(DM)
2.	Regulations to promote flood resilient buildings and infrastructure	Revise and implement the relevant rules in flood prone areas	State, SDMA, Revenue Dept.(DM), Local Bodies
3.	- Wetland conservation and restoration - Catchment Area Treatment/ Afforestation	- Discourage reclamation of wetlands, natural depressions - Action plan managing wetlands and natural drainage systems for flood moderation - Implementation of	State, SDMA, Revenue Dept.(DM), Local Bodies

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
		watershed management including catchment area treatment and afforestation programmes	
4.	Public Private Partnerships	Promote private participation in disaster management facilities	State, SDMA, Revenue Dept.(DM), DDMA
Capacity Development			
1.	Training	Training and orientation programs for state govt. staff, professionals for veterinary care and support to disaster-affected animals	SDMA, ATIs, Engineering Training Institutes, SIRD, Police Training Academies
		Incorporating disaster response, search and rescue in the training programs of youth such as village volunteers, and for protection of disaster-affected animals.	SDMA, SIDM, ATI DDMA, Panchayats, ULBs
2.	Curriculum Development	Update curriculum for undergraduate engineering courses to include topics relevant for flood hazard mitigation	Professional Bodies/ Councils
		Introduction of Crisis Management, emergency medical response/recovery and trauma management at Diploma/UG/PG levels for Health Professionals	Health Department of State Government
		Improving curriculum periodically using new technologies	State Board of Education

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
3.	Awareness Generation	- Carry out mass media campaigns - Promote culture of disaster risk prevention, mitigation, and better risk management - Promote attitude and behaviour change in the awareness campaigns/ IEC - Promote use of insurance/ risk transfer - Promote Community Radio - Strengthening network of civil society organizations for awareness generation about DRR and DM - Information on care and protection of disaster-affected animals	State, SDMA, Revenue Dept.(DM), Irrigation Dept., SIDM, SDRF, Fire and Emergency Services, Civil defence, Police, DMA, Panchayats, ULBs
4.	Mock Drills/ Exercises	Joint planning and execution of emergency drills	
5.	Vocational Training and Skill Development	- Conduct training programmes - Develop a team of Trainer-of-Trainers for different trades relevant to flood-resistant construction	
6.	Empowering women, marginalised, and persons with disabilities	Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels	

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
7.	Community Based Disaster Management	- Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach - Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach - Training for Panchayat, SHG, NCC, NSS, Youth, local community organizations	State Govt., SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs

2. Earthquake Risk Mitigation

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Risk			
1.	- Earthquake Monitoring Services - National Seismological Network - Real Time Seismic Monitoring Network (RTSMN)	Share information widely	State/UT, SDMA, Revenue Dept.(DM)
2.	Earthquake Hazard and Risk Assessment (EHRA)		

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Risk			
3.	Scientific Seismic Zonation	Ensuring implementation, enforcement, compliance and monitoring; awareness creation	State/UT, SDMA, Revenue Dept.(DM), UDD, PWD, ULB, DDMA
4.	Seismic Micro-zonation	Carry out needs assessment from end-users, conduct micro-zonation studies, prioritize important urban areas for micro-zonation, do professional review before adoption	State/UT, SDMA, Revenue Dept.(DM), Technical organizations/agencies
5.	Hazard Risk Vulnerability Assessment	Undertake HRVA as part of preparing and periodic revision of DM plans	SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs
Inter-Agency Coordination			
1.	Overall disaster governance	Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
2.	Response	Organising the immediate response and seeking assistance of central agencies	SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs
3.	Non-structural measures	Adapting the norms/ codes as per State's requirement, enforcement, monitoring	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
Investing in DRR–Structural Measures			
1.	Social Housing Schemes	Ensure that earthquake resistant features are incorporated in planning and execution of social housing schemes	State/UT, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs, DRD, UDD, PRD

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Structural Measures			
		Ensure compliance with relevant building codes	
2.	Strengthening and seismic retrofitting of prioritized 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.	State/UT, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
3.	Hazard resistant construction, strengthening, and retrofitting of all lifeline structures and critical infrastructure	Collaboration with technical agencies and implementation	State/UT, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs, PWD, all relevant Departments/Agencies
Investing in DRR–Non-Structural Measures			
1.	Regulations and model codes for town planning, civil works and public infrastructure	- Adopt suitable byelaws for rural and urban areas, put model codes into practice and ensure proper compliance - Ensure strict compliance with code implementation through relevant Departments and agencies	State/UT, SDMA, Revenue Dept.(DM), UDD, DRD, PWD, All other relevant departments, DDMA, Panchayats, ULBs
2.	Structural safety audit of lifeline structures and buildings Prioritization of lifeline structures and buildings for strengthening and seismic retrofitting	- Carry out safety audit of lifeline buildings and critical infrastructure - Ensure implementation, monitoring, enforcement and proper compliance within state by public, private and individuals	SDMA, Revenue Dept. (DM), UDD, PWD, DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
3.	Licensing and certification of professionals	Implement licensing of engineers through appropriate legal framework and institutional mechanism	Relevant Departments
4.	Public Private Partnerships	Promote private participation in disaster management facilities	State/UT, SDMA, Revenue Dept.(DM), DDMA
Capacity Development			
1.	Training	Contribute to the national effort to build the requisite number of trained personnel to handle seismic safety in India Trainings in search and rescue	SDMA, Revenue Dept. (DM), Education Dept., ATIs
2.	Capacity Development	DM related aspects to be included in undergraduate and professional courses	SDMA, Revenue Dept. (DM), Health Dept., Education Dept.
3.	Awareness Generation	- Carry out mass media campaigns - Promote culture of disaster risk prevention, mitigation, and better risk management - Promote attitude and behaviour change in the awareness campaigns/ IEC - Promote use of insurance/ risk transfer - Promote Community Radio - Strengthening network of civil society organizations for awareness generation	State/ UT, SDMA, Revenue Dept.(DM), SIDM, ATI Relevant State Govt. Dept., SDRF, Fire and Emergency Services, Civil defence, Police,

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
4.	Mock Drills/ Exercises	Joint planning and execution of emergency drills	Relevant Departments
5.	Documentation and Dissemination	Popularization and distribution of documentation in local languages	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs, ATIs
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	State/UT, SDMA, Revenue Dept.(DM), SIDM, ATI, and other state-level institutions, DDMA, Panchayats, ULBs
7.	Community Based Disaster Management	• Manage and cope with disasters based on a multi-hazard approach • Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach • Training for panchayat, SHG, NCC, NSS, Youth, local community organizations	State Govt., SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs

3. Landslide and Snow Avalanche Risk Mitigation

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Risk			
1.	Hazard zoning, mapping, geological, and geotechnical Investigations in regions prone to landslides and snow avalanches	Support and cooperate with Central agencies	State, SDMA, Revenue Dept.(DM), State DGM, SRSC
2.	Research and Development	Support and cooperate with Central agencies	State, SDMA, Revenue Dept.(DM), State DGM, SRSC
3.	Hazard Risk Vulnerability Assessment	Undertake HRVA as part of preparing and periodic revision of DM plans	State, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
4.	Dissemination of warnings	- Ensure facilities and infrastructure for the implementation of adequate access to communities at risk - Dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk	State, SDMA, Revenue Dept.(DM), PWD, DDMA, Panchayats, ULBs
5.	Monitoring, Warning Systems, and Dissemination	Support and collaborate in implementation	State, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Inter-Agency Coordination			
1.	Overall disaster governance	Prepare and implement DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
2.	Response	Organize immediate response and seek assistance of Central agencies	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
3.	Warnings, Information, Data	Disseminate warnings to all, down to the last mile – remote, rural or urban; provide regular updates to people in areas at risk	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
4.	Non-structural measures	Adapt the norms/ codes as per State's requirement, enforcement, monitoring	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
Investing in DRR–Structural Measures			
1.	Overall disaster governance	Prepare and implement DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs
2.	Protection of Heritage Structures	Support and collaborate with Central agencies	State, SDMA, State DGM, SRSC, DDMA, Panchayats, ULBs
3.	Multi-Hazard Shelters	- Identify safe buildings and sites to serve as temporary shelters for people and livestock evacuated from localities at risk - Construct multi purpose shelters in high risk areas at safe sites away from hazard	State, SDMA, DDMA, Panchayats, ULBs,

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Structural Measures			
		- prone locations - Ensure proper maintenance of roads in risk-prone areas	
Investing in DRR–Non-Structural Measures			
1.	Site selection for Human Settlements in Landslide and Snow Avalanche Prone Areas	- Adopt suitable byelaws for rural and urban areas - Enforce model codes into practice and ensure proper compliance - Ensure proper compliance	State, SDMA, State DGM, DDMA, Local Authorities
2.	Regulations and building codes	Ensure implementation and adherence to codes and guidelines	State, SDMA, UDD, DDMA, Local Authorities
3.	Licensing and certification of professionals	Implement licensing of engineers through appropriate legal framework and institutional mechanism	Relevant Departments
4.	Public Private Partnerships	Promote private participation in disaster management facilities	State, SDMA, DDMA
Capacity Development			
1.	Training	- Support and collaborate with national agencies - Provide training and skill upgrades for search and rescue - Conduct regular	State, State DGM, SRSC, ATIs, SIDM

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
		training programmes for professionals including those for care and protection of disaster affected animals	
2.	Curriculum Development	Include information on landslides and snow avalanches in the curriculum	State, SDMA, Education Dept.
3.	Awareness Generation	- Carry out mass media campaigns - Promote culture of disaster risk prevention, mitigation, and better risk management - Promote attitude and behaviour change in the awareness campaigns/ IEC - Promote use of insurance/ risk transfer - Promote community radio - Inform people about care and protection of disaster-affected animals	State, SDMA, SDRF, Fire and Emergency Services, Information Dept., DDMA, Panchayats, ULBs, Civil Defence, Police
4.	Mock Drills/ Exercises	Conduct joint planning and execution of emergency drills	State, SDMA, SDRF, Fire and Emergency Services, Civil Defence, Police, DDMA, Panchayats, ULBs.
5.	Documentation	Constitute multi-institutional and multi-disciplinary teams for carrying out post landslide field investigations, document the lessons learnt and disseminate	State, SDMA, SIDM, ATI, other academic institutions, DDMA, Panchayats, ULBs.

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
6.	Empowering women, marginalized, and persons with disabilities	Incorporate gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the State, district, and local levels	State, SDMA, SIDM, ATI, other academic institutions, DDMA, Panchayats, ULBs.
7.	Community Based Disaster Management	- Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach - Conduct training for panchayat, SHG, NCC, NSS, youth, and local community organizations	State, SDMA, DDMA, Panchayats, ULBs

4. Drought Risk Mitigation

	Activities	Responsibilities of State Government	Agencies Responsible
1.	Vulnerability Maps	- Annually, after the end of the South West monsoon, carry out comprehensive assessment of water availability for drinking and irrigation in all the dryland farming drought-prone areas in the State to demarcate blocks and preferably villages - Prepare maps of areas likely to face water deficit before onset of	State, SDMA, Revenue Dept.(DM), SDMC, SAUs in collaboration with central agencies

	Activities	Responsibilities of State Government	Agencies Responsible
		next monsoon (demarcate blocks and preferably villages) Undertake village-wise assessment of water storage in the vulnerable blocks	
2.	Assessment, Monitoring and Early Warning	- Coordinate with Central agencies in the compilation of data, for refining forecast accuracy for the region, and analysis of all the drought, water deficit, and crop related data - Ensure functioning of DMC under control of SDMA - Separately, at the end of southwest and northeast monsoon, as applicable, prepare and update a robust database of micro level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio economic factors - Separately, at the end of southwest and northeast monsoon, prepare crop advisory for blocks that are likely to face water deficit - Separately, at the end of southwest and northeast monsoons, prepare comprehensive water conservation, re-distribution, and	State, SDMC, SDMA, Revenue Dept. (DM), Agricultural, Irrigation Dept., SAUs in collaboration with central agencies

	Activities	Responsibilities of State Government	Agencies Responsible
		and management plan for the areas in the State that are likely to experience water deficit	
3.	Drought Declaration	- Monitor key indicators for drought declaration with the support of relevant Central/ State agencies/ Departments - State Government to issue a formal declaration of drought affected areas after which Collector will notify the district and talukas affected and initiate drought response measures	State, SDMA, Revenue Dept. (DM), SDMC, SAU, Agricultural Dept., Irrigation Dept., DDMA, District Collector
4.	Hazard Risk Vulnerability Assessment	- Undertake HRVA as part of preparation revision of DM plans including change invulnerability and risk considering climate change scenarios - Estimate vulnerability of crops to rainfall uncertainties	State/ UT, SDMA, DDMA, SAU, Agriculture Dept., Panchayats, ULBs
5.	Research	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	State, SAUs in collaboration with CRIDA, NRAA

	Activities	Responsibilities of State Government	Agencies Responsible
Inter-Agency Coordination			
1.	Overall disaster governance	Prepare and implement DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept. (DM), Agriculture Dept., DRD, PRD, DDMA, Panchayats, ULBs.
2.	Response	Organize immediate response and seek assistance of central agencies	SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs
3.	Warnings, Information, Data	Disseminate warnings to all, down to the last mile – remote, rural or urban; provide regular updates to people in areas at risk	SDMC, SDMA, Revenue Dept. (DM), Agriculture Dept., Irrigation Dept., DDMA, Panchayats, ULBs
4.	Non-structural measures	Adapt the norms/ codes as per State's requirement, enforcement, monitoring	SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs
Investing in DRR–Structural Measures			
1.	Storage Facilities	- Provide drinking water storage and distribution facilities - Provide fodder storage facilities to maintain fodder banks - Provide rainwater harvesting systems – individual and community	State, SDMA, Revenue Dept. (DM), DDMA, Forest Dept., Panchayats, ULBs, DRD, PRD, Revenue Dept., other relevant departments
2.	Water Conservation	- Create water harvesting and storage structures - Create check dams and reservoirs with excess capacity - Create groundwater recharge augmentation systems	State/UT, SDMA, Revenue Dept.(DM), DDMA, Panchayats, ULBs, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., other relevant departments.

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Structural Measures			
3.	Social Housing Schemes	Ensure rainwater harvesting and storage in the social housing schemes especially in drought-prone areas	State/UT, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, PRD, Revenue Dept.(DM), Irrigation Dept., other relevant departments.
Investing in DRR–Non-Structural Measures			
1.	Mitigation Measures	- Coordinate the efforts of the central agencies in implementing mitigation measures - Promote private participation in disaster management facilities - Improve the implementation of watershed development programmes - Ensure risk management for dryland/rain fed farmers through agricultural extension, and financial institutions based on assessments at the end of monsoon (southwest or northeast as applicable) - Ensure drought proofing of Agriculture & Horticulture	State/UT, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, PRD, Revenue Dept., Irrigation Dept., SAU, Forest/ Environment Dept., Other relevant departments

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
2.	Promote water conservation, harvesting, efficient irrigation, afforestation Prioritization of lifeline structures and buildings for strengthening and seismic retrofitting	- Promote water efficient irrigation systems (sprinklers, drip, etc.) - Promote protective irrigation through micro irrigation systems - Provide advice to farmers to cope with drought, crop management under drought conditions, and efficient water management - Impart training in water and soil moisture conservation - Promote village-level information systems for natural resource management - Explore afforestation and other options	State, SDMA, Revenue Dept. (DM), DDMA, ULBs, DRD, PRD, AHD, Revenue Dept., Irrigation Dept., SAU, Forest Dept.
3.	Agricultural credits, agricultural inputs, finance, marketing, and crop insurance	- Provide need-based credit - Promote financial inclusion - Monitor the availability of credit and other financial support from banks and other financial institutions to farmers in drought prone areas - Ensure the insurance programmes reach the target audiences (especially dryland/ rain fed farmers) and dependent agricultural labour - Extend marketing	State/UT, DMC, Agriculture Dept., State Rural Coop. Banks, Rural Banks, NABARD, SLBC, DDMA

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
		support Ensure availability of quality agricultural inputs	
4.	Reducing climate change impact	Implement various water and soil conservation programmes taking into account climate change impact	State/UT, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, PRD, Revenue Dept., Irrigation Dept., SAU, Forest Dept.
Capacity Development			
1.	Training and Capacity Building	- Formulate and implement national training and capacity building programme for drought management, especially, better water conservation, integrated water management (surface and ground water), and cropping systems - Implement different training programmes for officials at various levels, elected representatives, community leaders, civil society organizations, and animal welfare organizations - Ensure availability of qualified and experienced trainers conversant with	State/UT, SDMA, ATI, SIDM, SDMC, DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
		drought mitigation and management techniques (crop, animal care, integrated water resources – surface and ground water) • Ensure availability of professionals for veterinary care and support to drought affected animals	
2.	Curriculum Development	Include basic aspects of disaster management including drought in graduate and post-graduate courses in agriculture and veterinary courses offered by state institutions	State, SAU, Education Dept.
		Include drought mitigation in secondary and higher secondary school curriculum	State, SBSE
3.	Awareness Generation	• Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management covering crop and water management (including conservation of surface and ground water) • Promote attitude and behaviour change in the awareness campaigns/IEC • Promote use of insurance/ risk transfer • Promote community	State, SDMA, Revenue Dept. (DM), all other relevant line departments, DDMA, Panchayats, ULBs, SAU

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
		radio Inform people about care and protection of disaster affected animals	
4.	Empowering women, marginalized, and persons with disabilities	Incorporate gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the State, district, and local levels	State, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, Agriculture Dept. DRD, PRD, Irrigation Dept., SAU, Forest/ Environment Dept., DSJE, other departments
5.	Drought Management Plans	Incorporate gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the State, district, and local levels	State, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, Agriculture Dept. DRD, PRD, Irrigation Dept., SAU, Forest/ Environment Dept., DSJE, other departments
6.	Mainstreaming drought management in development plans	All State Government departments/ agencies will mainstream disaster management efforts in their developmental plans	State/UT, SDMA, Revenue Dept. (DM), DDMA, Panchayats, ULBs, Agriculture Dept., AHD, PRD, Irrigation Dept.

5. Chemical (Industrial) Disasters

	Activities	Responsibilities of State Government	Agencies Responsible
Understanding Risk			
1.	Information Systems and Research	Support and coordinate with Central Government	State, SDMA, Industries Dept., SPCB and other relevant departments
2.	Zoning/ Mapping Hazard Risk Vulnerability Assessment	Identify industrial zones on basis of hazard potential and effective disaster management for worst case scenarios Carry out the mapping and related studies in collaboration with central agencies, technical organisations.	State, SDMA, Industries Dept., SPCB and other relevant departments
3.	Monitoring	Ensure implementation, enforcement, compliance and monitoring; awareness creation.	State, SDMA, Industries Dept., SPCB and other relevant departments
4.	Hazard Risk Vulnerability Assessment	Undertake HRVA as part of preparing and periodic revision of DM plans	State, SDMA, DDMA, Panchayats, ULBs and other relevant departments
Inter-Agency Coordination			
1.	Overall disaster governance	Prepare and implement DM plans and ensure the functioning of agencies with DM tasks	SDMA, Revenue Dept. (DM), Industries Dept., SPCB, DDMA, Panchayats, ULBs
2.	Response	Organize the immediate response and seek assistance of Central agencies	SDMA, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Inter-Agency Coordination			
3.	Warnings, Information, Data	Disseminate warnings to all, down to the last mile – remote, rural or urban; Provide regular updates to people in areas at risk	SDMA, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs
4.	Non-structural measures	Adapt the norms/ codes as per State's requirement, enforcement, monitoring.	SDMA, Revenue Dept., Industries Dept., SPCB, DDMA, Panchayats, ULBs
Investing in DRR–Structural Measures			
1.	- Shelters, evacuation, and support facilities - Multiple routes for reliable access and escape - Decontamination facilities	- Identify shelters with basic facilities like drinking water and first aid for chemical exposure - Ensure water storage facilities and sources for water for accident containment and firefighting operations - Provide wide roads and multiple routes in the industrial area to allow quick access by first responders and to ensure escape pathways - Establish decontamination facilities for off-site emergencies of MAH units	State/UT, SDMA, Industries Dept., DDMA, Panchayats, ULBs, Industries, Industrial Associations

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
1.	- Laws, Regulations, Techno-Legal regimes - Enforcement, Compliance and Monitoring - Institutional Arrangements	- Formulate rules, norms, and laws such as factories rules consistent with that of ensuring greater safety in hazardous industries and to reduce likelihood of disasters - Empower factory inspectorates to take legal actions for noncompliance of Manufacture, Storage and import of Hazardous Chemical (MSIHC) Rules - Review rules to grant compensation to chemical accident victims to improve them in favour of victims - Amend land use norms to ensure greater safety and to ensure buffer zones without human settlements in close proximity of hazardous industries - Strengthen the conduct of safety audits and enforcement of disaster prevention norms.	State/UT, SDMA, DDMA, SPCB, Forest/ Environment Dept. Industries Dept., Other relevant depts., Panchayats, ULBs, Industries Associations
2.	Public Private Partnerships	- Promote private participation in off-site disaster management facilities - Provide legal support	State/UT, SDMA, DDMA, Industries Associations

	Activities	Responsibilities of State Government	Agencies Responsible
Investing in DRR–Non-Structural Measures			
		for Mutual Assistance Groups among industries within clusters Encourage private participation in enhancing off site disaster response and mitigation	
Capacity Development			
1.	Training	Impart training and orientation programmes for State Government staff, and other direct stakeholders	SDMA, State ATIs, SPCB, Industries Dept., DDMA, Panchayats, ULBs, Industries, Associations
2.	Curriculum Development	Incorporate disaster response, search and rescue in the training programmes of youth such as village volunteers, civil society, and village/ward level leaders Add more specializations and electives on HAZCHEM and chemical disaster management	SDMA, SIDM, ATI DDMA, Panchayats, ULBs Professional Bodies and Councils in States
		Implement the recommendations of reviews in all educational institutions in the State	State, Health Dept.
		Introducing basic DM concepts and precautions related to HAZCHEM	State Education Board
3.	Awareness Generation	- Carry out mass media campaigns - Promote culture of	State/UT, SDMA, SDRF, Fire and Emergency Services,

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
		disaster risk prevention, mitigation, and better risk management • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Strengthen network of civil society organizations for awareness generation about DRR and DM • Focus on safety and compliance with SOP at workplace for workers • Provide information on safety, care and protection of disaster affected animals	Industries Dept., Civil Defence, Police, DDMA, Panchayats, ULBs
4.	Mock Drills/ Exercises	Conduct joint planning and execution of emergency drills	State, SDMA, Industries Dept., SDRF, Fire and Emergency Services, Civil Defence, Police, DDMA, Panchayats, ULBs, Industries Associations
5.	Empowering women, marginalized, and persons with disabilities	Incorporate gender sensitive and equitable approaches incapacity development covering all aspects of disaster management at the State, district, and local levels	State, SDMA, SIDM, ATI and other state-level institutions, DDMA, Panchayats, ULBs
6.	Community Based Disaster Management	• Strengthen ability of communities to manage an cope with disasters based on a multi-hazard approach	States/UTs, SDMA, DDMA, Panchayats, ULBs

	Activities	Responsibilities of State Government	Agencies Responsible
Capacity Development			
		Training for Panchayat, SHG, NCC, NSS, Youth, and local community organizations	

Responsibility Matrix for Preparedness and Response

	Activities	Responsibilities of State Government	Agencies Responsible
1.	Early Warning, Maps, Satellite inputs, Information Dissemination	- Disseminate early warning signals to the district administration, local authorities, and the public at large in the areas likely to be affected by a disaster so as to reduce loss of life and property - Disseminate warnings and information up to the last mile - Ensure appropriate compilation/ analysis of received data - Use of satellite imageries and other scientific methods for risk assessment and forecasting	State, SDMA, Revenue Dept. (DM), EOC, DDMA, all other relevant Departments/ Agencies
2.	Evacuation of People and Animals	- Quick assessment of evacuation needs such as the number of people and animals to be evacuated and mode of evacuation - Mobilize transport and resources for evacuation - Identify and prepare sites for temporary relocation of affected people and animals - Identify requirements of resources for	State, SDMA, Revenue Dept. (DM), SEOC, DDMA, all other relevant Departments/ Agencies, SDRF, Civil Defence

	Activities	Responsibilities of State Government	Agencies Responsible
		evacuation such as helicopters, aircrafts, high speed boats and ships to be provided to the affected State Government • Request for Central resources, if needed • Coordinate with central agencies to mobilize required resources • Monitor the situation • Earmark resources/ units/ battalions of SDRF for quick deployment • Prepare handbook manuals and SOP for evacuation of people and animals • Undertake review and revise DMPs and SOPs after each major incident • Prepare evacuation plan taking into account local conditions and periodically update it • Undertake mock simulation drills • Prepare operational checklists • Prepare list of agencies/ organizations who could assist in evacuation • Web-based resource inventory and its regular updates	
3.	Search and Rescue of People and Animals	• Various positions of IRTs (State, District, Sub-division and Tehsil) are trained and	State, SDMA, Revenue Dept. (DM), SEOC, DDMA, all other relevant

	Activities	Responsibilities of State Government	Agencies Responsible
		activated for response at their respective administrative jurisdiction • SDRF teams are trained, equipped and ready to move at a short notice to the affected areas • Strategic stationing of state of the art equipment for search, rescue and response with dedicated trained manpower • MoU is 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) • Nodal officer selected for coordination is in regular touch with MHA/NDMA for additional requirements (including help from other Central Ministries)	Departments/ Agencies, Civil Defence
4.	Medical Care	• 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	State, SDMA, Revenue Dept. (DM), SEOC, DDMA, Health Dept., all other relevant departments, Civil Defence

	Activities	Responsibilities of State Government	Agencies Responsible
		- 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 - Include the hospital wise information in the DM Plans at local levels - Tie-up with the companies for easy availability of common medicines during the emergency situations - Hygienic conditions are prevalent at all times in various facilities established as well as hospitals to curb the spread of diseases - Establish sound protocols for coordination between State's health Dept. and the Central agencies - Ensure strict compliance with minimum standards of relief as per Section 12 of Disaster Management Act 2005	
5.	Drinking Water/ Dewatering Pumps/ Sanitation Facilities/ Public Health	Ensure strict compliance with minimum standards of relief as per Section 12 of Disaster Management Act 2005	State, SDMA, Revenue Dept., SEOC, DDMA, Health Dept., all other relevant Departments/ Agencies, Civil Defence

	Activities	Responsibilities of State Government	Agencies Responsible
		• Provide disaster affected areas with clean drinking water and to prevent the spread of water borne diseases • Provide emergency water supplies when there is scarcity of potable water • 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 • Dept. of Water Resources and Drinking Water and Sanitation works with the Logistic section of the State level IRT to provide effective services to the field level IRTs • Necessary arrangements are made for supplying drinking water through tankers • Necessary arrangements are made for supplying chlorine tablets • MoU is 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	

	Activities	Responsibilities of State Government	Agencies Responsible
		usually within six hours of placing order • MoU is in place with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within six hours of request • Availability of hygienic portable toilets and bleaching powder through pre-disaster agreements/ contracts with suppliers	
6.	Food& Essential Supplies	• 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 • Agreements/MoUs with organizations, trusts, and firms for setting up community kitchens in the affected areas • Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the supplies reach the site on time • Deploy a dedicated team at the local level to receive the supplies, maintain log (manual or computerized), and distribute them at	State, SDMA, Revenue Dept., SEOC, DDMA, Food and Civil Supply Dept., all other relevant Departments, Civil Defence

	Activities	Responsibilities of State Government	Agencies Responsible
		- required locations - Food godowns have sufficient food materials and not situated at vulnerable location	
7.	Communication	- Failsafe communication plan is prepared with all early warning agencies - Logistic section of the State level IRT coordinates with Central agencies to provide effective communication support to the field level IRTs for response - State and district EOCs are equipped with satellite phones/ VHF/ HF as a back up to the landline - All communication equipment, especially the satellite phones, are in good working condition 24x7 on all days through regular testing - Plans for communication including telephone and HAM is prepared for smooth coordination with the field level IRTs - Establish protocols and responsibilities for coordinating with central agencies and various service providers - Prepare, update and	State, SDMA, Revenue Dept., EOC, DDMA, Information Dept., all other relevant departments

	Activities	Responsibilities of State Government	Agencies Responsible
		maintain a district wise list of HAM Operators who could be contacted and deployed at the site of emergency • Have binding agreements with telecom service providers to restore damaged facilities and set up temporary facilities on emergency basis • Ensure inter operability among different telecom service providers	
8.	Housing and Temporary Shelters	• Ensure strict compliance with minimum standards of relief as per Section 12 of Disaster Management Act 2005 • Logistic section of the State level IRT must coordinate with Railways to provide effective services to the field level IRTs for response • Alternate places for 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 • Identify shelter suppliers for supply of tents/ shelters up to the village level and	State, SDMA, Revenue Dept., SEOC, DDMA, UDD., all other relevant Departments

	Activities	Responsibilities of State Government	Agencies Responsible
		enter into an MoU for supply at short notice (usually less than 24 hours) as per requirement • Stockpile tents, tarpaulins and temporary shelter material in regional warehouses/stores/ ERCs • Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the tents/shelters reach the site on time • Deploy a dedicated team at the local level to receive the tents/ shelters • Maintain logs (manual or computerized) of all material movements and details of distribution to required locations	
9.	Power	• Electricity Board and Power Distribution Companies work with the Logistic section of the State level IRT to provide effective services to the field level IRTs for response • Pre-disaster arrangements for quick restoration of power supply with alternate mechanisms to critical facilities usually within six to 12 hours of placement	State, SDMA, Revenue Dept., SEOC, DDMA, Electricity Board, Power Distribution Companies, all other relevant Departments

	Activities	Responsibilities of State Government	Agencies Responsible
		- of order - Pre-disaster agreements with Central and neighbouring state governments for technical support in restoration of power supply and infrastructure - Mobile power supply units or other arrangements with power generation companies for quick deployment at the site during emergency	
10.	Fuel	- Logistic section of the State level IRT to coordinate with the relevant departments/agencies to provide effective services (Ground Support Unit) to the field level IRTs for response - Assess and indicate clear requirement of fuel to the Central Ministry and coordinate the delivery of fuel through local arrangements - Ensure sufficient availability of tankers other vehicles for local transportation through the relevant Department - Establish mechanism for stocking the fuel at strategic locations with relevant agencies	State, SDMA, Revenue Dept., SEOC, DDMA, Civil Supply Dept., all other relevant Departments

	Activities	Responsibilities of State Government	Agencies Responsible
11.	Transportation	- Department 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 - Requirement of transport for the sending the relief material, responders are arranged - Need of the transport of various activated section of the IRT as per Incident Action Plan is fulfilled - Indian Railway works with the Logistic section of the State level IRT to provide effective services (Ground Support Unit) - Restoration of railway tracks and functioning of railway at the earliest - Coordinate with Central Government for transportation of relief materials - Within and near Airports: Airports Authority of India 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 - Restoration of airport	State, SDMA, Revenue Dept., SEOC, DDMA, Transport Dept., Forest/ Environment Dept., PWD, Railways, Airport Officer, all other relevant Departments

	Activities	Responsibilities of State Government	Agencies Responsible
		at the earliest involving specialized response force of the Central Government • Coordination with State and district administration to provide air support • Cater to the needs of transporting affected people if required	
12.	Relief Logistics and Supply Chain Management	• Establish a mobilization centre at the airport railway station for the movement of relief supplies within the state • Deploy special transport mechanism for the movement of relief supplies within the state • Make arrangements to receive and distribute relief and emergency supplies received from different parts of the country • Coordinate transportation (air, rail, road, water) with Central Ministries departments/ agencies • Arrange alternative means of transportation to send relief supplies to the affected locations if normal transport cannot reach	State, SDMA, Revenue Dept., SEOC, DDMA, all other relevant Departments/ Agencies
13.	Disposal of animal carcasses	• Equip and train the staff in carcass removal/disposal	State, SDMA, Revenue Dept., SEOC, DDMA, Forest/ Environment

	Activities	Responsibilities of State Government	Agencies Responsible
		at pre-identified sites to ensure that no other health hazard is created, both for the staff as well as general public	Dept., Agriculture Dept., AHD, Animal Welfare Organizations
14.	Fodder for livestock in scarcity-hit areas	- Mobilize fodder and cattle feed to meet shortages, as in drought or scarcity conditions - Transport fodder from storage facilities or collection centres to the scarcity-hit areas - Organize collection centres for fodder and cattle feed - Enlist PSUs and private agencies for providing fodder and other support	State, SDMA, Revenue Dept., SEOC, DDMA, Forest/ Environment Dept., Agriculture Dept., AHD, Animal Welfare Organizations
15.	Rehabilitation and Ensuring Safety of Livestock and Other Animals, Veterinary Care	- Include provisions for evacuation, safety, and rehabilitation of animals in SDMP - Set up livestock camps/ shelters for animals in distress due to disasters, including drought - Organize proper care of animals in the camps/ shelters - Ensure proper management and running of livestock camps/ shelters - Proper rehabilitation of animals - Provide veterinary care to disaster-affected livestock, including in drought-hit areas	State, SDMA, Revenue Dept., SEOC, DDMA, Forest/ Environment Dept., Animal Husbandry Department, Agriculture Dept., Animal Welfare Organizations

	Activities	Responsibilities of State Government	Agencies Responsible
16.	Data Collection and Management	- Representative of SDMA works with the Planning section at State level for making of IAP and dissemination of information - Creation of a cell at the district level (preferably as part of DEOC) and place dedicated resources to collect/ update data on all essential services (as per the template given in the IRS guidelines) which will help during the response phase for effective reporting a compilation	State, Revenue Dept./ SEOC/ SDMA, DDMA, Bureau of Economics and Statistics, all other relevant Departments
17.	Relief Employment	- Provide opportunities for unskilled work in public works for people seeking work in drought-affected areas as a relief measure - Ensure quick and prompt payment of wages - Carry out health check up of those seeking work - Draw from various funds including Disaster Response Fund to implement the employment schemes	State, Revenue Dept., SDMA, DDMA
18.	Media Relations	Department of Information and Public Relations works with the Command staff as Information and	State, SDMA, Revenue Dept., SEOC, DDMA, Information Dept., all other relevant Departments

	Activities	Responsibilities of State Government	Agencies Responsible
		Media Officer of the State level IRT to provide effective services • Ethical guidelines for coverage of disaster is prepared and shared with all media agencies • Plan is prepared for providing/ broadcasting warnings, dos and don'ts etc. to media and ensure its dissemination	



Annexure V

District-wise Disaster Damage and Loss in Himachal Pradesh (2007-2015)

Districts	Deaths (Nos)	Minor injuries (Nos)	Major injuries (Nos)	Livestock lost (Nos)	Agricultural crops lost (tons)	Horticultural crops lost (tons)	Cash Crop lost (tons)	Trees uprooted (Nos)	Kachha houses damaged (Rural) Nos	Pacca houses damaged (Rural)	Kachha houses damaged (Urban)	Pacca houses damaged (Urban)	Damages to Roads & Bridge (Rs.Lacs)	Damages to power supply (Rs. Lacs)
Bilaspur	1016	420	1029	2842	184183	6985	75391	388400	3632	751	4	11	1629	89
Chamba	1090	269	808	8506	4709	248138	2982	29197	3949	173	3	44	0	302
Hamirpur	662	518	449	2148	134427	8394	43088	67183	3631	574	12	44	7772	238
Kangra	1951	2916	871	7620	55276	139194	44682	53819	7584	526	143	32	4861	352
Kinnaur	1214	364	926	12928	1110	28616	1330	72168	6220	2116	0	0	698	417
Kullu	880	466	397	4733	107025	284147	116978	105858	3102	285	0	17	6489	359
L&S	249	446	39	7050	3	77	360	12694	2442	1	0	0	805	19
Mandi	1918	2054	2669	5798	106028	98935	122887	180513	5730	716	0	166	5568	38
Shimla	2181	1534	1170	4207	3335	723697	26567	35436	9721	840	18	121	154	84
Sirmour	1125	367	1031	3896	24198	4915	6961	8594	6176	282	4	35	0	0
Solan	898	70	734	1501	18293	6377	19334	30	5212	599	25	11	70	164
Una	238	85	129	459	105783	42008	6333	0	3317	650	45	405	183	95
Total	13422	9509	10252	61688	744370	1591483	466893	953892	60716	7513	254	886	28229	2157

HP STATE DISASTER MANAGEMENT AUTHORITY

Emergency Support Functions (ESFs) Plan

In the aftermath of a major natural disaster wherein State Government's assistance is required for the districts, the command, control and coordination will be carried out under the ESFs Plan.

EOC shall activate the ESFs and the concerned Department/Agency of each ESF shall identify requirements in consultation with their counterparts in affected districts, mobilize and deploy resources to the affected areas to assist the district (s) in its/their response action. The State EOC shall maintain a close link with the District EOCs and NEOC.

ESFs shall be responsible for the following:

1. They will coordinate directly with their functional counterpart in districts to provide the state government assistance required. Request for assistance will be channelled from the district both through the Deputy Commissioner and designated departments/ agencies. Based on the identified requirements by the districts, appropriate assistance shall be provided by an ESF Department/ Agency to the district or at the Deputy Commissioner's request, directly to an affected area.
2. The designated authorities for each of ESF shall constitute quick response teams and assign the specific task to each of the member.
3. The designated authorities for each of the ESF shall identify and earmark the resources i.e. Manpower and materials to be mobilized during the crisis.
4. An inventory of all the resources with details shall be maintained by each of the designated authority for each of the ESF.
5. The designated authority for each of the ESF will also enter into pre-contracts for supply of resources, both goods and services to meet the emergency requirements.
6. The designated authority for each of the ESF will be delegated with adequate administrative, legal and financial powers for undertaking the tasks assigned to them.

Primary and Secondary Agencies

The designated primary agency, acting as the State agency shall be assisted by one or more support agencies (secondary agencies) and shall be responsible for managing the activities of the ESF and

assisting the district in the rescue and relief activities and ensuring that the mission is accomplished. The primary and secondary agencies have the authority to execute response operations to directly support the needs of the affected districts.

Agency for Each Emergency Support Functions and Roles to be Performed

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
1.	Communication	Police	Police, Units of Armed Forces of the Area	Coordinate national actions to assure the provision of telecommunication support to the State and district; Coordinate the requirement of temporary telecommunication in the affected areas.	Responsible for coordination of national actions to assure the provision of telecommunication support the State and district response elements; Coordinate the requirement of temporary telecommunication in the affected areas.	Make available police wireless network at the affected locations; Coordinate for the other networks available such as Ham Radios or HPSEB network etc.; The units of armed forces in the area would provide communication network on the request of the competent authority
2.	Public Health	Department of Health & Family Welfare	Department of Ayurveda	Coordinate, direct and integrate State level response; Direct activation of medical personnel, supplies and equipment; Coordinate the evacuation of patients; Provide human	Provide systematic approach to patient care; Perform medical evaluation and treatment as needed; Maintain patient tracking system to keep record of all patients treated; Mobilization of the private Health services providers for emergency response. In the event of CNBR disaster	Perform the same functions as assigned to the primary agency; Provide manpower to the primary agency wherever available and needed; Make available its resources to the primary agency wherever needed and available.

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
				services under the Dept. of health; To prepare and keep ready Mobile Hospitals and stock; To network with private health service providers; To provide for mass decontamination; Check stocks of equipment and drugs.	to provide for mass decontamination of the affected population; Maintain record of dead and arrange for their post mortem.	
3.	Sanitation and Sewerage Disposal	Urban Development Rural Development	Irrigation & Public Health Department	Make arrangement for proposal disposal of waste in their respective areas; Arrange adequate material and manpower to maintain cleanliness and hygiene	Ensure cleanliness and hygiene in their respective areas; To arrange for the disposal of dead bodies and keeping record thereof; Hygiene promotion with the availability of mobile toilets; To dispose of the carcass	Perform the same functions as assigned to the primary agency; Provide manpower to the primary agency wherever available and needed; Make available its resources to the primary agency wherever needed and available.

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
4.	Power	HPSEB Ltd	Himurja	Provide and coordinate State support until the local authorities are prepared to handle all power related problems; Identify requirements of external equipment required such as DG sets etc.;	Support to local administration; Review the total extent of damage to the power supply installations; To provide alternative means of power supply for emergency purposes; Dispatch emergency repair teams equipped with tools, tents and food; Hire casual labour for the clearing of damaged poles etc.	Make arrangement for and to provide the alternative sources of lighting and heating to the affected populations and for the relief camps.
5.	Transport	Department of Transport	HRTC, Civil Aviation, GAD	Overall coordination of the requirement of transport; Make an inventory of vehicles available for various purposes; Coordinate and implement emergency related response and recovery functions, search and rescue and damage assessment	Coordinate arrangement of vehicles for transportation of relief supplies from helipads/airports to the designated places; Coordinate arrangement of vehicles for transportation of SAR related activities.	Make available its fleet for the purpose of SAR, transportation of supplies, victims etc.; Act as stocking place for fuel for emergency operations; Make available cranes to District Administration; Civil Aviation and GAD will coordinate for helicopter services etc. required

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
						for transportation of injured, SAR Team, relief and emergency supplies.
6.	Search and Rescue	Civil Defence, Home Guards, Fire & Emergency Services	NDRF, SDRF, Armed and Paramilitary Forces, Police, Red Cross, VOs, and 108	Establish, maintain and manage states search and rescue response system; Coordinate search and rescue logistics during field operations; Provide status reports of SAR updates throughout the affected areas.	GIS is used to make an estimate of the damage area and the deployment of the SAR team in the area according to the priority; Discharge all ambulatory patients for the first aid which has the least danger to health and others transported to safer areas.	108 and Red Cross to make available ambulances as per requirement; SDRF, VO and volunteers to assist the primary agency in SAR; NDRF, Armed and para military forces to provide assistance to civil authorities on demand; Police to arrange for the Transportation and post mortem of the dead.
7.	Public Works and Engineering	HP PWD	CPWD, National Highways Authority of India, MES, BRO	Emergency clearing of debris to enable reconnaissance; Clearing of roads; Assemble casual labour; Provide a work team carrying emergency tool	Establish a priority list of roads which will be opened first; Constructing major temporary shelters; Connecting locations of transit/relief camps; Adequate road signs should be	Making machinery and manpower available to the PWD and to keep national highways and other facilities in functional state

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
.				kits, depending on the nature of disaster, essential equipment's such as • Towing vehicles • Earthmoving equipment's • Cranes etc. Keep national and other main highways clear from disaster effects such as debris etc.; Networking with private service providers for supply of earth moving equipment's etc.	installed to guide and assist the relief work; Clearing the roads connecting helipads and airports; Restoring the helipads and making them functional; Rope in the services of private service providers and secondary services if the department is unable to bear the load of work.	
8.	Information and Communication	Department of Revenue through State EOC	Department of IT NIC	Operate a Disaster Welfare Information (DWI) system to collect, receive, and report and status of victims and assist family reunification; Apply GIS to speed other	Documentation of response/ relief and recovery measures; Situation reports to be prepared and completed every 3-4 hours.	Render necessary assistance in terms of expertise to the primary agency in performing the assigned task.

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
				facilities of relief and search and rescue; Enable local authorities to establish contact with the state authorities; Coordinate planning procedures between district, the state and the centre; Provide ready formats for all reporting procedures as a standby.		
9.	Relief Supplies	Department of Revenue	Department of Food and Civil Supplies	Collect, process and disseminate information about an actual or potential disaster situation to facilitate the overall activities of all responders in providing assistance to an affected area in consultation; Coordinate activities	Support to local administration; Allocate and specify type of requirements depending on need; Organize donation (material) for easy distribution before entering disaster site.	Assist the primary agency in arranging and supplying relief supplies; Assist the primary agency in running the relief camps.

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
.				involved with the emergency provisions; Temporary shelters; Emergency mass feeding; Coordinate bulk distribution of emergency supplies; Provide logistical and resource support to local entities; In some instances, services also may provide disaster workers; Coordinate damage assessment and post disaster needs assessment.		
10.	Food Supplies	Department of Food & Public Distribution	Department of Cooperation	Requirement of food And clothing for affected population; Control the quality and	Make emergency food and clothing supplies available to population; Ensure the provision of specific nutrients and supplementary diet for	Ensure the distribution of food supplies to the affected population through the Public Distribution System network etc.

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
				quantity of food, clothing and basic medicines; Ensure the timely distribution of food and clothing to the people; Ensure that all food that is distributed is fit for human consumption.	the lactating, pregnant women and infants.	
11.	Drinking Water	Department of Irrigation & Public Health	Urban Development Department	Procure clean drinking water; Transport water with minimum wastage; Special care for women with infants and pregnant women; Ensure that sewer pipes and drainage is kept separate from drinking water facilities.	Support to local administration; Water purification installation with halogen tablets, etc.	Assist the primary agency wherever ULB is associated in the distribution of potable water

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
12.	Shelter	Department of Revenue	HIMUDA, HPPWD, UDD, Panchayati Raj	Provide adequate and appropriate shelter to all population; Quick assessment and identifying the area for the establishment of the relief camps; Identify public buildings as possible shelters; Identify the population which can be provided with support in their own place and need to be shifted; Locate relief camps close to open traffic and transport links.	Support to local administration; Locate adequate relief camps based on survey of damaged houses; Develop alternative arrangements for population living in structures that might be affected after the disaster.	HIMUDA and HPPWD would assist the primary agency in establishing temporary shelters of larger dimensions; Department of Panchayati Raj through local Panchayats would assist the primary agency in establishing shelters of smaller dimensions
13.	Media	Department of Public Relations	Local DD and AIR	Provide and collect reliable information on the status of the disaster and disaster victims for effective coordination of relief work	Use and place geographical information to guide people towards relief operation; Use appropriate means of	Assist the primary agency in discharge of its role

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
				at state level; Not to intrude on the Privacy of individuals and families while collecting information; Coordinate with DOCs at the airport and railways for Required information for international and national relief workers; Acquire accurate scientific information from the Ministry of Science and Technology; Coordinate with all TV and Radio networks to send news flashes for specific needs of donation; Respect the socio-cultural and emotional state of the disaster victims while collecting information for dissemination	disseminating information victims of affected area; Curb the spread of rumours; Disseminate instructions to all stakeholders. One of the most critical needs will be having a simplified way of identifying and tracking victims and providing assistance; Identify locations for setting up transit and relief camps, feeding centres and setting up of the helplines at the nodal points in the state and providing the people information about the numbers.	

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
14.	Help Lines	Department of Revenue	Department of Public Relations	Receive distress calls from the affected people and coordinate with the control room; Facilitate the optimization of donations received in kind; Coordinate, collect, process, report and display essential elements of information and to facilitate support for planning efforts in response operations; Coordinate pre-planned and event-specific aerial reconnaissance operations to assess the overall disaster situation; Pre-positioning assessment teams headed by the State coordinating officer and deployment of other	One of the most critical needs will be having a simplified way of identifying and tracking victims and providing assistance; Identify locations for setting up transit and relief camps, feeding centres and setting up of helplines at the nodal points in the state and providing the people, the information about the numbers.	Assist the primary agency in performing its job effectively and provide its manpower

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
				advance elements; Emergency clearing of debris to enable reconnaissance of the damaged areas and passage of emergency personnel and equipment for life saving property protection and health and safety.		
15.	Animal Care	Department of Animal Husbandry	Department of Panchayati Raj	Treatment of animals; Provision of vaccination; Disposal of dead animals.	Arrange for timely care and treatment of animals in distress; Removal of dead animals to avoid outbreak of epidemics.	Assist The primary agency in performing its role
16.	Law and Order	Police	Home Guards	Having a communication and security plan in place to coordinate law and order issues; Training to security personnel in handling disaster situations and issues related to them.	Maintain law and order; Take measures against looting and rioting; Ensure the safety and security of relief workers and material; Make specific measures for the	Assist the primary agency by making available manpower

ESF No.	Emergency Support Function	Primary Agency	Secondary Agency	Responsibilities of Primary Agency	Activities for Response	Role of Secondary Agency
					protection of weaker and vulnerable sections of the society; Provide safety and security at relief camps and temporary shelters.	
17.	Removal of trees and fuel wood	Forest	Forest Corporation	Removal of fallen trees; Provide fuel wood for the relief camps and public; Have adequate storage of fuelwood and make arrangement for distribution thereof;	Arrange for timely removal of trees obstructing the movement of traffic; Arrange for timely removal of trees which have become dangerous; Make arrangement for fuel wood for the relief camps and for general public; Provide fuel wood for mass cremation etc.	To support and supplement the efforts of the primary agency

Disaster Specific Response Plans

1. EARTHQUAKE-SPECIFIC RESPONSE PLAN

1.1 Levels of earthquakes:

Response to earthquake would differ according to the levels of earthquakes. Broadly, earthquakes may be categorized in the following four levels:

- **L0 level disaster:**
Earthquakes of magnitude less than 5.0 would not cause much damage to life and property and do not require coordinated response. However, effort should be made at local level to find out damage/loss if any and to take appropriate actions. Level L0 is a no-disaster situation when the disaster management system should be maintaining a close watch over the state of preparedness. Mock drills at various levels have to be undertaken to check the preparedness. This is the most important period for disaster prevention, preparedness and mitigation when these activities are taken up actively.
- **L1 level disaster:**
The L1 level disaster is designated when earthquakes of magnitude greater than 5.0 and less than 6.0 occur. When reported from any quarter, necessary actions are set into action, without formal orders from anywhere, some basic initial management response steps alerting all concerned according to a predetermined procedure. Generally, district administration should be able to manage earthquake disaster of this level.
- **L2 level disaster:**
The L2 level disaster is designated when earthquakes of magnitude greater than 6.0 and less than 6.7 occur. This should entail triggering off some basic initial management response steps, which would be set into motion without formal orders from any quarters. The mitigation, relief and rescue operations would swing into action simultaneously. The State Government is likely to be involved in relief and response measures.
- **L3 level disaster:**
The L3 level disaster is designated when earthquakes of magnitude greater than 6.7 occur. Large scale deaths and destruction is likely to take place. The assistance of Central Government, its agencies, NDRF and Armed Forces may be required to deal with the situation.

1.2 Measures to be Taken in Case of L2 and L3 Earthquake Disaster

The following measures shall be taken for effective response to L2 and L3 earthquake disasters.

1.2.1 Real Time Information on Earthquake

The IMD has been designated to monitor seismic activity in and around the country and notify the user agencies including the State Governments about the magnitude and epicentre of the earthquake as soon as it occurs. The I/C State and district EOCs can also obtain information about occurrence of earthquake either directly contacting the IMD office or checking up with IMD website.

1.2.2 Impact Assessment

- i) EOCs/Control Rooms at the State, District and Sub-division and Tehsil Level would be activated fully and response mechanism as per ESF Plan would be put into motion automatically on the basis of information on the magnitude and epicentre of the earthquake.
- ii) State/District Administration will gather information regarding the deaths, injuries and damages to the buildings/infrastructures.
- iii) State Government, if need be, will conduct an aerial survey to determine the scope of the damage, casualties, and the status of key facilities.
- iv) State Government/District Administration will identify areas and assess the requirement of NDRF teams for urban search and rescue operations. The priority of conducting these operations will be established by the DDMA.
- v) The Deputy Commissioner (s) will send FIR as per SOPs to the State EOC and State EOCs would send consolidated FIR to the NEOC.

1.2.3 Deployment of Search and Rescue Teams

- i) As an immediate measure District Administration would deploy local search and rescue (SAR) teams of Civil Defence/Home Guards, Police, Local Volunteers etc.
- ii) Requirement of Armed Forces – Army, Air Force, CPMFs, NDRF etc. would be worked out by the respective DDMA and requisitioning placed by the DM or the SRC/State Government as the case may be.
- iii) The ESF Department/District Administration shall arrange for local transportation (from airport/railway station to affected site) of NDRF teams and supplies POL etc. for their equipment vehicles of NDRF.
- iv) District and local authorities shall control traffic to ensure that NDRF teams/other SAR and relief teams could reach the earthquake affected areas without delay.
- v) ESF Department/District Administration shall provide access routes for transportation of NDRF, other SAR and Relief Teams to the affected sites. If need be, roads and bridges will be repaired or reinforced even on a temporary basis or emergency detours be provided.
- vi) State Government in consultation with DG NDRF/JS, DM Division, MHA, shall make arrangement for deployment of USAR Teams from foreign countries to districts.

1.2.4 Emergency Medical Relief

- i) The Department of Health and Family Welfare and Ayurveda would activate their respective emergency medical plan forthwith.

- ii) NDRF teams are also trained in Emergency Medical Services (EMS) such as Medical First Response techniques with basic knowledge of life saving of disaster victims Each NDRF battalion has nine Doctors and 90 paramedics. NDRF teams shall provide EMS to the areas of their deployment during post disaster phase.
- iii) Ministry of Defence would be requested to provide Quick Response Medical Teams (QRMTs), mobile field hospitals, ARMVs and Heli-ambulances. They will be activated to reach the earthquake affected areas immediately along with dressing material, splints, portable X-ray machines, mobile operation theatres, resuscitation equipment and life-saving drugs, etc.
- iv) The Department of Health and Family Welfare at the State level would coordinate with its counterpart at the national level for medical assistance required for the State.

1.2.5 Supply of Relief Materials to Affected States

- i) The DDMAAs would assess requirement of relief items and material required for the affected areas. It would also project its demand to the State Government.
- ii) The ESF departments both at the district and State level would arrange to supply relief material to the affected locations.
- iii) The Revenue Department at the State level would consolidate demands received from the districts and would coordinate with Central Relief Commissioner for central assistance, if any.
- iv) The DDMAAs/districts would appoint Nodal Officers at airports/helipads to coordinate receipt and channelization of relief material. Adequate arrangement would be made the transportation of relief material to different parts of the district.
- v) A mechanism would be put in place for proper accounting for and distribution of the relief material received in the district.

1.2.6 Establishment and Running of Relief Camps

- i) District administration would establish relief camps as per requirement.
- ii) ESF departments would ensure arrangement for all basic amenities in these camps.
- iii) These relief camps would be run and managed by the PRIs and ULBs.
- iv) Temporary shelters would be constructed as per requirement by the Public Works Department (PWD), HIMUDA, Urban Development and the Rural Development.

1.2.7 Restoration of Roads, Communication, Electricity and Water Supply

- i) PWD would undertake repair, build temporary bridges, access ways and other temporary structures for restoration of National and State Highways and other roads.
- ii) PWD would also repair damaged helipads and make temporary helipads as per requirement.
- iii) Communication network would invariably be damaged in an earthquake. The BSNL and other service providers would take immediate steps to restore communication in the affected areas. Secondary ESF departments/agencies for communication would also provide communication facilities for disaster communication and relief.

- iv) NDRF, if called, would be requested to set-up mobile communication facility at the site so that rescue and relief operations are conducted smoothly.
- v) HP SEB Limited would take immediate steps for restoration of electricity supply to the affected areas.
- vi) The I & PH Department would restore water supply to the affected areas and would also ensure supply of water through other means till water supply is not fully restored through pipelines.

1.2.8 Damage Assessment of Public Building, Infrastructure and Individual Houses

- i) All Departments would constitute teams of officers/technical persons to:
 - Inspect buildings and structures that are critical to emergency services operations and mass care activities. Designate those that may be occupied and identify/mark those that are unsafe.
 - Inspect buildings and structures that may threaten safety. Identify/mark those that are unsafe and may not be occupied.
 - Inspect less critical damaged structures. Designate those that may be occupied and identify/mark those that are unsafe to occupy.
- ii) District administration shall constitute teams of qualified technical personnel for damage assessment of individual houses. These teams shall also identify/certify those houses that are unsafe and may not be occupied.
- iii) The State Government in consultation with the IITs and NITs will develop guidelines for assessment of damaged individual housing units.
- iv) The State Government in consultation with the IITs/NITs will develop guidelines for repair retrofitting of earthquake damages housing units.
- v) Criteria for damage and usability classification of houses would be as per the table given hereunder:

Indicative Criteria for Damage and Usability Classification of Buildings

Type	Usability Category	Damage State	Damage Degree	Damage Description	Note
I	Usable	None:	1.	Non-visible damage to structural elements.	Buildings classified as damage degree 1 and 2 are without decreased seismic capacity and do not pose a danger to human life. These buildings are immediately usable, or usable after removal of local hazards such as
		Slight non-Structural damage,		Possible appearance of fine cracks in the wall and ceiling mortar.	
		very isolated or		Non-structural and structural damage barely visible.	

Type	Usability Category	Damage State	Damage Degree	Damage Description	Note
		negligible structural damage	2.	Cracks in the wall and ceiling mortar. Displacement of large patches of mortar from wall and ceiling surfaces. Considerable cracks or partial failure of chimneys, attics and gable walls. Disturbance, partial sliding, sliding or collapse of roof covering. Cracks in structural elements such as columns, beams, and reinforced concrete walls	cracked chimneys, attics and gable walls.
II	Temporarily Usable	Severe: Extensive non-structural damage, considerable structural damage, yet repairable structural systems	3.	Diagonal or other cracks in supporting walls, walls between windows and similar structural elements. Large cracks in reinforced structural elements such as columns, beams and reinforced concrete walls. Partially failed or failed chimneys, attics or gable walls. Disturbance, sliding and collapse of roof covering.	Building classified as damage degree 3 and 4 are of significantly decreased seismic capacity. Limited entry to the buildings is permitted, and it is not usable before repair and strengthening. The needs for supporting and protection of the building and its surroundings should be considered.
			4.	Large cracks with or without detachment of walls, with crushed materials from walls between windows and similar elements of structural walls. Large cracks with small dislocation of reinforced concrete, structural element columns, beams and walls. Slight dislocation of structural elements and whole building.	

Type	Usability Category	Damage State	Damage Degree	Damage Description	Note
III	Unusable	Total: Destroyed or partially or totally collapsed Structural system	5.	Structural elements and their connections are extremely damaged and dislocated. Large number of crushed structural elements. Considerable dislocation of the entire building and roof structure. Partially or completely failed buildings	Buildings classified as damage degree 5 are unsafe and have risks sudden collapse. Entry to such buildings should be prohibited. Protection of streets and neighbouring buildings or urgent demolition is required. Decision on demolition should be based on an economic study that considers repair and strengthening as one of the possible alternatives.

1.2.9 Information Management and Helpline

- i) State Government/District Administration shall set up Emergency Information Centre (EIC) at the SEOC/DEOC level or other suitable location for release of consolidated information to all stakeholders including the media at the State/district level.
- ii) A Helpline would be established at SEOC/DEOCs or other suitable location for providing information about victims to the next of kin, friends and others.
- iii) EIC shall maintain all records and document of all major actions taken in managing the incident.

1.2.10 Prevention of Human Trafficking of Widows/Orphans

The Department of Women Empowerment and Child Development shall setup monitoring and coordination mechanism in the affected area for prevention of human trafficking of women and children.

1.2.11 Identification and Disposal of Dead Bodies

The Home Department shall deploy forensic teams and equipment for DNA fingerprinting of victims in mass casualty cases. The Department would also coordinate with MHA for central assistance as per requirement. While disposing of unclaimed/unidentified dead bodies NDMA Guidelines shall be followed.

1.2.12 Psychosocial Support

- i) The Health and Family Welfare Department shall arrange to provide psychosocial support to the victims of disaster and train volunteers for this job.

- ii) The Health and Family Welfare Department shall assess the requirement of central assistance for providing psychosocial support to the victims.

1.2.13 Financial Assistance to the Victims of Disaster

- i) The victims/dependants of victims shall be provided disaster relief assistance as per the Himachal Pradesh Disaster Management and Relief Manual, 2012 and as per additional assistance guidelines issued by the Government in such cases.
- ii) The damage and needs assessment carried out by the State Government shall be sent to the Central Government for seeking grants under National Disaster Response Fund or Prime Minister's Relief Fund.

The damage and needs assessment carried out by the district administration shall be sent to the State Government for seeking grants under State Disaster Response Fund or Chief Minister's Relief Fund.

2. LANDSLIDE-SPECIFIC RESPONSE PLAN

2.1 Likely impact of landslides:

- **Primary Impacts**
 - Multiple injuries and deaths;
 - Impact on hydroelectric and multi-purpose projects;
 - Extensive damage to roads and highways;
 - Major road closures;
 - Damage to habitations leading to relocation of population and establishments;
 - Loss of cultivable lands;
 - Adverse effect on environment; and
 - Creation of artificial lakes.
- **Secondary Impact**

Landslide may result in blocking courses of relatively large natural drainages with or without the formation of artificial lakes. Such artificial lakes created due to landslides may result in flooding upstream and downstream.

2.2 Measures to be Taken in Case of a Major Landslide

2.2.1 Real Time Information on Landslide and Impact Assessment

- i) GSI, the Nodal Agency, shall monitor landslides for identified sites and notify about the impending landslide to all the user agencies and departments of the state and district administration.
- ii) Earthquakes may trigger landslides and therefore, IMD shall communicate the occurrence of an earthquake magnitude and epicentre of the earthquake to GSI for initial assessment of earthquake induced landslide.
- iii) PWD, BRO, Forest Department shall notify the SEOC/DEOC about the occurrence of the landslide along with preliminary information on location, magnitude, damage caused, etc. The State EOC

shall notify the NEOC and GSI if the magnitude of the landslide is huge and the assistance of Central agencies is required.

2.2.2 Landslide Response Planning

- i. The DEOC/Sub-Division control room will establish contact with the site and obtain information regarding deaths, injuries, damages to building/infrastructure, environment etc. and communicate the same to all designated/ESF departments/authorities for appropriate action.
- ii. District/local administration shall mobilize local SAR teams and further identify areas and assess the requirement of SDRF/NDRF teams for urban search and rescue operations. The priority for conducting these operations shall be established by the district administration.
- iii. The Deputy Commissioner shall also send FIR to the State EOC and requisition for NDRF and other State/Central resources. The SRC shall also coordinate and follow up with the Central Government for its assistance and resources, if so required.

2.2.3 Deployment of Search and Rescue (SAR) Teams of NDRF, Army, etc.

- i. The NDRF, Army etc. if requisitioned by the district will be deployed for search and rescue operations as per assessment of the situation.
- ii. The BRO by virtue of its capabilities and location will also be deployed for SAR operations in the affected area.
- iii. The district administration shall arrange for transport (from railway station or airport) of NDRF teams and supply POL etc. for equipment, vehicles of NDRF.
- iv. DM/SRC will also coordinate with JS MHA (DM Division) for deployment of Army, if required.

2.2.4 Emergency Logistics

- i. Specialized heavy earthmoving and SAR equipment will be required immediately after a landslide to clear debris and carry out search and rescue operations of trapped people in huge masses of debris.
- ii. The PWD will immediately move its machinery and men to the locations.
- iii. The equipment available with CPWD, power projects, and private sector would also be mobilized as per requirement.
- iv. SRC will coordinate with JS (DM), MHA for mobilization of earthmoving equipment from SAIL, BEML etc. to the effected site, if need be.

2.2.6 Repair and Restoration of Road, Power, Water and Telecommunication etc.

- i. The PWD will repair and restore the affected roads immediately. The department may take assistance of secondary ESF agencies, if need be.
- ii. The damaged water supply, electricity and telecommunication lines will be restored by the respective departments forthwith.

2.2.7 Other Measures

- i. Environment Impact Assessment: Department of Environment and Forest will get the environment impact assessment carried out for the affected area.
- ii. Technical Assistance: GSI will be requested to provide trained professionals and technical experts to the State Government for geo-technical studies and remedial measures for stabilization of slopes.
- iii. Monitoring of Artificial Lakes: NRSC/ISRO/HP State Council of Environment, Science and Technology/CWC shall monitor through application of space technology and provide information regarding formation of any artificial lakes, if any, due to landslide in higher/inaccessible reaches.

3. FLASH-FLOOD SPECIFIC RESPONSE PLAN

3.1 Likely impacts of flash floods:

- Extensive damage to structure
- Multiple injuries and deaths
- Major road closures
- Damage to public utilities – power, water, telecom etc.
- Loss of land

3.2 Case Scenarios:

Two case studies of flash floods and GLOF in Himachal are given below which can be considered as WCS for flood/flash flood disaster response:

- Satluj Valley, 31st July and 1st August 2000:** Increase in water level of Satluj up to 60 feet above the normal level. The flash flood was termed as the one that occurs once in 61,000 years. Widespread damage in the valley right from its confluence with Spiti river near Khab to downstream areas. Extensive damage to 200 km of NH-22, washed away 20 bridges, 22 Jhulas and badly damaged 12 bridges. About 1,000 irrigation, sewerage, flood protection and water supply schemes were badly damaged. A total of 135 people and 1673 cattle lost their lives. The total estimated loss was to the tune of INR 1466.26 crore.
- Parechoo Lake Outburst, 2005:**
 - Flash flood in Satluj river due to breach in the Pareechu lake in Tibetan catchment on 26th June 2005.
 - Washed away the NH-22 at a number of places, 10 bridges, 11 ropeways washed away, 15 motorable bridges and eight jeep-friendly bridges and footbridges damaged affected, 10 stretch of NH-22 between Wangtoo and Samdo was washed away, and various link roads were damaged.
 - Total loss estimated to the Government as well as public property was around INR 610 crore.

3.3 Measures to be Taken in Case of a Flash Flood

3.3.1 Early Warning and Preparedness

- Central Water Commission (CWC) is the nodal agency for issuing alerts and forecasts about the floods. CWC has installed an early warning system in the River Sutlej and has been issuing daily bulletins on water level in the river. The IMD office, Shimla issues weather forecasts (heavy rains etc.) on daily basis. The Early Warning agencies would send alerts as per the SOPs prepared at the State and National level.
- National Remote Sensing Agency (NRSC) also monitors landslides and blockages of rivers which may cause flooding. Tie up with the NRSC Hyderabad would be made by CWC once there is any information of blockade of river and threat of floods. The local administration would be kept updated on the situation.

- iii) The HP State Council for Science, Technology and Environment will also monitor the potential dangerous lakes and keep the State Government abreast of any dangerous situation. The Council shall also assist districts in assessing the severity of submergence due to release of excess water downstream the dams.
- iv) The SEOC/DEOCs shall keep the public updated about the forecasts on heavy rains and early warning alerts on floods through electronic and other means.

3.3.2 Flood Response Planning and Impact Assessment

- i) EOCs/Control Rooms at State, district and local level shall be fully activated and response/ESF mechanism put into motion.
- ii) The district authorities will assess the impact of damage and organize response mobilizing the local teams. The Deputy Commissioner will also place requirement for state assistance. Requisitioning for NDRF or CPMFs/Army will also be done under intimation to the State Government.
- iii) The State Government, if need be, will conduct an aerial survey to determine the scope of damage, casualties, and the status of key facilities.
- iv) District administration will identify areas and assess the requirement of NDRF teams for SAR operations. The priority for conducting these operations will be established by the District administration.
- v) District administration shall arrange for local transportation (from airport/railway station to the affected area) of NDRF teams and supplies of POL etc. for equipment/vehicles of the NDRF.
- vi) The DM will send FIR to the State EOC.
- vii) SRC will coordinate with JS (DM), MHA for central assistance and deployment of Army/Air Force including helicopters for SAR and relief operations.

3.3.3 Emergency Medical Relief

- i. The CMO/Department of Health and Family Welfare will dispatch a team of medical specialists to the affected site with medicines etc. and prepare the nearest hospital for receiving the victims. The helpline 108 medical response will be activated too.
- ii. NDRF teams are also trained in Emergency Medical Services (EMS) such as Medical First Response techniques with basic knowledge of saving disaster victims. Each NDRF battalion has nine Doctors and 90 paramedics. NDRF teams, if deployed, shall provide EMS to the areas of their deployment during post disaster phase.
- iii. The Department of Health and Family Welfare at the State level would coordinate with its counterpart at the national level for medical assistance required for the State.

3.3.4 Supply of Relief Material to the affected Areas

- i) DDMA will assess requirement of relief material for the affected and mobilize the local reserves. It will also place its requirement for relief material with the SRC. It will also assess demand for helicopter for relief distribution, if the access through road is cut off.
- ii) In case of deployment of helicopter for relief, a senior officer of the DA will be appointed as nodal officer to coordinate with the Air Force/Helicopter authorities.

3.3.5 Repair and Restoration of Road, Power, Water and Telecommunication etc.

- i. The PWD will repair and restore the affected roads immediately. The Department may take assistance of secondary ESF agencies, if need be.
- ii. The damaged water supply, electricity and telecommunication lines will be restored by the

respective departments forthwith.

3.3.6 Other Measures

- i. Environment Impact Assessment: Department of Environment and Forest will get the environment impact assessment carried out for the affected area.
- ii. Safety Assessment of Dams: The CWC shall deploy structural engineers/experts for safety assessment of dams wherever necessary.

4. SNOWAVALANCHE SPECIFIC RESPONSE PLAN

Avalanches constitute major hazards in the higher reaches of the Himalayas. Parts of the Himalayas which receive snowfall round the year and avalanche spots are in abundant. Avalanches occur in winter soon after snowfall mainly in Lahaul & Spiti, Kinnaur and Pangi areas of the State.

4.1 Key features of an avalanche hazard are:

- More common at elevation of more than 3,500 metres
- More frequent in slopes of 30-45 degrees
- Convex slopes are more prone to this sort of disaster
- North facing slopes have avalanche in winter and south facing during summer
- Slopes covered with grass are also more prone to this hazard

Avalanches reach speeds of up to 200 km/hour and can exert forces great enough to destroy structures coming in their way and snap off large trees.

4.2 Case Scenario

In March, 1979, 237 people were killed in Lahaul & Spiti in what was the worst avalanche disaster in the State. Occurrence of such incidents in future cannot be ruled out.

4.3 Likely Impact of Snow Avalanche:

- Extensive damage to the forests and vegetation
- Extensive damage to roads and highways
- Multiple injuries and deaths
- Damage to habitations leading to relocation of population and establishments
- Loss of cultivable land and
- Adverse effect on environment

4.4 Measures to be Taken in Case of a Snow Avalanche

4.4.1 Real Time information on Avalanche

- i. BRO and SASE (the nodal Agency for Snow Avalanche) will monitor the area of Himachal to forewarn the civil population of impending avalanche danger.
- ii. BRO and SASE will notify all the user agencies including SEOC and DEOC about an impending avalanche.
- iii. Earthquake may trigger avalanches and therefore, IMD shall communicate the occurrence of an earthquake to SASE for initial assessment of earthquake-induced avalanches.
- iv. BRO, PWD, Forest Department shall notify the SEOC and DEOC about occurrence of the avalanches along with preliminary information on location, magnitude, damage caused, etc.

4.4.2 Impact Assessment

- i. District administration shall gather information about the deaths, injuries and damages to buildings/infrastructure.
- ii. State Government, if need be, will conduct an aerial survey to determine the scope of the damage, casualties, and the status of key facilities.
- iii. District administration will mobilize local response and will identify areas and assess the requirement of NDRF teams for urban search and rescue operations.
- iv. The DM will send FIR to the SEOC which will then send consolidated report to the NEOC.
- v. The services of ISRO/ HP State Council for Environment, Science and Technology will be taken to assess the extent of damage caused by avalanche.

4.4.3 Deployment of SAR Teams

- i. BRO shall be primarily involved in SAR operations by virtue of their capabilities and locations across the landslide prone areas in the State.
- ii. The PWD will also deploy its men and machinery for debris clearance.
- iii. SDRF/NDRF shall be requisitioned and deployed by the DM as per requirement.
- iv. District administration shall arrange for local transportation (from airport/railway station to the affected area) of NDRF teams and supplies of POL etc. for equipment/vehicles of the NDRF.
- v. SRC shall coordinate with JS (DM), MHA for further coordination with the IDS, HQ, MOD for deployment of Army, if required.

4.4.4 Emergency Logistics

- i. Specialized heavy earthmoving and SAR equipment will be required immediately after an avalanche to clear debris and carry out SAR operations of trapped people in huge masses of debris. DM shall coordinate with BRO, NHPC, PWD and other power projects for mobilizing earthmoving equipment.
- ii. SRC shall coordinate with JS (DM), MHA for further coordination with the MOD, SAIL, BEML etc. for mobilizing earthmoving equipment and provide the same for the affected area, if required

4.4.5 Emergency Medical Relief

Chief Medical Officer of the affected district shall:

- i. Assess the needs of emergency medical relief;
- ii. Constitute and deploy specialized medical team to handle orthopaedic and surgery related injuries including anaesthetists, radiologists etc.;
- iii. Supply medicines, disinfectants, etc. as per demand of the affected area.

- iv. In worst cases of avalanches, MOD will be requested to provide QRMTs duly equipped for the affected area.

4.4.6 Supply of Relief Material to the affected Areas

- i. DDMA will assess requirement of relief material for the affected and mobilize the local reserves. It will also place its requirement for relief material with the SRC. It will also assess demand for helicopter for relief distribution, if the access through road is cut off.
- ii. In case of deployment of helicopter for relief, a senior officer of the District Administration will be appointed as nodal officer to coordinate with the Air Force/Helicopter authorities.
- iii. Provision of temporary shelter will be made for those whose houses have been affected/damaged.

4.4.7 Repair and Restoration of Road, Power, Water and Telecommunication etc.

- i. The PWD will repair and restore the affected roads immediately. The Department may take assistance of secondary ESF agencies, if need be.
- ii. The damaged water supply, electricity and telecommunication lines will be restored by the respective departments forthwith.

4.4.7 Environment Impact Assessment

Department of Environment and Forest will get the environment impact assessment carried out for the affected area.

STANDARD OPERATING PROCEDURES: EARTHQUAKE RESPONSE

**Real Time Information on Earthquake received from IMD to
Emergency Operation Centre**

Impact Assessment

Deployment of Search and Rescue Teams

Emergency Medical Relief

Supply of Relief Materials to affected Districts

Establishment and Running of Relief Camps

**Repair and Restoration of Roads, Communication,
Electricity and Water Supply**

**Earthquake Damage Assessment of Public Building and
Infrastructure and Individual Houses**

Information Management and Helpline

Identification and Disposal of Dead Bodies

**Prevention of Human Trafficking of Widows/Children
Financial Assistance to the Victims of Disaster**

IMD/Geological Survey of India issues alerts

**Disseminate landslide alert received from GSI/IMD to
Emergency operation Centre**

**Alert citizens through SMS, Media, website in case of
heavy landslide**

Monitor Landslide and watch for flooding

Issue early warning to ward if Heavy Landslide occurs

Deployment of SAR Teams

Emergency Logistics

Emergency Medical Relief

Repair of Lifelines

Environment Impact Assessment

Monitor Lake Artificial Lakes

STANDARD OPERATING PROCEDURES: FLASH-FLOODS RESPONSE

**Disseminate rain forecast received from IMD to
Emergency Operation Centre**

**Alert citizens through SMS, media, Website in case of heavy to very
heavy rainfall**

**Alert citizens through SMS, Media, website in case of
heavy landslide**

Monitor rainfall on AWS

Issue early warning to ward if rainfall exceeds 10mm in 15 min

Flood Response Planning and Impact Assessment

Supply of Relief Material to the affected Areas

Repair and Restoration of Road, Power, Water and Telecommunication etc.

Deploy anti-flooding teams in uniform at flooding sites

Coordinate with other stakeholders as per requirement

STANDARD OPERATING PROCEDURES: SNOW AVALANCHE RESPONSE

IMD/SASE/BRO issues alert to EOC

Disseminate snow avalanche alert received from SASE/IMD/BRO to Emergency Operation Centre

Alert citizens through SMS, media, website in case of snow avalanche

Monitor snow avalanche

Impact assessment in case of occurrence of avalanche

Deployment of SAR Teams – Local coordination for deployment of NDRF and Army if need be

Emergency logistics for disaster response

Emergency Medical Relief

Supply of relief material to the affected areas

Repair and restoration of lifelines and EIA

ANNEXURE VIII

List of Nodal Officers in Various Departments – Himachal Pradesh

Department	Name of Nodal Officer	Designation	Contact. No.	Email Id
Town & Country Planning	Ms. Anjali Sharma	State Town Planner	0177-2621450 94180-72391	tcpdatabank@gmail.com
Ayurveda	Dr. Sunder Sharma	Dy. Director	94184-59195 0177-2622262	
Planning	Dr.Sursh Surya	Dy.Director	0177-2621698 (O) 9816666239	ppo-planning@nic.in
HP Vidhan Sabha	Sh.G.L. Sharma	Under Secretary (Estt)	0177-2656424 9418030154	visabha-hp@nic.in
Directorate of Urban Development	Sh.B.D.Bagga	Xen	0177-2626516,	ud-hp@nic.in
Department of Environment & Science & Technology	Dr. Suresh Attri	P. S.O	01772659608(O) 01772659609(F) 94187-00062(M)	sattri-env-hp@nic.in
State council for Science & Technology & Environment	Dr. S.S. Randhawa	(Scientific Officer)	0177-2622490 0177-2622908 (F) 94183-82126 (M)	ssrandhawa15@gmail.com
HP State Pollution Control	Sh. Chandan Kumar Singh	Assistant Environmental Engineer	94180-18223 0177-2673766	csvnit@gmail.com
E & C Division				
Economics & Statistics	Sh. Chander Mohan	Dy. Director	0177-2626206 94180-88136	chanderm21@gmail.com
PWD Nigam Bihar	Sh. Pasang Negi	(S.C. Works)	94180-27276 (M) 0177-2625821(O)	pwd-hp@nic.in
Deputy Director Horticulture (P&P)	Sh.Ramlal	Dy. Director	0177-2841199 94180-79345	horticulture-hp@nic.in

Department	Name of Nodal Officer	Designation	Contact. No.	Email Id
Sanik Welfare Deptt.	Anupum Kumar	O.S.D	01972-222825 94184-70002	dir-swo-hp@nic.in
Directorate of Prosecution	Sh. Bhairav Negi	Assistant Distt. Attorney.	0177-2624590 (O) 0177-2626882 88946-39819 (M)	
Local Audit Department	Sh.Ram Singh	Dy. Director	0177-2620040 94181-36636	ramsingh3672@yahoo.com
Directorate of Agriculture	Sh. Rajender Verma	Joint Director of Agriculture -1	94184-66767	krishibhawan-hp@gov.in
Additional Directorate of Police, HP Shimla	None Deputed	---	0177-2623046 (O)	igp-apt-hp@nic.in
Tanda Medical College	Dr. Dipali	H.A.O	94184-10463(M) 01892-287187(O)	
Directorate of Animal Husbandry	Dr. Narseh Kumar Kaushal	Dy. Director	0177-2830168 94180-61411	
Department of Panchayati Raj	Sh. Satish Sharma	Dy. Director	0177-2623805 (O) 2629106 (F) 94189-29292 (M)	satishsharma.sharma@gmail.com
Directorate of Youth Services & Sports	Sh. Sudesh Dhima	Sports officer (Head Quarter)	0177-2622032 94187-17827	
		Distt. YSS Officer, Bilaspur	019978- 222611	
		Distt. Yss officer, Chamba	01899-224403	
		Distt. Yss. Officer, Hamirpur	1972-223851	
		-Do-. Kangra At Dharamshala	01892-222317	
		-Do- Kinnaur at R. Peo	01786-222625	
		-Do- Kullu	01902-224702	

Department	Name of Nodal Officer	Designation	Contact. No.	Email Id
		Do. Lahaul at Keylong	01900-222262	
		-Do- Spiti at Kaza	01906-222258	
		-Do- Mandi	01905-235524	
		-Do- Solan	01792-222225	
		-Do- Shimla	0177-2803981 0177-2803981 01702-224176	
IPH Department	Smt. Indu Sharma	Supritending Engg.	98161-60052 (M) 0177-2655262 (O)	hpirg@rediffmail.com
Finance Department- Treasuries, Accounts & Lotteries.	D.D.Sharma	Spl.Secy.Finance	0177-2626444 0177-2620887	
HP Power Transmission Corporation Limited, Barowalia House, Khalini 02	A.K. Khnatiya	AGM	0177-2626824 0177- 2622784 9418155986	
Directorate of Transport, Shimla	Sh. Sunil Sharma	Additional Commissioner Transport cum Secretary STA Directorate of Transport, Shimla	0177-2803136 94186-83266	Sta-hp@nic.in
Department of Tribal Development	Prem raj Sharma	Supritendent	0177-2621997(O) 94184-93580	ctd-hp@nic.in
Electrical Inspectorate	Sh. Arun Gupta	Assistant Electrical Inspector	0177-2621020 0177-2628090 98171-14002	
GAD	Sh. Sachin Kanwal	Joint Secretary	0177-2622686 94184-80003	adsecy-gad-hp@gov.in
Forest	Sh,Rqajesh Ikka	Additional.PCC	0177-2624186 98168-05882	prseepamboya@ gmail.com

Department	Name of Nodal Officer	Designation	Contact. No.	Email Id
SASE, Chandigarh	Mr. Naresh Thakur	Technical Officers	0172-2699804 0172-2699806	
IIT Roorkee	Prof. Yongender Singh.	Head Eng. Department	01332-285536 098972-48751	
Fisheries	Smt. Chanchal Thakur	SFO	01978-224068 94181-01320 (M)	vkpuri1960@gmail.com sofisheries@gmail.com
Higher Education	Sh.Parmod Chauhan	Joint Director	0177-2658202/207/307 9418002021	dir.edu@rediffmail.com dhe-sml-hp@gov.in
HIPA	Sh. Desh Bandhu Kaith	Research & Documentation Officer	0177-2740225 98160-20434 (M)	dbkaith@gmai.com
Health and Family Welfare	Dr. U.V Tyagi	Deputy Director	0177-2621424 94183-00121	Health and Family Welfare
Tourism and Civil Aviation	Sh. Surjeet Kumar	Publicity Officer	0177-2625924 9418105752	tourim.hp@nic.in
LAD	Mr. Ram Singh Chauhan	Deputy Director	94181-36636	ramsingh3672@yahoo.com
HRTC	Sh. Yunus	Managing Director	88940-35375	md@hrtc.gov.in
Civil Defence and Home Guards	Rakesh Bhardwaj	Divisional Commdant	0177-2811453 2751728(O) 98056-41119	hgshimla@gmail.com
Backward Classes Commission	Sh. Dhayan Singh	Supdt. Gr. II	0177-2620302 9592-79508	social-hp@nic.in
Central Water Commission	O.P .Gupta	Director	0177-2624224 9711377337	dirmashimla-cwd@nic.in

State Disaster Management Authority

Name	Designation	Phone No. (O)	Phone No. (R)	Mobilie
Chairperson	Hon'ble Chief Minister	2625400 2625819 2620979 2625011(Fax)	2621384 262529	
Member	Chief Secretary	2621022 2880714 Fax 2621813	9818872273	9818872273
Member Secretary	Principal Secretary (Revenue)	2622269	2801009	9418230009
Sh. Onkar Sharma		2880737		
Member Sh. Jagdish Chand	Principal Secretary (PWD)	2620625 2880727	2623927	9418000066
Member Sh. Manoj Kumar	Addl. Chief Secy. (Home)	0177-2880703, 2621586 (Fax)	9999532109	9418068438
Member Sh. R. D. Dhiman	Addl. Chief Secy. (Health & Family Welfare,	2621911 2880733	2626646	9418026646
Member Sh. Sanjay Kunddu	Director General of Police	177-2626938		

State Executive Committee

Name	Designation	Phone No. (O)	Phone No. (R)	Mobilie
Chair: Anil Kumar Khachi	Chief Secretary	0177-2621022	2623295	9818872273
Member Secretary Sh. Onkar Sharma	Principal Secretary (Revenue)	2622269 2880737	2801009	9418230009
Member Sh. Jagdish Chand	Principal Secretary (PWD)	2620625 2880727	2623927	9418000066
Member Sh. Manoj Kumar	Addl. Chief Secy. (Home)	0177-2880703 0177-2621586 (Fax)	9999532109	9418068438
Member Sh. R. D. Dhiman	Addl. Chief Secy. (Health & Family Welfare,	2621911 2880733	2626646	9418026646

ANNEXURE IX

IMPORTANT CONTACT DETAILS FOR DISASTER MANAGEMENT RESPONSE DISASTER MANAGEMENT DIVISION, MINISTRY OF HOME AFFAIR (for reporting of grave emergencies and request for specialized response)

Name of Office/ Designation	Telephone (O)	Telephone (R)	Mobile No.	Email Id
Home Secretary, Sh. Ajay Kumar Bhalla	23092989 23093031 23093003 (FAX)			hshso@nic.in
Secretary Sh. Sanjeeva Kumar (Border Management)	23092431 23092573 (Fax)			Secybm@Nic.In
SANJEEV KUMAR JINDAL JS(DM)	23438096 23438098(F)			jsdm@nic.in
Director DM-I	23438123 (Tele Fax)			dirdm1@mha.gov.in
Director DM-II PRADEEP KUMAR	23438154(T/Fax)			dsdm@nic.in
Director DM-III ROHTAS BHANKHAR	23438071 (T) 23438144 (F)			rohtas.bhankhar@nic.in
Control Room Disaster Management	23438252 (53/54) (011-23093054 Fax)			

NATIONAL DISASTER MANAGEMENT AUTHORITY
(for reporting of grave emergencies and request for specialized response)

Name of Office/ Designation	Telephone (O)	Telephone (R)	Fax	Email Id
Sh. G V V Sarma, IAS, Member Secretary	011-26701701 011-26701704		011-26701716 (Fax)	secretary@ndma.gov.in
Lt Gen PVSM, AVSM, (Retd) Syed Ata hasnain, Member secretary	011-26701775		011-26701783 (Fax)	marwahnc.ndma@nic.in
Dr. Rajinder Singh, Member	011-26701738		011-26701767 (Fax)	dnsharma@ndma.gov.in
Shri Kamal Kishore, Member	011-26701740		011-26701754 (Fax)	kkishore@ndma.gov.in
Sh. Ramesh Kumar Ganta, IAS, JS (Admin)	011-26701718		011-26701864 (Fax)	jsadm@ndma.gov.in
JS (Mitigation) Sandeep Pondrik	011-26701780		011-26701864 (Fax)	jsmitigation@ndma.gov.in
Brig. Ajay Gangwar Advisor (OPS & Communication)	011-26701886			advopscomn@ndma.gov.in
Control Room	011-26701728 011-1078	9868891801 9868101885		

SNOW & AVALANCHE STUDY ESTABLISHMENT (CHANDIGARH) (DRDO)
(for snow avalanche, early warning and related issues)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Fax	Email Id
Snow & Avalanche Study Establishment HimParisar, \Plot No.1 Sector 37A, Chandigarh - 160036	0172-2699801	0172-2705990	0172-2699970	director@sase-drdo.in

GEOLOGICAL SURVEY OF INDIA
(for landslide related issues)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Fax	Email Id
Shri Dr. Rajneet Rath Director General 27, J.L.Nehru Road, Kolkata-700016, West Bengal	033-22521779 033-22521775		033-22521656 033-22521714	dg.gsi@gov.in

INDIAN METEOROLOGICAL DEPARTMENT (SHIMLA)
(for weather related early warning and data)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
Manmohan Singh Director	0177-2626211	0177-2626490	9816127668	mm_sandhu@yahoo.co.in
Scientist 'B'	0177-2629724		8219916582, 9418018373	manishrai.imd@gmail. com (Vacant)
Ramesh Chand, Meteorologist 'A'	0177-2629724		459348185	
Ravinder Kumar, Meteorologist 'B'	0177-2624976	0177-2633462	9418422462	

NAVY INTERGRATED HEADQUATERS

Ministry of Defence, Room No-234 A 'C' Wing, Sena Bhawan, New Delhi – 110011
(For Navy assistance)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Fax	Email Id
Integrated Headquarters of Ministry of Defence (Navy)	01123014167 011-23019665		011-23010680	pronavy.dprmod@nic.in

CENTRAL WATER COMMISSION (SHIMLA)

(For floods /flash floods and early warning thereof)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
Sh. O.P.Gupta Director (M&A) CWC, Block 10 First Floor Commercial Complex Kasumpti Shimla-171009	0177-2624036 0177-2624224 (Fax)		9711377337	dirmashimla-cwc@nic.in
Shri. Somesh Kumar Executive Engineer, Snow Hydrology Division, CWC, B-29, Block 9 Kasumpti Shimla -171009	0177-2623026		98684-39974	eeshdcwc@yahoo.com

ARMY HQR (EXCHANGE NOS-23010131/23018197)
(for requisition of army during disasters)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
ACAS (Ops)	23014424 23010231/7528 Fax 23017627	24672974		
PF Ops (Off) (T&H)	23110231/7559 23016354 Fax 23016354	24642195		
Dir Ops (T)	23010231/7545 2305857	23098030		
Dir Ops (H)	23010231/7551 Fax 23016354	25674906		

ARMY TRAINING COMMAND, SHIMLA
(for Army Assistance)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
Lt. Col.Gaurav Nagi, 2nd in Command Territorial Army Panjab	0177-2807975		96224-00990	gauravnegi_2007@gmail.com
Col. Arijit Upadhayay ARTRAQ-Shimla	0177-2807975			
Army Exchange	0177-2804590-92		Shimla-3	

ARMY HQR (EXCHANGE NOS-23010131/23018197)
(for requisition of army during disasters)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
DGMO	23011506E-33170 23011506 (Fax)	23011506 E-33172		
ADGMO (A)	23011611E-33174 23011617 (Fax)	4615208E-35251		
ADGMO (B)	23014891E-33220 23011617 (Fax)	26142269 E39124		
Dir MO - 6	23018034 E- 33220 23011617 (Fax)			
GSO-I MO - 6	23019739E-33221 23011617 (Fax)			
Dir OL-2	23335218 23018350 E-35221	23339055		

**CIVIL MILITARY LIASON FOR DISASER RELIFE OPERATION
(AIR) CONTACT DETAILS OF AIR FORCE STATION SARSAWA,
SAHARANPUR, UTTAR PRADESH**
(for Requisition and deployment of Helicopters in Disasters)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Mobile No.	Email Id
Group Captain and Station In charge	01331-244919- 207 01331-244822 (Fax)	23011506 E-33172		
Ajay Shukla Wind Commander Chief Operation Officer	01331-244919- 207 01331-244822 (Fax)		96500-53350	

COMMERCIAL AIRPORTS IN THE STATE

for Requisition and Deployment in Disasters for Air Evacuation and Relief Operation)

Name of officer/ Designation & Location of deployment	Telephone (O)	Address	Email Id
Airport Director Airport authority of India Shimla Airport	0177-2736835 0177-2736835 APD 0177-2736673 (Fax)	Airport Road, Jubberhatti Shimla, Himachal Pradesh 171011 Code: SLV	Email id apdshimla@aai.aero
Airport Director Airports authority of India Kullu Manali Airport	01902-265052 01902-265037 01902-265062 (Fax)	Kullu Manali Airport Bhuntar -175125, Himachal Pradesh Code: KUU	Email : apdbhuntar@aai.aero

CENTRAL CRISIS GROUP (NATIONAL LEVEL)

(for industrial and chemical disasters)

Name of officer/ Designation & Location of deployment	Telephone (O)	Mobile No.	Email Id
Mr. R.P. Gupta Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodi Road, New Delhi	011-24695262, 011-24695265 011-4695270 (Fax)		ecy-moef@nic.in
Mrs Geeta Menon	24695281, 24695283 (Fax)		menong@cag.gov.in

ALL INDIA RADIO
(for broadcasting services)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Mr. S. K. Singh Director	0177-2811355	0177-28037789	
Mrs Geeta Menon Assistant Station Director	0177-2801899 2831281 (Fax)	0177-2808295	

HEADQUARTER, CE DEEPAK PROJECT
(for Maintenance of Border Roads)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Shri M.S.Bagi, Chief Engineer	0177-2830986	0177-2831850	
Shri Rajesh Rai, Director (Works)	0177-2633602		

BHARAT SANCHAR NIGAM LIMITED, HP CIRCLE SHIMLA
(for communication related issues)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Sh. P.K. Jain Chief General Manager	0177-2620220 0177-2625325 (Fax)		cgmhp@bsnl.co.in
Ms. Gurubaksh Singh General Manager, BD & IT	0177-2628880 0177-2628881 (Fax)		

INDIAN OIL CORPORATION
(for POL and LPG)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Mr. Anil Kumar Senior Divisional Manager –Sales/ Retail	0177-2622385		cgmhp@bsnl.co.in
Mr. I.L.Negi CDIBM	0177-2625768		
Mr.Vineet Seth Manager, LPG	0177-2623133		

CENTRAL PUBLIC WORKS DEPARTMENT
Kennedy Cottage, Shimla-4 (for POL and LPG)

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Er. Devender Prakash SE	0177-2657531 2652476 (Fax)		secyshimla@yahoo.com
Er.Purnsh Kumar XEN Planning	0177-2657531 (O)		
Mr. Rohit Jorwal XEN	0177-2652830 (O)		eescdl.sml.cpwd@nic.in

CONTACT DETAILS OF NDRF OFFICERS

(for Specialized response during disasters NDRF Headquarter
HQ NDRF, ANTYODAYA BHAWAN, B-2 WING, 9TH FLOOR
CGO COMPLEX, LODHI ROAD, NEW DELHI-110003

Name of officer/ Designation & Location of deployment	Telephone (O)	Telephone (R)	Email Id
Shri S N Pradhan (IPS) Director General	011-23438020, 011-23438119 011-23438091 (Fax)		dg.ndrf@nic.in
Shri Amrendra Kumar Sengar (IPS) Inspector General	011-23438021 011-23438091 (Fax) 09871115726 (Mob)		ig.ndrf@nic.in
Shri Muneesh Kumar Second-in- Command Works & Proc)	011-23438091 011-23438091 (Fax)		dc.prog.ndrf@nic.in
Shri. Anil Sekhawat Ass.Commandant	011-24363260 0164-2246193 011-24363261 (Fax)		
Sh. Ravi Kumar Pandita Commandant	Unit Control Room No. 0164-2246193 0164-2246570 01642246570 (Fax)		dc.prog.ndrf@nic.in
Sh.P.K.Srivastava Commandant	0120-2766013 0120-27666012 (Fax) Unit Control Room No. 0120-2766618 09412221035		Up08-ndrf@nic.in

ANNEXURE X

LIST OF DISTRICT WISE HELIPADS IN HIMACHAL PRADESH WITH THE COORDINATES

1. Bilaspur

Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
1	BARMANA	31.24.87	76.49.51	A.302/24	2000
2	BILASPUR	31.20.	76.45.	A.301/39	670 mtrs
3	SHAH TALAI	31.27.22.30	76.30.46.30		609 mtrs
4	GHUMARWIN	31.27	76.43		706 mtrs
5.	HATWAR	31.35	76.42		800 mtrs
6.	GEHRWIN	31.22	76.41		760 mtrs
7.	JHANDUTTA	31.22	76.39		743 mtrs
8.	BUHAR (KOTIDHAR)	31.19	76.38		1049 mtrs
9.	SWARGHAT	31.13.30	76.42.30		
10	BBMB Football Ground Nangal	31.23	76.22		
11	NFL GROUND NAYA NANGAL	31.23	76.22		
12	LUHNU	31.20	76.45		670 m
13	GSSS JUKHALA	31.16	76.51		725 m
14	NAMHOL	31.15.40	76.51.55		
15	SUNHANI	31o24'17.9" N	076o39'57.8" E		
16.	MALANGAN	31o23'5.4" N	076o36'51.9" E		
17.	GHUMARWIN (TIKKARI)	31.22.12	76.39.12		712 Mtrs.

2 Chamba

1	BAKLOH	32.28.8	75.55.2	A.322/104	4350
2	BANIKHET	32.32.7	75.56.9	A.323/106	5250
3	BHARMOUR	32.25.30	76.31.55	A.337/86	2220 mtrs.
4	CHAMBA	32.33	76.07		872 mtrs.
5	CHAURI	32.26.3	76.00.3	A.323/99	
6	CHHATRU	32.19.30	77.23		3400
7	KILLAR	33.05.06	76.23.54	B.331/82	8800
8	TISSA	33.80	76.51		1324
9	SAACH	33.02	76.25		
10	AJOG	32.55.3	76.27.5	B.329/72	7200
11	BHANJRARU	32. 50. 00	76. 09. 00		1324 mtrs
12.	KHAIRI	32.37.30	75.55.40		600 Mtrs.
13.	HOLI	32.19.40	76.33.30		1830 mtrs.

2 Chamba					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
14.	CHAMBA	32.2.30	76.33.0		922 mtrs.
15.	ITI GROUND, GARNOTA	32.19.25	76.05.46		976 Mtr.
16.	SURAL (PANGI)	33.8.55.432	76.26.57.21		3373 mtrs.
3 Hamirpur					
1	BARSAR	31.31.6	76.27.5	A.304/44	
2	HAMIRPUR	31.40.8	76.32.3	A.316/47	2650
3	NADAUN	31.47.02	76.22.10	A.53A/5	750 mtrs
4	SUJANPURIHRA	31.49.55	76.30.01	A.53A/9	750 mtrs
5	BIAR	31.34.10	76.28.45		
6	BARU (HAMIRPUR)	31.40.50	76.32.25		850 mtrs
7.	GOVT. COLLEGE GROUND HAMIRPUR	31.42.10	76.31.17	53A/10	900 mtrs
8	KANJYAN	31.40.50 N	76.38.15 E		
9	SAMIRPUR	31 4 318.9 N	76 39 05.6 E		
10	JUNGALBARI	31.50.36	76.31.53		2905 feet
11	NIT HAMIRPUR	31°42'21.94"	76°31'29.58"		
12	GOVT. DEGREE COLLEGE HAMIRPUR ANU	31.42.03	76.31.17		
13	JAHU	31.35.24	76.43.29		
14	SR. SEC. SCHOOL (BOYS) GROUND HAMIRPUR	31.41.11	76.31.18		
15	RADHA SWAMI HOSPITAL GROUND BHOTA	31.36.32	76.34.08		
16.	RAILI JAJRI HELIPAD	31. 26	76. 35		
4 Kangra					
1	BAIJNATH	32.03	76.38		930
2	DHARAMSALA	32.10.35	76.18.28		4000 ft.
3	GAGAL	32.09.9	76.15.8	A.323/78	2600
4	JAISINGPUR	31°53'53.5086" N	76°35'51.378" E	A.328/55	1800
5	NURPUR	32.11.0	75.53.6	A.317/96	
6	PALAMPUR (AR)	32.07.0	76.33.5	A.332/68	4500
7	PALAMPUR (UN)	32.06.1	76.32.9	A.331/67	4000
8	PONG DAM	32.01.0	75.54.1	A.305/84	
9	REHAN	32.09.7	75.54.5	A.314/90	1700
10	SAPRI	31.53.5	76.17.9	A.317.64	1600
11	YEOL	32.09.5	76.22.2	A.326/75	3700
12	DHARAMSHALA ARMY GROUND	32.15	76.10		1630M
13	DHALIARA	31. 50.85	76. 11. 371		

4 Kangra					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
14	SHAHID BHUVNESH DOGRA GROUND DEHRA	31. 52. 53.6 N	76. 12. 46.4 E		
15	BARA-BHANGAL	32. 19. 50	76. 48. 27		
16	AADI HIMANI CHAMUNDA	32o11'18.07" N	76o26'44.82"E		2626 Mtrs.
17	GSSS BHODA (BHAWARNA)	76.28.22	32.01.08		1143 Mtrs.
5 Kinnaur					
1	GIABUNG	31o46'30" N	78o26'30" E		8500 ft. (Dimension 70X50 Meter)
2	CHOLLING (Near Karchham Army)	31.35	78.05		5500 (660X260)
3	KARCHHAM	31.39.24	78.12.08		1824 Mtr.
4	POOH	31.44.9	78.34.8	A.061/82	
5	RAKCHHAM	78.22.5	31.23		10300 ft. (161X77 Mtr)
6	RECKONG PEO	31.52.9	78.17.1	A.064/64	7500
7	SANGLA (JP Ind)	31°.25.50	78°.14.31		2533.50
8	SUMDO	32.03.3	78.36.2	A.051/93	
9	KUPPA	31o.25'.51.04"	78o.14'.32.08"		8200
10	ROPA	31.46.85	78.26.57		9300 Ft.
11	JANGI (Rukling Helipad)	31.36.05	78.25.50		2420 mtr.
12.	ITBP Helipad Recong Peo	31.32.20	78.16.25	GR-161548	7612 ft.
13.	Shipkila(Chhappan)	31.49.43	78.43.00	GR-547909	12730 ft.
14.	Lukma-1	31.48.06	78.42.10	GR-537878	15678 ft.
15.	SR. SEC. SCHOOL GROUND, LEO	31o52'59.5" N	78o35'34.8" E		8950 ft. (80X45 dimension)
16.	NAKO	31o53'00" N	78o38'28" E		
17.	Chulling School Play Ground.	31o49'0.58"N	78o35'0.00" E		
6 Kullu					
1	LARJI	31.43.0	77.13.0	A.004/36	
2	MANALI	32.15.0	77.10.6	A.360/68	6300
3	NAGAR	32.07.1	77.09.1	B359/14	
4	PALCHAN	32.18.36	77.10.82		7100 Ft.
7 Lahaul & Spiti					
1	BARING	32.38.8	76.50.6	B.340/49	10000
2	CHHOTA DARA	32.16	77.31		3600
3	JISPA	32.38.34	77.11.22		10300 Ft.

7 Lahaul & Spiti					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
4	KAZA	32.13.0	78.04.5	B.065/51	12000
5	RUKLING	31.36.15	78.26.17		7800 Ft.
6	SAGNAM	32.02.05	78.03.30		12000 Ft.
7	SISSU	32.28.5	77.07.05	B.356/36	9700 ft.
8	STINGRI	32.33.7	77.04.4	B.353/41	10200
9	TABO	32.05.5	78.23.0	A.045/86	
10	TANDI	32.32.2	76.58.5	B.346/41	
11	TINDI	32.45.0	76.28.0	KIL.169/20	8000
12	TINGRIT	32.51.0	76.47.1	UD 035/10	10500
13	UDAIPUR	32.42.24	76.40.0	B.333/56	8800
14.	GONDLA	32.30.49	77.01.48		
8 Mandi					
1	JUNJAIL	31.30.8	77.13.2	A.006/24	
2	KARSOG	31.22.9	77.13.4	A.011/17	
3	MANDI	31.42.4	76.56.2	A.341/14	
4	PANDOH	31.40.23	77.03.2	A.350/35	2700
5	PRASHAR LAKE	31.45.30	77.6		2650
6	SARKAGHAT	31.40.54	76.43.46	A.326/41	1120 meters
7	SUDHAR	31.56	76.59		2075 Approx.
8	SUNDERNAGAR	31.30.7	76.53.2	A.329/28	
9	KANGU	31.26.30	76.51.30		
10	THACHI	31.40.50	77.12.40		2260
11	BATAIL	31.35.05	76.44.26		710 M
12	DHARAMPUR MANDI	31.48.20	76.45.45		525M
13	KAW KARSOG	31.21.24	77.13.52		
14	JANJEHLI	33.31.0N	77.30.0E		
15	BASA	31.35N	77.2E		
16	SHIKARI DEVI	31.29N	77.10E		
17	JOGINDERNAGAR (DOHAG)	31.59.50	76.45.46.9		
18	GOVT. POLY. TECH. COLLEGE GROUND SUNDERNAGER	30. 75	76. 53.5 30		900 mtrs
19	GSSS KARSOG (MUMAIL)	31. 23 00	77 12 10		1360 mts
20	BAGSAID HELIPAD	31° 33' 40'' N	77° 07' 07'' E		1850 Mtr.
21	GHANALA GROUND NEAR BAKAR KHAD	31 43 18	76 44 32		
22	CHHATRI	31° 28' 0''	77° 18' 0''		

9 Shimla					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
1	ANNADALE	31.06.7	77.09.5	SH.064/5	6000
2	CHOPAL	30.56.9	77.35.2	A.113/24	
3	DODRAKAWAR	31.11.9	78.05.2	A.082/48	8200
4	DEHA (Shimla)	31° 28' m	77° 27' m		2082
5	JHAKHARI	31.30.20	77.42.71		3800 Ft.
6	JUBBAL	31.07	77.39.5	A.088/26	
7	KALYANI (RETREAT)	31.07.8	77.17.6	A.080/7 Size: L-120 mtr., W-22-55 mtr., Area 55m ²	8,800 ft.
8	KANDA	31.34.0	77.09.5	A.359/27	4050
9	KUMARSAIN	31.19.3	77.26.7	A.048/19	
10	KUPVI	30	77		
11	NERWA	30.55.2.3	77.38.29		
12	RAMPUR	31.28.0	77.37.7	A.051/30	5550
13	ROHRU	31°12'37.01"	77°44'42.19"	A.078/31	
14	SARAHAN	31.30.4	77.47.5	A.053/40	
15	THEOG	31.08.0	77.02.3	A.082/11	
16	THARU NANKHARI	31.20.2 N	77.33.32 E	67X57 meter	1600M
17	SUNNI	31.14.43	77.07.14	-	
18.	SUNDLI	31°5'10.38" N	77°40'2.27" E	-	3053 FT.
19.	MAHASU	31°05'10.38" N	77°31'11.25" E		-
20.	SARSWATI NAGAR	31°07'29.44" N	77°45'04.80" E		2500 Mtrs.
21.	GHASIGAON (KOTKHAI)	31°12'68.77"N	77°53'81.51" E	-	5029 ft..
22.	SHILLAROO SPORTS COMPLEX	31°12'6"N	77°25'21" E		1985 meters
10 Sirmour					
1	AMBOTA	30.46.4	77.41.2	A.125/34	
2	DADAHU	30.35.52	77.26.20	A.153/34	641 Mtrs.
3	RAJGARH	30.50.30	77.18.1	A.155/18	1827 mtr.
4	HARIPURDHAR	30.46	77.32		2500 mts
5	KAFOTA	30.37.3	77.42.0	A.135/41	
6	KALA AMB	30.31.5	77.11.7	A.176/35	
7	NAHAN	30.33.7	77.16.9	A.168/34	2800
8	PAONTA (RAINBAXY)	30 25 44.09 N	77 35 19.41 E		
9	PAONTA SAHIB	30.26.2	77.37.4	A.148/47	1050
10	SANGRAH	30.41.5	77.26.4		1830
11	SARAHAN (Sirmour)	30.43.0	77.12.0	A.174/24	
12	NAYA HELIPAD (SHILLAI)	30. 41	77.42		887 Mtr.
13	BECHAR-KA-BAGH	77.39	30-22.5		
14	TRILOKPURI	30.35.4	77.30.64.5		

10 Sirmour					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
15	BARU SAHIB	30.45.30	77.18		3500 Feet
16	DNKNAR	30.43.0	77.16.8	A.164/24	
17	HALHAN	30.43.6	77.37.8	A.132/34	
18	JAUNG	30.35.51.4	77.45.57.0		604 mtrs
19	SHALANA RAJGARH	30.50.30	77.18		6000 feet
20	RENUKA	30.36.31 N	77.26.59		
21.	GURUDWARA GROUND, PAONTA SAHIB	30°26'9.05"N	77°37'22.07"E		
22.	GOVT. BOYS SR. SEC. SCHOOL, TARUWALA	30°27'18.51"N	77°36'29.32"E		
23.	JAITAK(NAHAN)	30.35	77.19	-	1343
24.	MAINA BAG	30°38'35"N	77°26'41"E		
25	KAWAGDHAR, DISTT. SIRMOUR	30° 45.78* N	77° 9'.20* E		1705 Mtrs.
11 Solan					
1	BAROTIWALA (School Ground)	30.56	76.49		
2	DAGSHAI	30.52	77.05		
3	NALAGARH	31.02.3	76.42.6	A.258/24	
4	NAUNI	31.51.06	77.10.02	A.177/15	Corrected on 29.11.2013
5	SANAWR	30.53.59.4	77.59.55.6	A.212/15	
6	SOLAN(ARMY)	30.55.0	77.06.0	A.193/12	4750
7	BOHAR	31.18.7	76.37.7	A.203/30	
8	M/S JINDAL MECTECH PVT AS LANDING GROUND NALAGARH (LANDING DIRECTION IS EAST TO WEST)	31.3.0	76.43.0		
9	CHAIL	30.57.47	77.12.36		7500
10	BADIDHAR, 2KM AWAY FROM BATAL CHOWK (ADJACENT VILL. BAKHALAG.)	31.9	76.57		1200 meters
11	SHALAGHAT (KOTLI)	31.12.4	76.59		
12	KUNI HAR	30.4.50	76.57.25		
13	MARKET COMMITTEE DHALLI (PARWANOO)	30° 50.2	76° 58.8		
14	GSSS DHARAMPUR GROUND	30.54.15	76.56.0		4864 feet
15	GOVT. COLLEGE GROUND NALAGARH	31.02 N	76.45 E		
16	GROUND OF UHF NAUNI	30.52.	77.10		

12 Una					
Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
1	SANGNAI(Ambota) Una	31°.41.78	76°.2.32		
2	UNA	31.27.8	76.16.0	A.294/50	1300
3	DULEHAR	31.20.31	76.12.46		
4	KANGAR	31.26.37	76.12.27		
5	SNGNAI	31.41.7	76.02.4	A.301/67	
6	THANA KALAN	31.20.27	76.20.36		
7	KHAD PLAY GROUND	31.31.36	76.9.1		430 mtrs
8	POLICE LINES JHALEHRA	31.29.31	76.14.70		
9	GOVT. SS SCHOOL SALOH	31.28.24	76.12.00		
10	GOVT. ELEMENTARY SCHOOL GROUND CHURURU	31.35.821	76.09.318		
11	AMB GONDPUR BENERA	31. 44. 54	76. 02. 02		
12	MANDALI	31.31.34	76.21.34		
13.	INDIRA GROUND, UNA	31.27.51 N	76.16.54.E		
14.	POLICE LINES GROUND, UNA	31.29.31 N	76.14.70 E		
15.	NAVODYA VIDAYALAYA GROUND, PEKHUBELA	31.24.22 N	76.16.17 E		
16.	BEHAR(UNA)	31.38.182	76.09.290	-	1376 FT.
17.	BEHAR JASWAN GROUND	31o37'19.60"	76o 10'20.22"	-	
OTHER HELIPADS					
1	GHORAKHAL SAINIK SCHOOL NAINITAL	29.27.50	79.37.15		6200FT
2	KANWAN PUNJAB	31.52.12N	75.26.04E		
3	KELAKHAN NAINITAL	29.22.6	79.28.22		6700FT
4	LUDHIANA	30.53.57	75.48.44		
5	NANGAL	31.23.14	76.22.11		
6	SECRETARIAT PUNJAB	30.46.0	76.47.8	A.221/28	1250
7	ANNANDPUR SAHIB	31.13.9	76.35.6	A.283/30	1200
8	Pb Agriculture Ground Ludhiana	30.53.57	75.48.44		
9	DARAH Near Pathankot	31.59.0	76.28.8	A.25/63	
10	JAITAK Chandigarh	30.36	77.19		(39x22 Mtrs.)
11	Bhiwani Haryana	28-46-45 N	76-20-30 E		
12	Sangror Punjab	30-11.967	75-41.174		768feet
13	Chandimandir	30.44.05	76.52.54		
14	Arya Sr. Sec. School Panipat Haryana	29.24.04 N 31.49.04	76.57.58.6 E 75.23.31		
15	Kadian Gurdaspur				
16	Ropar (Birla Farm)	30.58.124	76.28.538		823(Elevation)
17	Nehru Stadium Rupnagar	30.58.966	76.31.424		

OTHER HELIPADS

Sr. No.	Name of Helipad/Station	Latitude	Longitude	REF	Altitude
18	University Sport Ground Kurukshetra	29° 57' 17.3" N	76° 49' 01" E		
19	Talwara Ground	31° 57' 3.7" N	75° 51' 48.5" E		
20	Chappar Chiri, Distt. SAS Nagar, Punjab Helipad No. 7	30° 42' 194" N	76° 39' 879" E		
21.	Pinjore Aerodrome	30° 49' 35" N	76° 52' 57" E	3000 ft X 75ft	
22.	Punjab State Power Corpn. Ltd. Helipad, Anandpur Sahib, Punjab	31° 13' 556" N	76° 30' 779" E		939
23.	Gurukul Kurukshetra, Haryana	29° 57' 33.42"N	76° 48' 31.51"E	20 Mtr Diameter	
24	Cricket Ground in Rajiv Gandhi Sports Stadium at Rohtak	28° 54' 55"N	76° 36.22"E		
25	Gurukul Nilokheri, Distt. Karnal, Haryana	29° 51' 02.4"N	76° 54.21.8"E		
26	International Gurukul (Girls) Chaman Vatka, Ambala, Haryana	30° 25' 9.7"	76° 46.42.5"		

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