VIRTUAL CADRE TRAINING PROGRAMME

Training Module on Disaster Risk Reduction for Fisheries Department

Published by

Kerala State Disaster Management Authority

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Virtual Cadre Training Programme

TRAINING MODULE ON DISASTER RISK REDUCTION FOR FISHERIES DEPARTMENT

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Contents

Abbreviations

AIDMI	All India Disaster Mitigation Institute
CCA	Climate Change Adaptation
CSA	Climate-Smart Agriculture
DDMA	District Disaster Management Authority
DDMP	District Disaster Management Plan
DEOC	District Emergency Operations Centre
DM	Disaster Management
DRR	Disaster Risk Reduction
HDI	Human Development Index
HVRA	Hazard, Vulnerability and Risk Assessment
IMD	Indian Meteorological Department
INCOIS	Indian National Centre for Ocean Information Services
IWRM	Integrated Water Resource Management
KSDMA	Kerala State Disaster Management Authority
KSDMP	Kerala State Disaster Management Plan
KSDMPo	Kerala State Disaster Management Policy
MAR	Managed Aquifer Recharge
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDMPo	National Disaster Management Policy
PDNA	Post Disaster Needs Assessment
SDMP	State Disaster Management Plan
SEC	State Executive Committee
SEOC	State Emergency Operations Centre
TNA	Training Needs Assessment
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund

Scope and Objective of the Module

1. Scope

The training module for the Virtual Cadre members of Fisheries Department shall cover the following details:

- Introduction to key disaster risk reduction policies, frameworks and legislations at the international, national and state level
- Introduction to the various disaster risk reduction terminology and concepts
- Types of disasters to which different parts of the State are hazard prone and vulnerable
- Roles & responsibilities of Department in the event of any disaster or threatening situation and the emergency support functions in response
- Standard operating procedures to be followed by a department in the event of disasters and emergencies

2. Objectives

This training module has been designed for the Virtual Cadre officials of the Fisheries Department, Government of Kerala with the following objectives:

- Imparting knowledge on DM/DRR to the members of virtual cadre
- Mainstream DRR into departmental Planning
- To assist the virtual cadre members in the formulation of Department DM plan
- Integration of department DM activities with state/district level mechanism of DM
- To assist the virtual cadre members in understanding Emergency Support Functions of their department during a disaster/emergency
- To build understanding of the virtual cadre members on their department's role during disasters/emergency for better coordination with DDMA and other departments

Executive Summary

This training module has been developed under the ambit of the project **'Virtual Cadre Training Programme for the Officials from Various Departments on DRR, Government of Kerala'**. The objective of this module is to introduce the key concepts of disaster risk reduction to the officials of virtual cadre

The following executive summary covers the main highlights from all of the six chapters in this module.

Chapter 1: Introduction to Disaster Management Cycle and Key Terminologies in Disaster Risk Reduction

This chapter introduces the readers to the key concepts and terminologies associated with the field of disaster risk reduction (DRR). It is meant to build the knowledge base of the reader to analyze disaster scenario through the prism of complex concepts such as hazard, vulnerability, risk, coping capacity and risk reduction. Parallelly, this chapter also introduces the disaster management cycle to the reader by lucidly explaining it through an example of a previous disaster.

Chapter 2: Introduction to International, National and State Level Frameworks, Laws and Policies on DRR

This chapter introduces the readers to the various legislations, policies, regulatory frameworks and executive bodies related with DRR at the international, national, state level. This chapter contains the evolution of DRR in India by citing examples of how the 2005 DM Act paved the way for various State Disaster Management Authorities (SDMAs) working under the stewardship of National Disaster Management Authority (NDMA). A detailed analysis of the Sendai Framework for Disaster Risk Reduction (SFDRR) and the international evolution of DRR have also been provided.

Chapter 3: Mechanism and governance related to DRR at the state level in Kerala

This chapter contains information on the mechanism and governance related to DRR at the state level in Kerala. It highlights the evolution and functions of the Kerala State Disaster Management Authority (KSDMA), the State Executive Committee (SEC), State Emergency Operation Centre (SEOC), District Disaster Management Authorities (DDMAs) and District Emergency Operation Centre (DEOC).

Chapter 4: Introduction to Hazard Vulnerability of Kerala

This chapter introduces the general profile of Kerala State along with the its detailed hazard vulnerability, including natural and anthropogenic hazards. A discussion on the major natural and anthropogenic hazards in Kerala are discussed along with hazard zonation maps for each of them. A brief table on the early warning systems against various natural phenomena is also included in this chapter.

Chapter 5: Introduction to IRS and IDRN

This chapter consists of an in-depth introduction to Incident Response System (IRS) in Kerala across the state, district and taluk levels. Moreover, this chapter also introduces the India Disaster Resource Network (IDRN) in detail to the reader.

Chapter 6: Brief Profile of the Fisheries Department

This chapter consists of a brief overview of the Fisheries Department with its vision, objectives and roles and functions. This chapter also explores how the department can help in disaster risk reduction activities in Kerala.

Chapter 7: Mainstreaming DRR into Fisheries Department

This chapter focuses on various ways to mainstream disaster risk reduction (DRR) into the activities of the Fisheries Department. Protection of marine and inland biodiversity and the various activities to be undertaken by Fisheries Department in preparedness, mitigation, response and recovery phases of the DM cycle are highlighted in this chapter.

Chapter 8: Financial Arrangements

This chapter discusses the various financing mechanisms and arrangement available for the department to undertake DRR work and activities.

Annexure: Model Template for Preparation of Departmental Disaster Management Plan

This annexure is meant to guide the officers of the Fisheries Department to draft their own departmental disaster management plan.

1. Introduction to Disaster Management Cycle and Key Terminologies in Disaster Risk Reduction

Learning objectives of this chapter

- To introduce the key terms related with disaster risk reduction (DRR) to the reader.
- To highlight the key concepts in the disaster management cycle to the reader.
- To build the understanding of the reader on these theoretical concepts by providing an example from the real world.

At the end of this chapter, the reader should be able to:

- Define the key terms related with disaster risk reduction such as hazard, vulnerability, risk, capacity, disaster, etc.
- Understand the disaster management cycle and its various phases, viz. response; recovery; mitigation; and preparedness.
- Relate the theoretical concepts with the real-life example of the 2018 Kerala Floods and Landslides.

Key concepts discussed in this chapter

- **Disaster:** A catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area;
- **Disaster Management:** The organization, planning and application of measures preparing for, responding to and recovering from disasters. it focuses on creating and implementing preparedness and other plans to decrease the impact of disasters and "build back better". Failure to create and apply a plan could lead to damage to life, assets and lost revenue.
- **Hazard:** A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.
- **Multi-hazard** means (1) the selection of multiple major hazards that the country faces, and (2) the specific contexts where hazardous events may occur simultaneously, cascading or cumulatively over time, and considering the potential interrelated effects.
- **Disaster Risk:** The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.
- **Vulnerability:** The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

1.1 Introduction to Key Terminologies

I. **Build Back Better**
The use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment.

II. **Capacity**
The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.

Annotation: Capacity may include infrastructure, institutions, human knowledge and skills, and collective attributes such as social relationships, leadership and management.

Coping Capacity is the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks.

III. **Contingency Planning**
A management process that analyses disaster risks and establishes arrangements in advance to enable timely, effective and appropriate responses. Contingency planning is an important part of overall preparedness. Contingency plans need to be regularly updated and exercised.

Annotation: Contingency planning results in organized and coordinated courses of action with clearly identified institutional roles and resources, information processes and operational arrangements for specific actors at times of need. Based on scenarios of possible emergency conditions or hazardous events, it allows key actors to envision, anticipate and solve problems that can arise during disasters.

IV. **Critical Infrastructure**
The physical structures, facilities, networks and other assets which provide services that are essential to the social and economic functioning of a community or society.

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

VI. **Disaster Management**
The organization, planning and application of measures preparing for, responding to and recovering from disasters.

Annotation: Disaster management may not completely avert or eliminate the threats; it focuses on creating and implementing preparedness and other plans to decrease the impact of

disasters and “build back better”. Failure to create and apply a plan could lead to damage to life, assets and lost revenue.

VII. Disaster Risk

The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

VIII. Disaster Risk Management

Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.

Community-based disaster risk management promotes the involvement of potentially affected communities in disaster risk management at the local level. This includes community assessments of hazards, vulnerabilities and capacities, and their involvement in planning, implementation, monitoring and evaluation of local action for disaster risk reduction.

IX. Disaster Risk Reduction

Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

X. Early Warning System

An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.

XI. Emergency

In the framework of response and recovery, there is a large difference between the terms emergency and disaster. An emergency is an event that can be responded to using the resources available at hand, implying that there is no need to request external assistance. A crisis or emergency is a threatening condition that requires urgent action. Effective emergency action can avoid the escalation of an event into a disaster. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire 14 spectrum of emergency needs. The expression “disaster management” is sometimes used instead of emergency management

XII. Multi Hazard Early Warning Systems

These systems address several hazards and/or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, cascading or cumulatively over time, and considering the potential interrelated effects. A multi-hazard early warning system with the ability to warn of one or more hazards increases the efficiency and consistency of warnings

through coordinated and compatible mechanisms and capacities, involving multiple disciplines for updated and accurate hazards identification and monitoring for multiple hazards.

XIII. Evacuation

Moving people and assets temporarily to safer places before, during or after the occurrence of a hazardous event in order to protect them.

XIV. Exposure

The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.

XV. Extensive Risk

The widespread risk associated with the exposure of dispersed populations to repeated or persistent hazard conditions 16 of low or moderate intensity, often of a highly localized nature, which can lead to debilitating cumulative disaster impacts. Extensive risk is mainly a characteristic of rural areas and urban margins where communities are exposed to, and vulnerable to, recurring localised floods, landslides storms or drought. Extensive risk is often associated with poverty, urbanization and environmental degradation.

XVI. Forecast

In the context of risk reduction, forecasting as the provision of timely information to improve the management in the emergency phase, that is, shortly before, during and after a hazardous event. Hence, it does not include medium- and long-term risk assessments that are carried out to assist decision makers in risk prevention and mitigation activities. Definite statement or statistical estimate of the likely occurrence of a future event or conditions for a specific area. In meteorology a forecast refers to a future condition, whereas a warning refers to a potentially dangerous future condition.

XVII. Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Multi-hazard means (1) the selection of multiple major hazards that the country faces, and (2) the specific contexts where hazardous events may occur simultaneously, cascading or cumulatively over time, and considering the potential interrelated effects.

Hazards include (as mentioned in the Sendai Framework for Disaster Risk Reduction 2015-2030, and listed in alphabetical order) biological, environmental, geological, hydrometeorological and technological processes and phenomena.

XVIII. Intensive Risk

The risk associated with the exposure of large concentrations of people and economic activities to intense hazard events, which can lead to potentially catastrophic disaster impacts involving high mortality and asset loss. Intensive risk is mainly a characteristic of large cities or densely populated areas that are not only exposed to intense hazards such as strong earthquakes,

active volcanoes, heavy floods, tsunamis, or major storms but also have high levels of vulnerability to these hazards.

XIX. Mitigation

The lessening or minimizing of the adverse impacts of a hazardous event.

Annotation: The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques and hazard-resistant construction as well as improved environmental and social policies and public awareness. It should be noted that, in climate change policy, “mitigation” is defined differently, and is the term used for the reduction of greenhouse gas emissions that are the source of climate change.

XX. Preparedness

The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters.

XXI. Prevention

Activities and measures to avoid existing and new disaster risks.

Annotations: Prevention (i.e., disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts of hazardous events. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high-risk zones, seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake and immunization against vaccine-preventable diseases. Prevention measures can also be taken during or after a hazardous event or disaster to prevent secondary hazards or their consequences, such as measures to prevent the contamination of water.

XXII. Reconstruction

The medium- and long-term rebuilding and sustainable restoration of resilient critical infrastructures, services, housing, facilities and livelihoods required for the full functioning of a community or a society affected by a disaster, aligning with the principles of sustainable development and “build back better”, to avoid or reduce future disaster risk.

XXIII. Recovery

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

XXIV. Rehabilitation

The restoration of basic services and facilities for the functioning of a community or a society affected by a disaster.

XXV. Residual Risk

The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained. 24 Comment: The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery together with socio-economic policies such as safety nets and risk transfer mechanisms.

XXVI. Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.

XXVII. Response

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

Annotation: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief. Effective, efficient and timely response relies on disaster risk-informed preparedness measures, including the development of the response capacities of individuals, communities, organizations, countries and the international community.

XXVIII. Retro Fitting

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Annotation: Retrofitting requires consideration of the design and function of the structure, the stresses that the structure may be subject to from hazards or hazard scenarios and the practicality and costs of different retrofitting options. Examples of retrofitting include adding bracing to stiffen walls, reinforcing pillars, adding steel ties between walls and roofs, installing shutters on windows and improving the protection of important facilities and equipment.

XXIX. Risk Transfer

The process of formally or informally shifting the financial consequences of particular risks from one party to another, whereby a household, community, enterprise or State authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Annotation: Insurance is a well-known form of risk transfer, where coverage of a risk is obtained from an insurer in exchange for ongoing premiums paid to the insurer. Risk transfer can occur informally within family and community networks where there are reciprocal expectations of mutual aid by means of gifts or credit, as well as formally, wherein governments, insurers, multilateral banks and other large risk-bearing entities establish mechanisms to help cope with losses in major events. Such mechanisms include insurance and

reinsurance contracts, catastrophe bonds, contingent credit facilities and reserve funds, where the costs are covered by premiums, investor contributions, interest rates and past savings, respectively.

XXX. Structural and Non-Structural Measures

Structural measures are any physical construction to reduce or avoid possible impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems. Non-structural measures are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, through policies and laws, public awareness raising, training and education.

XXXI. Underlying Disaster Risk Factors

Processes or conditions, often development-related, that influence the level of disaster risk by increasing levels of exposure and vulnerability or reducing capacity.

Annotation: Underlying disaster risk drivers — also referred to as underlying disaster risk factors — include poverty and inequality, climate change and variability, unplanned and rapid urbanization and the lack of disaster risk considerations in land management and environmental and natural resource management, as well as compounding factors such as demographic change, non-disaster risk-informed policies, the lack of regulations and incentives for private disaster risk reduction investment, complex supply chains, the limited availability of technology, unsustainable uses of natural resources, declining ecosystems, pandemics and epidemics.

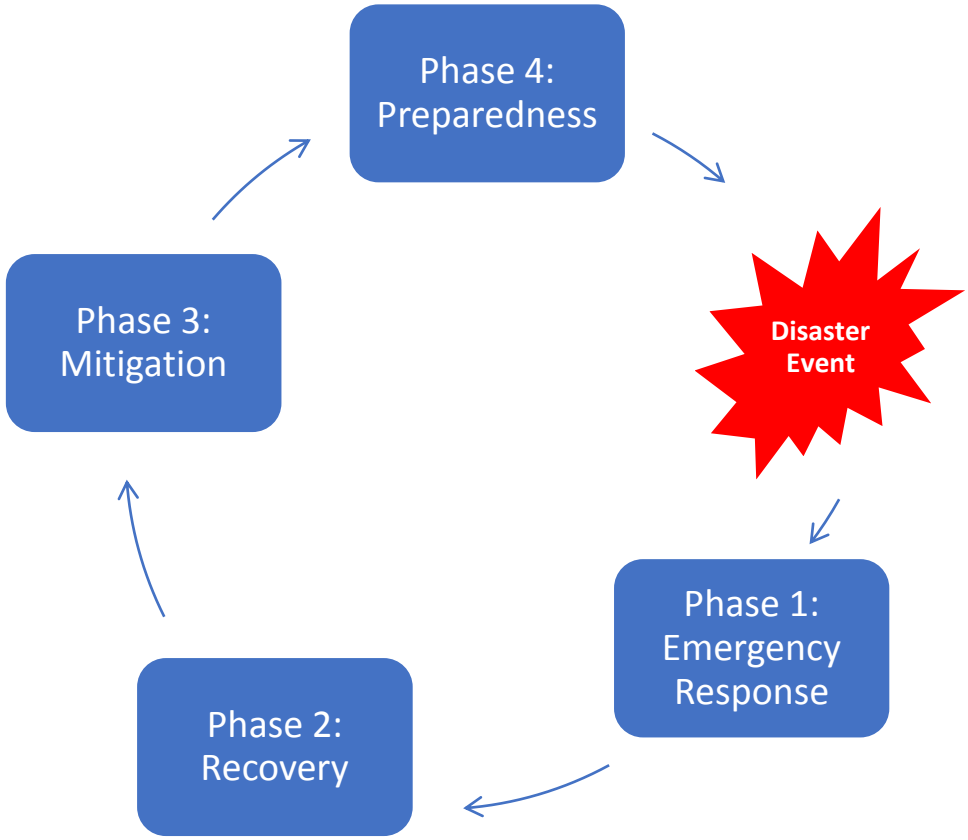
XXXII. Vulnerability

The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

1.2 Introduction to the Disaster Management Cycle

The Disaster Management Cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.

Current thinking defines four phases of disaster management cycle:



Source: National Policy on Disaster Management (https://www.mha.gov.in/sites/default/files/NPDM-101209.pdf)

Example of the Disaster Management Cycle during 2018 Kerala Floods

Phase	Details
Disaster Event A sudden calamitous event bringing great damage, loss, or destruction	Between June 1 and August 18, 2018, Kerala experienced the worst ever floods in its history since 1924. During this period, the state received cumulative rainfall that was 42% in excess of the normal average. The heaviest spell of rain was during 1-20 August, when the state received 771mm of rain. The torrential rains triggered several landslides and forced the release of excess water from 37 dams across the state, aggravating the flood impact. Nearly 341 landslides were reported from 10 districts. Idukki, the worst hit district, was ravaged by 143 landslides. 1,259 out of 1,664 villages spread across its 14 districts were affected.9 The seven worst hit districts were Alappuzha, Ernakulam, Idukki, Kottayam, Pathanamthitha, Thrissur, and Wayanad, where the whole district was notified as flood affected. The devastating floods and landslides affected 5.4 million people, displaced 1.4 million people, and took 433 lives.

Phase	Details
Emergency Response Actions taken to save lives and prevent further property damage in an emergency.	The state government responded swiftly with rescue and relief operations and saved many lives by rapidly mobilising the following national forces: • Kerala Fire and Rescue Services: 4,100 individuals and the entire rescue equipment deployed • National Disaster Response Force (NDRF): 58 teams, 207 boats • Army: 23 columns, 104 boats • Navy: 94 rescue teams, one medical team, nine helicopters, two fixed wing aircrafts and 94 boats • Coast Guard: 36 teams, 49 boats, two helicopters, two fixed wing and 27 hired boats • Air Force: 22 helicopters from Air Force and 23 fixed wing aircrafts • Central Reserve Police Force: 10 teams • Border Security Force: Two companies and one water vehicle team. In addition, the fishing community of the state rendered phenomenal voluntary assistance towards search and rescue in the flood affected areas. Nearly 669 boats that went out with 4,537 fishermen are estimated to have saved at least 65,000 lives.
Recovery Actions taken to return to a normal or an even safer situation following an emergency.	The Government of India announced an additional assistance of INR 600 crore (USD 85 million)10 which included ex gratia payment of INR 2 lakh (USD 2,800) per person to the next kin of the deceased and INR 50,000 (USD 700) per head to those seriously injured. The Ministry of Rural Development sanctioned an additional INR 1,800 crore (approximately USD 260 million) under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) for 2018–19 for 5.5 crore person days of work. Relief assistance was provided to people in camps including immediate food supplies (rice, wheat, and pulses), drinking water, kerosene and other life-saving items. Food packets and assistance of INR 10,000 per family to clean inundated houses were also disbursed.
Mitigation Activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.	After this disaster in 2018, Kerala has shaken up its disaster response system by spelling out roles and responsibilities of each department clearly in a revised handbook of the state disaster management cell. This was done following the tragical experience while battling cyclone Ockhi in 2017 and the state's worst floods in 2018. The handbook, known as the Orange Book has details of roles and responsibilities of monsoon preparedness and emergency response of 29 official departments, central agencies and district management authorities and State Emergency Operations Center (SEOC).

Phase	Details
Preparedness Plans or preparations made to save lives and to help response and rescue operations.	After the 2018 floods, a lot of thrust was given to planning for and preparedness against such unprecedented disasters. The Kerala State Disaster Management Authority (KSDMA) has updated the standard operating procedures for various state departments and adopt new protocols for enhancing emergency preparedness and response capacity. For example, the state water board and electricity board are asked to notify district-level disaster monitoring cells about the status of dams and plans of controlling their outflow before 10 June. It lists the availability of disaster response teams set up with trained members of the civil society, and guidelines to set up relief camps. It has asked the tourism department to restrict visitors if there are more than two days of intense rain in a location. The water board is told to post a person round the clock, to liaison with the emergency disaster management cell, whose job will be to monitor daily rainfall and water levels in dams. KSDMA is also leading the way for the formulation of departmental disaster management plans for all the key departments of Kerala government.

Sources:

- Kerala Post Disaster Needs Assessment Floods and Landslides - August 2018, https://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/post-disaster-needs-assessment---kerala.html#:~:text=Between%20June%201%20and%20August,worst%20floods%20ever%20since%201924.&text=The%20Post%20Disaster%20Needs%20Assessment,be%20at%20USD%204.4%20billion.
- Orange Book on Disaster Management 1, Standard Operations Procedures (SOP) & Emergency Support Functions Plan (ESFP), https://sdma.kerala.gov.in/wp-content/uploads/2020/06/Orange-Book-of-Disaster-Management-1-2020.pdf
- Orange Book of Disaster Management 2, Monsoon Preparedness and Response Guidelines (Malayalam), https://sdma.kerala.gov.in/wp-content/uploads/2019/12/Orange-Book-of-Disaster-Management-2-2020.pdf

External References and Reading Material Related with Chapter 1:

1. Terminology, United Nations Office for Disaster Risk Reduction (UNDRR), https://www.undrr.org/terminology#I
2. Global Assessment Report on Disaster Risk Reduction (GAR) 2019, UNDRR. https://gar.undrr.org/
3. Disaster Risk Management, UN-Spider Knowledge Portal, https://www.un-spider.org/risks-and-disasters/disaster-risk-management

2

2. Introduction to International, National and State Level Frameworks on DRR

Learning objectives of this chapter

- To introduce a brief history of disaster management in India to the reader
- To provide an overview of the legal and institutional structure of disaster management in India
- To highlight the significance of international frameworks like the Sendai Framework and National Disaster Management Plan

At the end of this chapter, the reader should be able to:

- Understand the roles and responsibilities of the disaster management authorities at the national, state and district levels in India
- Grasp the legal and institutional set-up of the disaster governance system in India
- Understand the historical evolution of disaster management at the international and national levels

Key concepts discussed in this chapter

- **Disaster Management Act (2005):** This Act provides for the effective management of disaster and for matters connected therewith or incidental thereto. It provides institutional mechanisms for drawing up and monitoring the implementation of the disaster management activities. The Act also ensures measures by the various wings of the Government for prevention and mitigation of disasters and prompt response to any disaster situation. The Act provides for setting up of a National Disaster Management Authority (NDMA) under the Chairmanship of the Prime Minister, State Disaster Management Authorities (SDMAs) under the Chairmanship of the Chief Ministers, District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners.

- **Sendai Framework for Disaster Risk Reduction (2015-2030):** The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the Government has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome: “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”.

- **National Disaster Management Plan (2019)**
  The National Disaster Management Plan (NDMP) aims to make India disaster resilient and significantly reduce the loss of lives and assets. The plan is based on the four priority themes of the “Sendai Framework,” namely: understanding disaster risk, improving disaster risk governance, investing in disaster reduction (through structural and non-structural measures) and disaster preparedness, early warning and building back better in the aftermath of a disaster.

2.1 History of Disaster Management in India

Disaster Management during British Administration and Post-Independence
During the British administration, relief departments were set up for emergencies during disasters. The policy was relief-oriented, and activities included designing the relief codes and initialising food for work programmes. Post-Independence, the task for managing disasters continued to rest with the Relief Commissioners in each state, who functioned under the Central Relief Commissioner, with their role limited to delegation of relief material and money.

Emergence of Institutional Arrangement in India
A permanent and institutionalised setup began in the decade of 1990s with set up of a disaster management cell under the Ministry of Agriculture. Following series of disasters such as Latur Earthquake (1993), Malpa Landslide (1994), Orissa Super Cyclone (1999), a High Powered Committee under the Chairmanship of Mr. J.C. Pant, Secretary, Ministry of Agriculture was constituted for drawing up a systematic, comprehensive and holistic approach towards disasters. There was a shift in policy from an approach of relief through financial aid to a holistic one for addressing disaster management. Consequently, the disaster management division was shifted under the Ministry of Home Affairs in 2002 vide Cabinet Secretariat's Notification No. DOC.CD-108/2002 dated 27/02/2002 and a hierarchical structure for disaster management evolved in India.

The HPC was constituted in August 1999 under the Chairmanship of Shri J.C. Pant. HPC members were drawn from the Ministries, States, NGOs and experts from relevant fields. It was the first attempt in India towards evolving a systematic, comprehensive and holistic approach towards all disasters. The original mandate of the HPC was confined to the preparation of management plans for natural disasters only. However, it was expanded to include human-made disasters as well in order to develop an effective plan of action that would encompass disasters of all origins and shades. The Terms of Reference of the HPC were subsequently enlarged to include non-natural or human-made disasters also with the approval of the Prime Minister vide order dated April 17, 2000. Representation from concerned Ministries dealing with industrial, nuclear, biological, chemical disasters was ensured by way of inclusion of experts from these Ministries.

The HPC constituted five sub-groups to go into details of five major classifications as decided by the HPC. In an effort to ensure comprehensive coverage to the vast subject of disaster management, it also commissioned a number of research studies and set up special committees to look into certain important aspects of disaster management in appropriate detail.

Present Structure for Disaster Management in India
At present, the National Disaster Management Act, 2005 has established the National Disaster Management Authority (NDMA) at the centre, and the State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA) at state and district levels respectively. In addition to this, the National Crisis Management Committee, part of the earlier setup, also functions at the Centre. The nodal ministries, as identified for different disaster types of function under the overall guidance of the Ministry of Home Affairs (nodal ministry for disaster management). This makes the stakeholders interact at different levels within the disaster management framework.

2.2 Disaster Management Act 2005

This Act provides for the effective management of disaster and for matters connected therewith or incidental thereto. It provides institutional mechanisms for drawing up and monitoring the implementation of the disaster management. The Act also ensures measures by the various wings of the Government for prevention and mitigation of disasters and prompt response to any disaster situation.

The Act provides for setting up of a National Disaster Management Authority (NDMA) under the Chairmanship of the Prime Minister, State Disaster Management Authorities (SDMAs) under the Chairmanship of the Chief Ministers, District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners. The Act further provides for the constitution of different Executive Committee at national and state levels. Under its aegis, the National Institute of Disaster Management (NIDM) for capacity building and National Disaster Response Force (NDRF) for response purpose have been set up. It also mandates the concerned Ministries and Departments to draw up their own plans in accordance with the National Plan. The Act further contains the provisions for financial mechanisms such as creation of funds for response, National Disaster Mitigation Fund and similar funds at the state and district levels for the purpose of disaster management. The Act also provides specific roles to local bodies in disaster management.

2.3 Institutional Mechanism for DRR

National Disaster Management Authority (NDMA)

The National Disaster Management Authority (NDMA) was initially constituted on May 30, 2005 under the Chairmanship of Prime Minister vide an executive order. Following enactment of the Disaster Management Act, 2005, the NDMA was formally constituted in accordance with Section-3(1) of the Act on 27th September 2006 with Prime Minister as its Chairperson and nine other members.

Details of these responsibilities are given as under:

1. Lay down policies on disaster management;
2. Approve the National Plan;
3. Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;
4. Lay down guidelines to be followed by the State Authorities in drawing up the State Plan
5. Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;
6. Coordinate the enforcement and implementation of the policy and plan for disaster management;
7. Recommend provision of funds for the purpose of mitigation;
8. Provide such support to other countries affected by major disasters as may be determined by the Central Government;
9. Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;

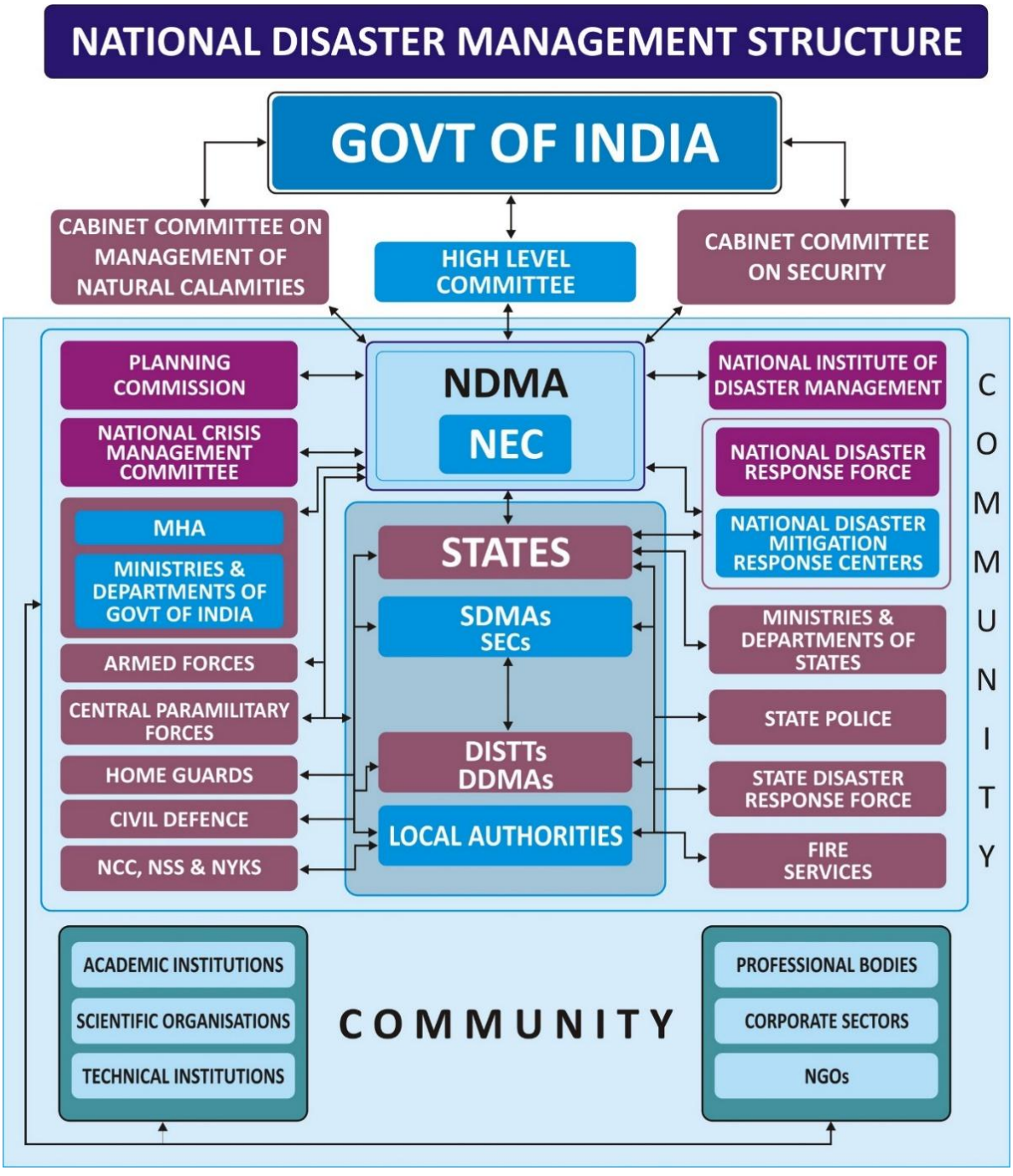
10. Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

National Executive Committee (NEC)

National Executive Committee is constituted under Section 8 of DM Act, 2005 to assist the National Authority in the performance of its functions

State Level Institutions

State Disaster Management Authorities (SDMAs)



State Disaster Management Authorities are statutory bodies constituted under the Disaster Management Act, 2005 (Central Act 53 of 2005). They have the following functions:

1. lay down the State disaster management policy;
2. approve the State Plan in accordance with the guidelines laid down by the National Authority;
3. approve the disaster management plans prepared by the departments of the Government of the State;
4. lay down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;
5. coordinate the implementation of the State Plan;
6. recommend provision of funds for mitigation and preparedness measures;
7. review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;
8. review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary.

District level Institutions

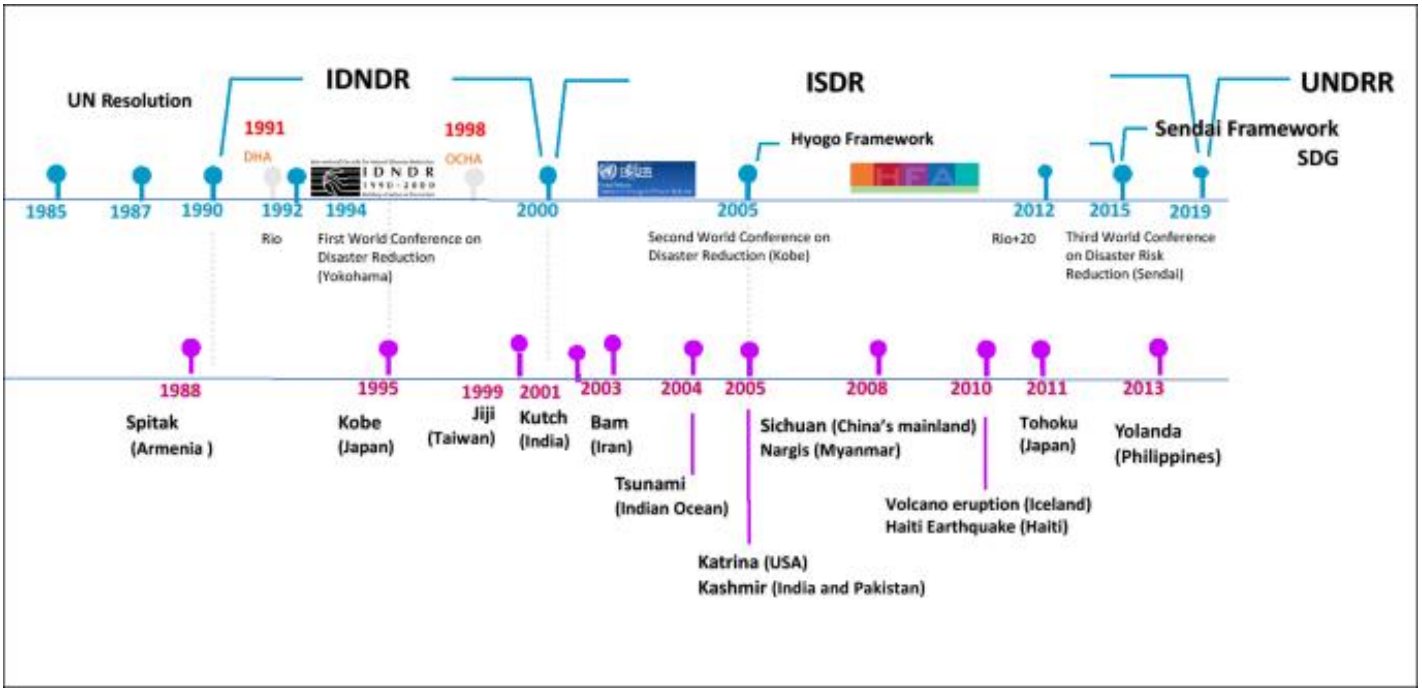
District Disaster Management Authority (DDMA)

Section 25 of the DM Act provides for constitution of DDMA for every district of a state. The District Magistrate / District Collector/ Deputy Commissioner heads the Authority as Chairperson besides an elected representative of the local authority as Co-Chairperson except in the tribal areas where the Chief Executive Member of the District Council of Autonomous District is designated as Co-Chairperson. Further in district, where Zila Parishad exist, its Chairperson shall be the Co-Chairperson of DDMA.

The District Authority is responsible for planning, coordination and implementation of disaster management and to take such measures for disaster management as provided in the guidelines. The District Authority also has the power to examine the construction in any area in the district to enforce the safety standards and to arrange for relief measures and respond to the disaster at the district level.

3.4 International Frameworks on DRR

Evolution of Disaster Risk Reduction (DRR) at International Level



Sendai Framework for Disaster Risk Reduction (2015-2030)

The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the Government has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome:

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. The Sendai Framework is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations held from July 2014 to March 2015, which were supported by the UNISDR upon the request of the UN General Assembly.

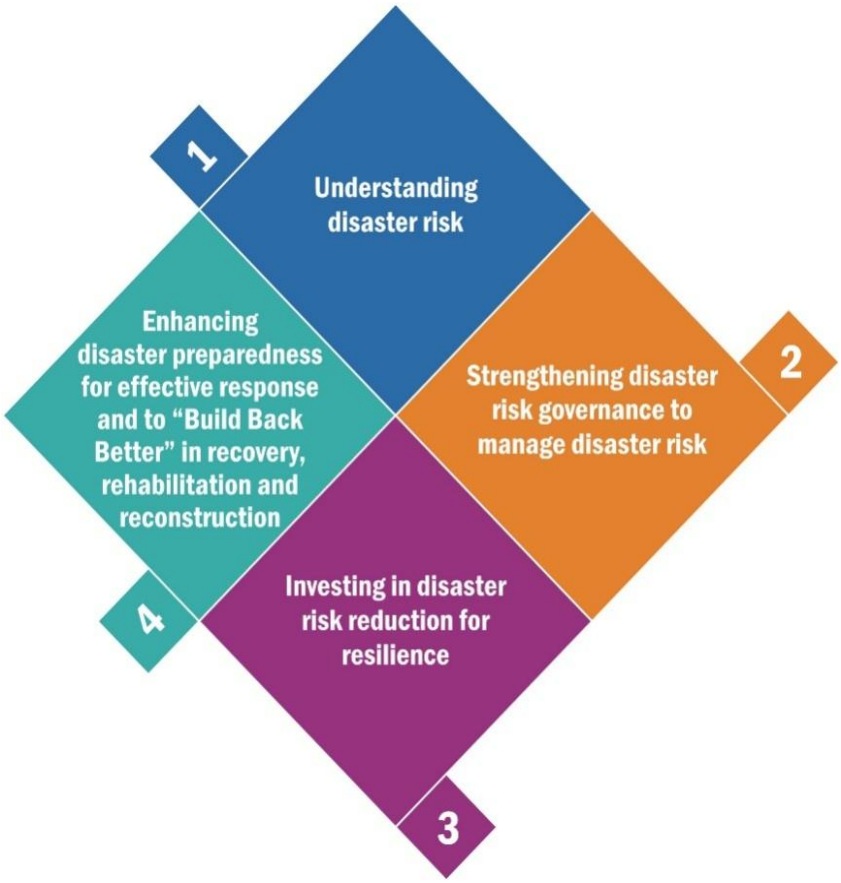
The Four Priorities of Action

Priority 1. Understanding disaster risk

Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.

Priority 2. Strengthening disaster risk governance to manage disaster risk
Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3. Investing in disaster risk reduction for resilience
Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.



Four Priorities of Action of SFDRR

Priority 4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction
The growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase are a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

The Targets of the Sendai Framework
The seven targets of the Sendai Framework are as follows:

2016 – Target (a): Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rates in the decade 2020- 2030 compared to the period 2005-2015;

2017 – Target (b): Substantially reduce the number of people affected globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020- 2030 compared to the period 2005-2015;

2018 – Target (c): Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;

2019 – Target (d): Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;

2020 – Target (e): Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;

2021 – Target (f): Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;

2022 – Target (g): Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

National Disaster Management Plan (2019)

The National Disaster Management Plan (NDMP) aims to make India disaster resilient and significantly reduce the loss of lives and assets. The plan is based on the four priority themes of the "Sendai Framework," namely: understanding disaster risk, improving disaster risk governance, investing in disaster reduction (through structural and non-structural measures) and disaster preparedness, early warning and building back better in the aftermath of a disaster.

The NDMP recognizes the need to minimize, if not eliminate, any ambiguity in the responsibility framework. It, therefore, specifies who is responsible for what at different stages of managing disasters. It is meant to be implemented in a flexible and scalable manner in all phases of disaster management: a) Mitigation (prevention and risk reduction), b) Preparedness, c) Response and d) Recovery (immediate restoration and build-back better). While the names of ministries/ departments of the Centre and State/UT having specific roles and responsivities are mentioned in the Plan, in the spirit of the DM Act 2005 and the exigencies of humanitarian response, every ministry/ department and agency is expected to contribute to DM going beyond their normal rules of business.

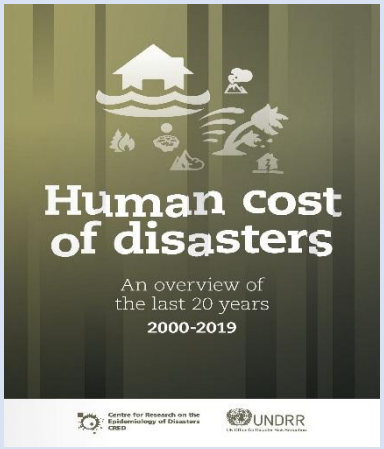
Main Pillars of NDMP

I. Conforming to the national legal mandates—the DM Act 2005 and the NPDM 2009
II. Participating proactively to realising the global goals as per agreements to which India is signatory—Sendai Framework for DRR, Sustainable Development Goals (SDGs) and Conference of Pares (COP21) Paris Agreement on Climate Change
III. Prime Minister's Ten Point Agenda for DRR articulating contemporary national priorities
IV. Social inclusion as a ubiquitous and cross-cutting principle
V. Mainstreaming DRR as an integral feature

Structure of the NDMP

The NDMP has fourteen chapters: 1) Preliminaries, 2) Hazard Risks and Challenges, 3) Coherence and Mutual Reinforcement of Three Post-2015 Global Frameworks for DRR, 4) Social Inclusion in DRR, 5) Mainstreaming DRR, 6) Building Disaster Resilience – Responsibility Framework: Part-A, Prelude, 7) Building Disaster Resilience – Responsibility Framework, Part-B, 8) Preparedness and Response, 9) Recovery and Building Back Beer, 10) Capacity Development – An Overview, 11) Financial Arrangements, 12) Strengthening Disaster Risk Governance, 13) International Cooperation, and 14) Maintaining, Monitoring and Updating the Plan.

The Human Cost of Disasters- An overview of the last 20 years 2000-2019



UNDRR report published to mark the International Day for Disaster Risk Reduction on October 13, 2020, confirms how extreme weather events have come to dominate the disaster landscape in the 21st century. The statistics in this report are from the Emergency Events Database (EM-DAT) maintained by the Centre for Research on the Epidemiology of Disasters (CRED) which records disasters which have killed ten or more people; affected 100 or more people; resulted in a declared state of emergency; or a call for international assistance.

In the period 2000 to 2019, there were 7,348 major recorded disaster events claiming 1.23 million lives, affecting 4.2 billion people (many on more than one occasion) resulting in approximately US$2.97 trillion in global economic losses.

This is a sharp increase over the previous twenty years. Between 1980 and 1999, 4,212 disasters were linked to natural hazards worldwide claiming approximately 1.19 million lives and affecting 3.25 billion people resulting in approximately US$1.63 trillion in economic losses.

Much of the difference is explained by a rise in climate-related disasters including extreme weather events: from 3,656 climate-related events (1980-1999) to 6,681 climate-related disasters in the period 2000-2019.

The last twenty years has seen the number of major floods more than double, from 1,389 to 3,254, while the incidence of storms grew from 1,457 to 2,034. Floods and storms were the most prevalent events.

The report “The Human Cost of Disasters 2000-2019” also records major increases in other categories including drought, wildfires and extreme temperature events. There has also been a rise in geo-physical events including earthquakes and tsunamis which have killed more people than any of the other natural hazards under review in this report.

External References and Reading Material Related with Chapter 2:

1. Thirty Years of Science, Technology, and Academia in Disaster Risk Reduction and Emerging Responsibilities, Shaw, R., https://link.springer.com/article/10.1007/s13753-020-00264-z
2. National Disaster Management Authority (NDMA), Government of India, https://ndma.gov.in/
3. Ministry of Home Affairs, Disaster Management Division, https://ndmindia.mha.gov.in/#
4. Sendai Framework for Disaster Risk Reduction, 2015, UNDRR,https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

3

3. Mechanism and Governance Related to DRR at the State Level in Kerala

Learning objectives of this chapter

- To introduce the state level mechanism on disaster management to the reader
- To provide an overview of the various acts, laws and plans at the state level that determine the disaster governance in Kerala
- To highlight role of KSDMA in governing all matters related with disaster response, recovery, mitigation and preparedness in Kerala

At the end of this chapter, the reader should be able to:

- Understand the importance of Kerala State Disaster Management Plan (KSDMP)
- Understand the role and responsibilities of the virtual cadre (VC) in all the selected departments of Kerala government
- Get an overview of State Emergency Operation Centre (SEOC) and District Emergency Operation Centre (DEOC)

Key concepts discussed in this chapter

- **Kerala State Disaster Management Policy:** While disasters cannot be completely avoided, the vulnerability to various hazards can be sustainably and substantially reduced by planned prevention, mitigation and preparedness measures. With this in view, the Kerala State Disaster Management Authority has formulated the 'Kerala State Disaster Management Policy'. The Disaster Management Policy calls for mechanism for coherence and alignment with existing policies of the government and future legislations.
- **Kerala State Disaster Management Plan (2016):** With the motto, "Towards a Safer State", the Kerala State Disaster Management Authority has approved the State Disaster Management Plan 2016 as mandated by the Disaster Management Act, 2005. The document is in line with the National Disaster Management Policy 2009, State Disaster Management Policy 2010 and the National Disaster Management Plan 2016 and numerous plans and guidelines relevant to Disaster Risk Reduction as issued by the NDMA, SDMA and various Ministries of Government of India. The plan is drafted after careful customization of the Sendai Framework (2015-30) to the local conditions of Kerala.
- **Virtual Cadre for Disaster Management:** The process of mainstreaming disaster management requires 'champions of disaster management' in each department for which the most appropriate is to create virtual cadres in the respective departments and incrementally train the same individuals to prepare the plans and support the respective departments. This was taken up as a project and added to the State Disaster Management Plan 2016 as a five-year perspective. Government approved the creation of virtual cadre vide GO (Rt) No. 56/2017/DMD dated 25-11-2017 and virtual cadre is to be formed in 25 departments to ensure that the departmental disaster management plans are prepared and mainstreamed.

3.1 Kerala State Disaster Management Policy (2010)

While disasters cannot be completely avoided, the vulnerability to various hazards can be sustainably and substantially reduced by planned prevention, mitigation and preparedness measures. With this in view, the Kerala State Disaster Management Authority has formulated the 'Kerala State Disaster Management Policy'. The Disaster Management Policy calls for mechanism for coherence and alignment with existing policies of the government and future legislations.

In accordance with Section 18 (2) (a), the Kerala State Disaster Management Authority (KSDMA) has prepared the Kerala State Disaster Management Policy.

The KSDMP deals with:

1. The vulnerability of different parts of the State to different forms of disasters
2. The measures to be adopted for prevention and mitigation of disasters
3. The way the mitigation measures shall be integrated with the development plans and projects
4. The capacity-building and preparedness measures to be taken

3.2 Kerala State Disaster Management Plan (2016)

With the motto, "Towards a Safer State", the Kerala State Disaster Management Authority has approved the State Disaster Management Plan 2016 as mandated by the Disaster Management Act, 2005. The document is in line with the National Disaster Management Policy 2009, State Disaster Management Policy 2010 and the National Disaster Management Plan 2016 and numerous plans and guidelines relevant to Disaster Risk Reduction as issued by the NDMA, SDMA and various Ministries of Government of India. The plan is drafted after careful customization of the Sendai Framework (2015-30) to the local conditions of Kerala. The plan contains 10 chapters, they being:

- Introduction
- Vulnerability of Kerala
- Disaster Preparedness and Mitigation
- Mainstreaming Disaster Risk Reduction
- Responsibilities of Stakeholders
- Disaster Response and Relief
- Rehabilitation and Reconstruction
- Financial Arrangements
- Plan Maintenance
- References

For more information visit: https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

3.3 Kerala State Disaster Management Authority

State Disaster Management Authorities are statutory bodies constituted under the Disaster Management Act, 2005 (Central Act 53 of 2005). Kerala State Disaster Management Authority is a statutory non-autonomous body under the Chairmanship of the Chief Minister of Kerala.

The first KSDMA was constituted vide S.R.O No. 395/2007 dated 4th May 2007. Present composition of KSDMA is notified vide S.R.O No. 583/2013 dated 17-7-2013. Vide Section 3 of the Kerala State Disaster Management Rules (KSDMR), 2007 the authority is chaired by Chief Minister and convened

by Additional Chief Secretary, Revenue and Disaster Management. The Chief Secretary (inter alia Chairperson of the State Executive Committee) is the Chief Executive Officer of KSDMA vide Section 14 (4) of the DM Act, 2005.

Additional Chief Secretary, Revenue and Disaster Management is the Head of the Department of KSDMA vide GO (Rt) No. 2181/2016/DMD dated 23-03-2016. Head of Kerala State Emergency Operations Centre is vide Section 3 (4) of KSDMR, 2007 (amendment 2015) is the Member Secretary of the Authority.

Routine decisions related to the functioning of KSDMA, as under the Disaster Management Act, 2005 is conducted as per the decision of the State Executive Committee by the Office of KSDMA. Technical and scientific matters and emergency operations are managed by Kerala State Emergency Operations Centre (KSEOC).

Members of the KSDMA include:

1. Chief Minister, Kerala - Chairman (Ex-officio)
2. Minister for Revenue, Kerala - Vice Chairman(Ex-officio)
3. Minister for Agriculture, Kerala - Member (Ex-officio)
4. Chief Secretary, Kerala - Chief Executive Officer (Ex-officio)
5. Additional Chief Secretary, Home, Kerala - Member (Ex-officio)
6. Principal Secretary, Revenue, Kerala - Convener (Ex-officio)
7. Head, Kerala State Emergency Operations Centre - Member Secretary (Ex-officio)

Advisory Committees of SDMA

KSDMA has constituted the following advisory committees under Section 17 of Disaster Management Act, 2005.

1. Landslides
2. House construction in Landslide Prone Areas
3. Minimum Relief Code for Housing
4. School Safety
5. Optimizing response for disasters
6. Earthquake Resistant Construction
7. Mullaperiyar

(Source: https://sdma.kerala.gov.in/advisory-committee/)

3.4 State Executive Committee (SEC) of KSDMA

Established as per Section 20 (1) of DM Act, 2005 and Section 11 (2) of KSDMR 2007. The SEC shall meeting at least once in 3 months. Routine decisions related to the functioning of KSDMA, as under the Disaster Management Act, 2005 is conducted as per the decision of the State Executive Committee by the Office of KSDMA. The following are existing members of the State Executive Committee (SEC) of KSDMA:

1. Chief Executive Officer (Ex-officio)- IAS ,Chief Secretary, Kerala
2. Member (Ex-officio)- Additional Chief Secretary, Home, Kerala
3. Member (Ex-officio) Additional Chief Secretary, Finance
4. Convener (Ex-officio)- Principal Secretary, Revenue, Kerala
5. Member (Ex-officio)- Principal Secretary, Health

3.5 Orange Book of Disaster Management

KSDMA has published the Orange Book of Disaster Management-1 Standard Operating Procedures (SOPs) & Emergency Support Functions (ESFs) and Orange Book of Disaster Management-2-Monsoon Preparedness and Response Guidelines (Malayalam). The handbooks contain the details of roles and responsibilities of monsoon preparedness and emergency response of 29 official departments, central agencies and district management authorities and State Emergency Operations Center (SEOC).
(Source: https://sdma.kerala.gov.in/handbooks/)

3.6 State Nodal Departments

At the state level, the government has assigned nodal responsibilities to specific departments for coordinating disaster-specific responses vide Section 6.5 of the KSDMPo, 2010. Preparedness, response, recovery and mitigation of a particular disaster will be as per the Departmental Disaster Management Plan prepared under Section 39 of the DM Act, 2005 of the respective department. Nodal departments and the specific disasters assigned to each department are listed in Section 5.1 of Kerala State Disaster Management Plan (KSDMA).

Each of these departments have their own projects under plan schemes and central schemes which contributes to the overall goal of disaster risk reduction.

3.7 Crisis Management Group – Natural Hazards

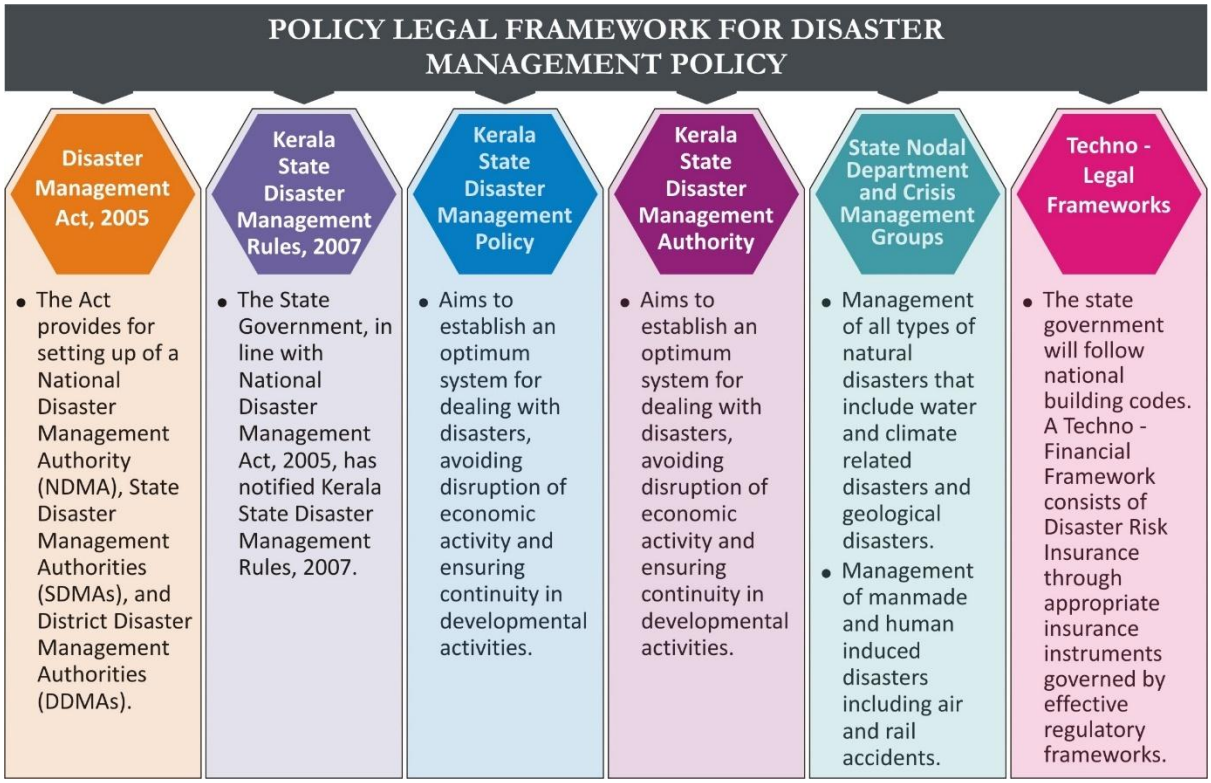
The State Executive Committee of KSDMA is the State Level Crisis Management Group for Natural Hazards vide GO (Ms) No. 68/2011/DMD dated 08-02-2011. The CMG shall meet once in 3 months.

3.8 Crisis Management Group

Anthropogenic Hazards

Anthropogenic hazards that fall under the preview of this CMG includes petro-chemical accidents, festivities related accidents (including stampedes), fireworks accidents, major mass transportation (road, railway & boats) accidents, air accidents, nuclear accidents and boat capsizing.

The State Police Chief shall be responsible for the administration relating to this CMG. The CMG is expected to meet at least once in three months and the decisions shall be reported to the State Executive Committee by the Chairperson in the next meeting of SEC. This CMG shall meet at least once in 3 months for which the convener shall take the necessary initiative.



Mitigation of Disasters in Mines

The State Level Crisis Management Group for Mitigation of Disaster in Mines vide G O (Rt) No. 542/14/ID dated 26-05-2014 is:

Sl. No.	Designation	Role
1	Principal Secretary, Industries department	Chairman
2	Secretary, Disaster Management Department	Member
3	State Police Chief or his representative	Member
4	Director General of Fire & Rescue Services	Member
5	Director, Health Services	Member
6	Director, Mining and Geology	Nodal Officer & Member

3.9 State Emergency Operation Centre (SEOC)

Established vide Section 6.8 of KSDMPo, 2010 and as provided in the National Disaster Management Guidelines - National Disaster Management Information and Communication System, 2012 based on direction vide Letter No. 05-03/2013/NDMA/CBT (Pt) dated 7th October 2013 by National Disaster Management Authority as determined by the State Executive Committee and the Government vide powers vested on it under Section 69 and Section 16 of DM Act, 2005, respectively.

Based on the conclusions and recommendations of this national workshop, the Department of Revenue and Disaster Management in consultation with the Kerala State Council for Science, Technology and Environment created the HVRA Cell as the research and technical laboratory of KSDMA under the scientific supervision of the Centre for Earth Science Studies (CESS) in April 2011. The Cell became fully operational in March 2012.

On 20 January 2014 the Government converted HVRA Cell as the State Emergency Operations Centre (SEOC). The SEOC is also the research and technology laboratory of the SDMA and directly functions under the Additional Chief Secretary, Revenue & Disaster Management.

3.10 State Disaster Response Fund (SDRF)

The State Disaster Response Fund (SDRF), constituted under Section 48 (1) (a) of the Disaster Management Act, 2005, is the primary fund available with State Governments for responses to notified disasters. The Central Government contributes 75% of SDRF allocation for general category States/UTs and 90% for special category States/UTs (NE States, Sikkim, Uttarakhand, Himachal Pradesh, Jammu and Kashmir). The annual Central contribution is released in two equal installments as per the recommendation of the Finance Commission. SDRF shall be used only for meeting the expenditure for providing immediate relief to the victims.

3.11 District Disaster Management Authorities

Established as per Section 25 of DM Act, 2005 and Section 14 of KSDMR, 2007 vide Kerala Extraordinary Gazette S.R.O No. 264/2016 dated 5th March 2016.

- The DDMA is a seven-member body chaired by the District Collector and Co-Chaired by the District Panchayath President
- The administrative matters related to the DDMA are carried out by the Natural Calamity section of the district collectorates
- In Thiruvananthapuram, Pathanamthitta, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode and Kannur the Chief Executive Officer of DDMA is Deputy Collector, Disaster Management
- In Kollam, Kottayam, Idukki, Palakkad, Wayanad and Kasaragod the Chief Executive Officer of DDMA is Additional District Magistrate (ADM)/Deputy Collector (General)
- The first DDMA was formed vide S.R.O No. 977/2008 dated 22nd September 2008

3.12 District Disaster Management Plans

The District Disaster Management Plans of Kerala were approved vide GO (Rt) No. 3104/2016/DMD dated 30-7-2016. A district disaster management plan (DDMP) seeks to develop and establish a structurally and functionally competent administrative unit at district taluk and village levels, cognizant and adept in disaster management activities, which is prepared to minimize the devastating effects of a disaster, whether natural or human induced, and capable of appropriate and timely deliverance of services upon an emergency.

Accordingly, the district disaster management plans (DDMPs) for following districts are available on the Kerala State Disaster Management Authority's (KSDMA) website:

- Thiruvananthapuram
- Kollam
- Pathanamthitta
- Alappuzha
- Kottayam
- Idukki
- Ernakulam
- Thrissur

- Palakkad
- Malappuram
- Kozhikode
- Wayanad
- Kannur
- Kasaragod

For more information: https://sdma.kerala.gov.in/ddmp/

3.13 Nodal Departments for Various Hazards

1. Revenue and Disaster Management: Hydro-meteorological and Geological disasters
2. Home: Road and rail accidents
3. Health and Family Welfare: Chemical, biological, radiological and nuclear disasters.
4. Factories and Boilers Department, Department of Industries and the Industry: Industrial accidents.
5. Agricultural: Pest attacks
6. Animal Husbandry: Cattle epidemics
7. Water resources: Dam break
8. Public works: Building collapse
9. Forests: Forest Fire
10. Airport: Air accidents

3.14 Role of Specific Departments in DRR Activities – Kerala Specific

The table below shows the nodal departments that will be responsible for each hazardous phenomena/event. These nodal departments shall prepare the Departmental Disaster Management plans.

Sl. No.	Type	Preparedness	Response	Recovery	Mitigation
Natural Hazards					
1.	Flood	WR	LR	LR	WR
2.	Landslides	LSG	LR	LR	LSG
3.	Drought	WR	LR	LR	LSG & Agri.
4.	Coastal hazards	WR & Fi	LR & Fi	LR & Fi	WR & Fi
5.	Wind	LSG	LR	LR	LSG
6.	Lightning	LSG	LR	LR	LSG
7.	Earthquakes	LSG	LR	LR	LSG
8.	Human epidemics	HS	HS	HS	HS
9.	Plant disease epidemics and pest attack on crops	AGD	AGD	AGD	AGD
10.	Avian epidemics	AH	AH	AH	AH
11.	Animal epidemics	AH	AH	AH	AH
12.	Pest attack of human habitations	AGD	AGD	AGD	AGD
13.	Forest Fire	FD	FD	FD	FD
14.	Meteorite/asteroid impacts	LR	LR	LR	LR

Sl. No.	Type	Preparedness	Response	Recovery	Mitigation
15.	Soil Piping	LSG	LR	LR	LSG
16.	Heat wave / sunburn / sunstroke	LR & LD	HS	HS	LR & LD
17.	Natural background radiation	HS	HS	HS	HS
Anthropogenic Hazards					
1.	Stampedes	P	P	P	P
2.	Fire cracker accidents	LR & P	P & FS	P & FS	LR
3.	Petro-chemical transportation accidents	P & OC	P & OC	P & OC	P & OC
4.	Industrial accidents	PB & FB	PB & FB	PB & FB	PB & FB
5.	Dam break	KSEB & WR	KSEB & WR	KSEB & WR	KSEB & WR
6.	Dam spillway operation related floods & accidents	KSEB/WR	KSEB/WR	KSEB/WR	KSEB/WR
7.	Oil spill	PCB, OC, OHA	PCB, OC, OHA	PCB, OC, OHA	PCB, OC, OHA
8.	Road accidents involving civilian transport vehicles	P	P	P	P
9.	Human induced forest fire	FD	FD	FD	FD
10.	Human-animal conflicts	FD & LSG	FD & LSG	FD & LSG	FD & LSG
11.	Fire accidents in buildings and market places	LSG & FS	LSG & FS	LSG & FS	LSG & FS
12.	Boat capsizing	TD, IND & KWTC	TD, IND & KWTC	TD, IND & KWTC	TD, IND & KWTC
13.	Accidental drowning	SYW & TD	FS	FS	SYW & TD
14.	Building collapse	LSG & PWD	FS	FS	LSG & PWD
15.	Hooch accident	E	E	E	E
16.	Air accidents	AAI	AAI	AAI	AAI
17.	Rail accidents	IR	IR	IR	IR
18.	Terrorism, riots and Naxalite attacks	P	P	P	P
19.	Nuclear and radiological accidents	RS & BARC	RS & BARC	RS & BARC	RS & BARC
20.	Space debris impacts	P	P	P	P
21.	Biological accidents	HS, FSa	HS, FSa	HS, FSa	HS, FSa
22.	Occupational hazards and recreational-area related hazards	LSGD, LD & TD	LSGD, LD & TD	LSGD, LD & TD	LSGD, LD & TD
23.	Accidents in Armed Forces premises and assets	AF	AF	AF	AF
Disaster occurring outside the state's administrative boundaries in		SDMA of the Respective State and NORKA		As decided by SEC or KSDMA	

Sl. No.	Type	Preparedness	Response	Recovery	Mitigation
	which tourists from Kerala of non-residential Keralaites are affected				

AAI: Airport Authority of India; AF: Armed Forces (Indian Army, Navy, Air Force, Coast Guard, Indo-Tibetan Board Police, Central Reserve Police Force; Defence Security Corps); AG: Agriculture Department; AH: Animal Husbandry; BARC: Baba Atomic Research Centre; E: Excise Department; FB: Factories and Boilers Department; FD: Forest Department; Fi: Fisheries; FS: Fire and Rescue Services; FSa: Food Safety; HS: Health Services; IND: Inland Navigation Department; IR: Indian Railway; KSEB: Kerala State Electricity Board Ltd.; KWTC: Kerala Water Transport Corporation; LD: Labour Department; LR: Land Revenue Department; LSG: Local Self-Government; P: Police; WR: Water Resources Department; OC: Oil Companies; OHA: Oil Handling Companies; PCB: Pollution Control Board; PWD: Public Works Department; RS: Radiation Safety Department; SYW: Sports & Youth Welfare Department; TD: Tourism Department

Source: Kerala State Disaster Management Plan (2016), https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

3.15 District Emrgency Operation Centre

Vide Ltr. No. 24121/K1/2014/DMD dated 22-05-2014 all District Disaster Management Authorities were directed to create District Emergency Operations Centres (DEOC) with 24 X 7 staff of Revenue, Police (with Police VHF access) and Fire & Rescue Services. This was reiterated vide Ltr. No. 29426/K1/2015/DMD dated 02-06-2015 and Ltr. No. 26378/K1/2016/DMD dated 05-05-2016. The State Executive Committee, in its meeting held on 29th January 2015 approved the ESFP, 2015 vide which necessary minimum requirements for the creation of the DEOCs were formalized. The DEOCs functions in a 100 m2 floor area in close proximity to the Office of the District Collector in the respective collectorates.

The DEOCs of Wayanad, Ernakulam and Idukki are linked to SEOC vide VSAT terminals funded under the National Disaster Management Services Project of NDMA. All 14 DEOCs are equipped with VHF network.

The DEOC is under the direct control of District Incident Commander. Day-to-day administration of the DEOC is delegated to the Deputy Collector (Disaster Management) [Deputy Collector (DM)] in Thiruvananthapuram, Pathanamthitta, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode and Kannur districts and to the Additional District Magistrate (ADM) in Kollam, Kottayam, Idukki, Palakkad, Wayanad and Kasargod. The DEOCs function 24 hours. The first dedicated district emergency operations centre with 24 hours staff from Revenue, Police and Fire & Rescue with a full-time medical doctor on-call started functioning at Alappuzha district on 5th September 2014. Presently all DDMAs have operation District Emergency Operations Centre. The State EOC has posted one Hazard Analyst per DDMA to support the DDMA in carrying out its activities.

3.16 Government Order on Virtual Cadre (VC)

It is notified that in all the major government departments, there must be a virtual cadre formed with 15 employees. With a long-term perspective view, it is directed that for the efficient disaster mitigation activities, experts from scientific and technical background with interest in the field to be made part of this cadre. As per this direction, people from the respective departments from below mentioned to be made part of this cadre.

1. Land revenue
2. Agriculture
3. Irrigation (Minor)
4. Irrigation (Major)
5. Kerala water authority
6. Ground water
7. Mining and geology
8. Wildlife conservation
9. Dairy department
10. Health department
11. Education department
12. Higher secondary department
13. Directorate of Collegiate education
14. Industries department
15. Fisheries department
16. Civil supplies department
17. Forest
18. Department of ports
19. Public works department
20. Local self-government department (Urban)
21. Local self-government department (Panchayats)
22. Soil conservation department
23. NORKA
24. Tourism department
25. Information and Public relations department

Criteria for selection of officials in state level

1. The official working in state level to be placed in the state level coordination office.
2. Official with relevant university degree in the respective field from the respective technical departments are to be selected for the post of department head.
3. The selected official should have a minimum of 20 days service left in the month of January 2018.
4. Officials selected in the technical cadre would not have any allowances.
5. Officials selected should be willing to work in emergency situations.
6. Officials selected for this cadre will receive the required national and international trainings facilitated by State disaster management authority.

Criteria for selection of officials in district level

1. To facilitate and assist district disaster management authority during emergency situations.
2. During emergencies, work in coordination with the respective departments in the district level.
3. During emergencies, assist and work in close coordination with the respective district and other state level departments for the smooth functioning of its activities.
4. Prepare district level, department specific disaster mitigation plan and update them annually.
5. Prepare annual training calendar for the respective district level departments and ensure coordination of trainings.

6. Provide necessary advice and assistance to the department head to ensure that the department annual plan document prepared at the district level has measures taken to mitigate the risk of disaster in the area.
7. Implementation of projects undertaken by the District Disaster Management Authority in the respective departments.

Responsibilities of state level officials

1. Assist State Disaster Management Authority to prepare State Disaster Mitigation Plan
2. In case of emergencies the State Disaster Management Authority's, State emergency operation centre will be responsible for the activities related to the said department.
3. In case of emergencies, inform and coordinate with the head of the respective department and the virtual cadre officers of the respective department at the district level and coordinate their activities.
4. Prepare and update Disaster Mitigation Plan Document annually.
5. Prepare the annual calendar of disaster mitigation training required for all officers in the department, prepare the annual calendar of training and ensure the necessary coordination for the trainee.
6. Provide necessary advice and assistance to the department head to ensure that the department annual plan document prepared at the district level has measures taken to mitigate the risk of disaster in the area.
7. Assistance in implementation of projects undertaken by the State Disaster Management Authority in connection with the area of operation of the respective departments

External References and Reading Material Related with Chapter 3:

1. Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf
2. Kerala State Disaster Management Policy (2010), Department or Revenue & Disaster Management, Government of Kerala,https://sdma.kerala.gov.in/wp-content/uploads/2018/12/a5KSDMA-Policy-2010.pdf
3. Kerala Disaster Management Rules (2007), Kerala Gazette, Government of Kerala,https://sdma.kerala.gov.in/wp-content/uploads/2018/12/a7KSDMA-Rules-2007.pdf

4

4. Introduction to Hazard Vulnerability of Kerala

Learning objectives of this chapter

- To introduce the vulnerability and hazard profile of Kerala to the readers
- To provide an overview of the various natural and anthropogenic hazards in Kerala
- To highlight the state specific disasters in Kerala and their implications on the State

At the end of this chapter, the reader should be able to:

- Understand the need for effective disaster risk reduction in Kerala
- Understand the Early Warning System (EWS) for different kinds of phenomena in Kerala
- Understand the gravity of disaster risks in Kerala through examples of 2018 and 2019 Floods and Landslides in Kerala.

Key concepts discussed in this chapter

- **Hazard Profile of Kerala:** Kerala is prone to high incidence of lightning, especially during the months of April, May, October and November. Apart from floods the mountain regions of the state experience several landslides during the monsoon season. It is known that a total of 65 fatal landslides occurred between 1961 and 2009 causing the death of 257 individuals (Kuriakose, 2010). Between 1871 and 2000, the state experienced 12 moderate drought years. The 570 km long coast line of Kerala is prone to erosion, storm surges and sea level rise. Land subsidence due to tunnel erosion or soil piping which is a slow hazard, is recently noticed to be affecting the hilly areas in the state. This often goes unnoticed and is a hazard with potential of causing landslides, infrastructural damages and crop loss covering vast areas in the high land regions of the state.

  KSDMP 2016 identifies thirty-nine (39) phenomena with potential to cause disasters requiring L2 attention that the state is susceptible to and they are grouped under two categories based on the major triggering factors, they being Naturally Triggered Hazards (Natural Hazards) and Anthropogenically Triggered Hazards (Anthropogenic Hazards). Not all of these hazards turn into disasters that are 'beyond the coping capacity of the community of the affected area'.

- **State Specific Disasters:** State specific disasters are those which have been notified by the State Government as falling within the local context for which expenditure on relief measures will be available from State Disaster Response Fund (SDRF). The disasters like coastal erosion, lightning, strong winds, soil piping, heat wave/Sun stroke/ sunburn have all been declared as state specific disasters, according to notifications issued by the office of the Special Relief Commissioner (SRC).

  Similarly, in the wake of the COVID-19 outbreak, the Government of India (GoI) has decided to treat COVID-19 as a notified disaster and has permitted the use of State Disaster Response Fund (SDRF) and has partially modified the norms of assistance from SDRF.

4.1 General Profile of Kerala

Kerala, often referred to as 'God's own Country' is one of the most beautiful, resource endowed and culturally diverse States in the Indian Union. Kerala is bordered by the Arabian Sea in the west and by the Western Ghats in the east. In its north is the State of Karnataka and to the east is Tamil Nadu State. Kerala has a Human Development Index (HDI) of 0.79 which is the highest in the country (Government of India, 2011).

Census 2011 put Kerala's population at 3,33,87,677 persons which includes 16,021,290 males and 17,366,387 females. Although Kerala accounts for only 1 per cent of the total area of India, it contains about 3 per cent of the country's population. The population density of the state is about 860 people per square kilometres, three times the national average. Kerala is one of the densest States in the country and it recorded a decadal population growth of + 4.86% (1,546,303 persons). Kerala, with a sex-ratio (females per 1000 males) of 1084, along with Puducherry (1037) are the only states in India which (2011 Census).

Kerala is a relatively rich Indian State. According to quick estimates for 2019-20, per capita income of Kerala was INR 149,563 in 2019-20, higher than the national average of INR 96,152. In other words, average income per person in Kerala was approximately 1.6 times the Indian average in 2018-19. Among big Indian States, Kerala is one of the leading states with respect to per capita income, along with Haryana, Gujarat, Karnataka, Maharashtra and Tamil Nadu.

The following table provides a brief geographic and demographic profile of Kerala[1]:

Feature	Description
Area	38,863 km^2
Location	Graticule 8°18'N & 12° 48N and 74° 52'E & 77° 22'E
Rivers	44
Forest	11,266 km^2
Coastline	590 km
Population	3,33,87,677 (Census, 2011)
Male	1,60,21,290
Female	1,73,66,387
Population density	860 people/km^2
Population growth rate	4.9%
Districts	14
Talukas	75
Corporations	6
Municipalities	87
Villages	1640* (including group villages)
Lock Sabha Constituencies	20
Rajya Sabha Constituencies	9
Assembly Constituencies	140
Climate	Humid equatorial tropic climate; the dominant climate phenomena being the monsoons called the South-West (June to September) the North-East (October to December) monsoons, the former is more significant than the latter with an annual rainfall of 3104 mm mainly contributed by the South West Monsoon.

4.2 Vulnerability of Kerala to Different Types of Disasters

The state of Kerala is vulnerable to a multitude of hazards and is categorized as a multiple-hazard prone state. The state experiences various kinds of disasters of recurrent nature that results in loss of life, livelihood and property, and disruption of economic activity, besides causing immense hardship to the affected population.

[1] Kerala State Planning Board

The specific vulnerabilities of the State include:

- Kerala has a long coast line of 590kms out of which, 322 km is prone to severe sea erosion
- The density of population is 819 persons per sq.km which is the second highest density in the country.
- About 96.9% of the total area in the state lies in the 140.4km/h wind zone which is classified as Moderate Damage Risk Zone by the BMPTC Atlas while the remaining area lies in 118.8km/h wind zone.
- The mean maximum storm surge height in the state is 3.5m and minimum is 2.3m. If the storm surge is during high tide, the maximum surge height in the state will be 4.2m and minimum storm height will reach up to 3m, as observed by the Meteorological Department, Thiruvanthapuram.
- The coastal belt of Kerala is one of the most densely populated regions in the country, which adds to its vulnerability.
- The Western flank of the Western Ghats covering the eastern part of Kerala is identified as one of the major landslide prone areas of the country.

Source: Kerala State Disaster Management Plan Profile, Kerala State Disaster Management Authority, http://www.kerenvis.nic.in/WriteReadData/UserFiles/file/49412317-Kerala-Disaster-Management-Plan-Profile-India.pdf)

4.3 Hazard Profile of Kerala along with the List of Major Hazards

Kerala is frequently ravaged by the disastrous consequences of numerous hazards and hence it is a multi-hazard prone State. The human system itself was subjected to significant transformation over its history. These transformations and their links to the natural system have served as templates of the dynamics of naturally triggered hazards and therefore, of disasters (Alcantara-Ayala, 2002). This 'template of disasters' is particularly apparent in the state of Kerala where, within a short period of last 80 years, there has occurred a rapid socio-economic transformation from an agrarian society to a highly urbanized consumerist society.

Parallel to this societal transformation, the population pressure along the coastline forced the then marginalized sections of the community to migrate from the coastal belt to the relatively inhospitable terrain of the Western Ghats (George and Chattopadhyay, 2001). A study conducted on migration suggested that in the past 80 years the coastal plains recorded a population growth of 306%, whereas the highlands, foot hills and uplands together experienced a growth of 1342% (Nair et al., 1997). This population with a density of ~860 people/km2 (Census of India, 2011) is more or less widely distributed across all geomorphic units of the state, exposing them to multiple hazards.

Kerala is prone to high incidence of lightning, especially during the months of April, May, October and November. Apart from floods the mountain regions of the state experience several landslides during the monsoon season. It is known that a total of 65 fatal landslides occurred between 1961 and 2009 causing the death of 257 individuals (Kuriakose, 2010). Between 1871 and 2000, the state experienced 12 moderate drought years. The 570 km long coast line of Kerala is prone to erosion, storm surges and sea level rise. Land subsidence due to tunnel erosion or soil piping which is a slow hazard, is recently noticed to be affecting the hilly areas in the state. This often goes unnoticed and is a hazard with potential of causing landslides, infrastructural damages and crop loss covering vast areas in the high land regions of the state.

The high density of population of 860 people/km2 (2011 Census), narrow roads, high density of road network, density of coastal population and the general higher standard of living of the public as compared to the rest of the country are factors that increase the vulnerability of the population to disasters.

KSDMP 2016 identifies thirty-nine (39) phenomena with potential to cause disasters requiring L2[2] attention that the state is susceptible to and they are grouped under two categories based on the major triggering factors, they being Naturally Triggered Hazards (Natural Hazards) and Anthropogenically Triggered Hazards (Anthropogenic Hazards). Not all of these hazards turn into disasters that are 'beyond the coping capacity of the community of the affected area'.

Sl. No.	Type
	Natural Hazards
1.	Flood (Riverine, Urban and Flash Floods)
2.	Landslides (includes debris flows, rock fall, rock avalanche, rock slide, landslips and mud slips)
3.	Drought
4.	Coastal hazards (High waves, Storm surges, Kallakadal, Tsunami, Salt Water Intrusion, Coastal erosion)
5.	Wind (Cyclone, Gustnados, Gusty winds)
6.	Lightning
7.	Earthquakes
8.	Human epidemics
9.	Plant disease epidemics and pest attack on crops
10.	Avian epidemics
11.	Animal epidemics
12.	Pest attack of human habitations
13.	Forest Fire
14.	Meteorite/asteroid impacts
15.	Soil Piping
16.	Heat wave/sunburn/sunstroke
17.	Natural background radiation
	Anthropogenic Hazards
1.	Stampedes
2.	Fire cracker accidents
3.	Petro-chemical transportation accidents
4.	Industrial accidents
5.	Dam break
6.	Dam spillway operation related floods & accidents
7.	Oil spill

[2] According to NDMA (2007), there are four levels of disasters. L0: Normal times; focus on preparedness activities; L1: Disasters that can be managed at the district level; state and centre in ready state; L2: Disasters that require mobilization of resources at the state level; L3: Disasters that require mobilization of resources at the national level

Sl. No.	Type
8.	Road accidents involving civilian transport vehicles
9.	Human induced forest fire
10.	Human-animal conflicts
11.	Fire accidents in buildings and market places
12.	Boat capsizing
13.	Accidental drowning
14.	Building collapse
15.	Hooch accident
16.	Air accidents
17.	Rail accidents
18.	Terrorism, riots and Naxalite attacks
19.	Nuclear and radiological accidents
20.	Space debris impacts
21.	Biological accidents
22.	Occupational and recreational area related hazards
23.	Accidents in Armed Forces premises
Disasters outside State's administrative boundaries, affecting Keralites	

4.4 Major Hazards of Kerala

4.4.1 Flood

Floods are the most common of natural hazards that affect people, infrastructure and natural environment in Kerala. Riverine flooding is a recurring event consequent to heavy or continuous rainfall exceeding the absorptive capacity of soil and flow capacity of streams and rivers. This causes a water course to overflow its banks onto flood plains; which by definition is a relatively flat land adjacent to a natural water course, composed primarily of unconsolidated depositional material derived from sediments transported by the related stream and subjected to periodic flooding. Flood plains are therefore 'flood prone' and are hazardous if the developmental activities in them exceed an acceptable level. Frequency of inundation depends essentially on rainfall, channel slope, relative height of the banks, materials that make up stream banks and land-use in flood plain. Reclamation and settlement in floodplain areas is a major cause of flood damage in Kerala. In order to evaluate flood hazard, one has to know where floodplains are, how often and how long the flood plain is covered by water and at what time of the year flooding can be expected. In Kerala, 5642.68 km2 of area which is 14.52% of the total area of the state is prone to floods.

2018 Kerala Floods

Between June 1 and August 18, 2018, Kerala experienced the worst ever floods in its history since 1924. During this period, the state received cumulative rainfall that was 42% in excess of the normal average. The heaviest spell of rain was during 1-20 August, when the state received 771mm of rain. The torrential rains triggered several landslides and forced the release of excess water from 37 dams across the state, aggravating the flood impact. Nearly 341 landslides were reported from 10 districts. Idukki, the worst hit district, was ravaged by 143 landslides.

1,259 out of 1,664 villages spread across its 14 districts were affected.9 The seven worst hit districts were Alappuzha, Ernakulam, Idukki, Kottayam, Pathanamthitha, Thrissur, and Wayanad, where the whole district was notified as flood affected. The devastating floods and landslides affected 5.4 million people, displaced 1.4 million people, and took 433 lives.

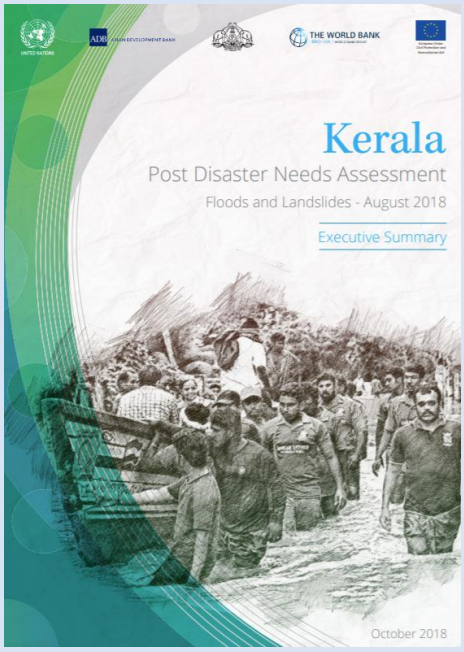
Source: Kerala Post Disaster Needs Assessment Floods and Landslides - August 2018, https://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/post-disaster-needs-assessment---kerala.html#:~:text=Between%20June%201%20and%20August,worst%20floods%20ever%20since%201924.&text=The%20Post%20Disaster%20Needs%20Assessment,be%20at%20USD%204.4%20billion

2019 Kerala Floods

During the South West monsoon of 2019, another deluge had hit the state, wherein 1038 villages from 13 districts were notified1 as affected by floods & landslides and 125 lives were lost. Sectors like housing, power, agriculture were affected badly and the damages have been reported in the memorandum. The state was hit by major floods in the two consecutive years of 2018 & 2019.

(Source: Govt. of Kerala, 2019. Memorandum – Kerala Floods 2019. 1st August to 31st August 2019. Department of Disaster Management, Govt. of Kerala. Contributors: Dr.V Venu, Kuriakose S.L, Pradeep G.S, Anupama N, Rajeev T.R, Nidhin Davis, Fahad Marzook, Anjali S. Ravi, Joe John George, Siji M. Thankachan)

Post Disaster Needs Assessment (PDNA) after 2018 Kerala Floods



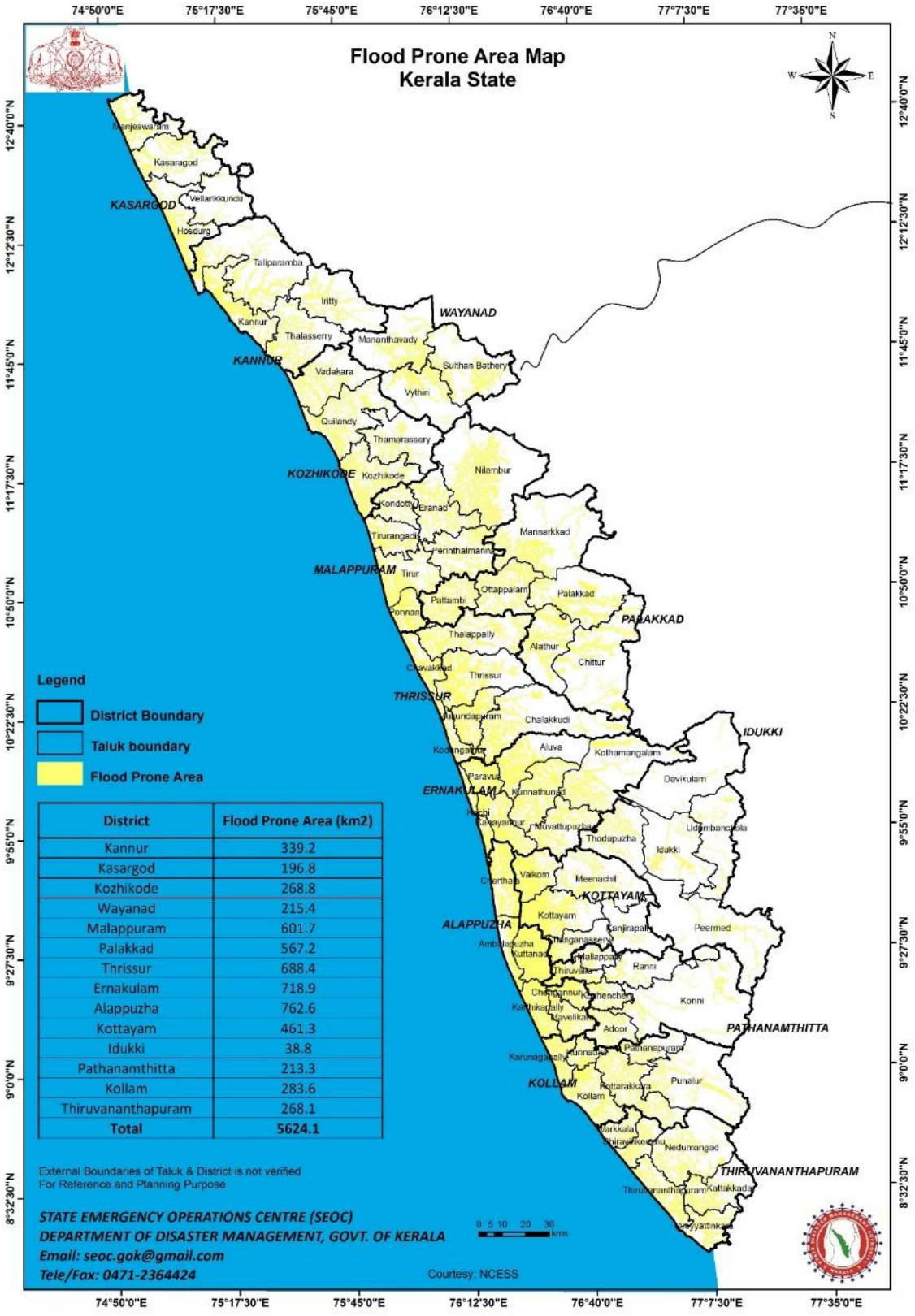
Between June 1 and August 18, 2018, Kerala experienced the worst floods ever since 1924. The torrential rains triggered several landslides and forced the release of excess water from 37 dams across the state, aggravating the flood impact. Nearly 341 landslides were reported from 10 districts. The devastating floods and landslides affected 5.4 million people, displaced 1.4 million people, and took 433 lives. The Government reports that 1,259 out of 1,664 villages spread across the state's 14 districts were affected. The floods and landslides caused extensive damage to house, roads, railways, bridges, power supplies, communications networks, and other infrastructure; washed away crops and livestock. The Post Disaster Needs Assessment (PDNA) conducted by the UN under the leadership of the Government of Kerala estimates the total Recovery needs to be at USD 4.4 billion.

The PDNA is the global methodology developed by the UN, the World Bank and the European Union to assess damage and loss in the wake of disaster and to recommend the recovery needs and strategies. In all, 76 experts from 10 UN agencies and European Union across 13 sectors collaborated to develop the report in 20 days. The UN agencies included, UNDP, UNICEF, UNESCO, UN Women, UNFPA, UNEP, WHO, WFP, ILO and FAO. Besides, two experts on integrated water resources management from the Netherlands also provided support. The report was prepared after visiting 120 villages in 10 districts and interacting with experts, affected people, elected representatives, officials and representatives of civil society organisations.

The report has suggestions to make Kerala the first green state in India with an eco-sensitive and risk-informed approach. The report also gives several high-ticket innovations and global examples to build back better (BBB) Kerala.

For more info, visit: https://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/post-disaster-needs-assessment---kerala.html#:~:text=Between%20June%201%20and%20August,worst%20floods%20ever%20since%201924.&text=The%20devastating%20floods%20and%20landslides,state's%2014%20districts%20were%20affected.

Flood Hazard Map of Kerala



District	Flood Prone Area (km2)
Kannur	339.2
Kasargod	196.8
Kozhikode	268.8
Wayanad	215.4
Malappuram	601.7
Palakkad	567.2
Thrissur	688.4
Ernakulam	718.9
Alappuzha	762.6
Kottayam	461.3
Idukki	38.8
Pathanamthitta	213.3
Kollam	283.6
Thiruvananthapuram	268.1
Total	**5624.1**

Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.4.2 Landslide

The highlands of Kerala experience several types of landslides, of which debris flows are the most common. They are called 'Urul Pottal' in the local vernacular. The characteristic pattern of this phenomenon is the swift and sudden downslope movement of highly water saturated overburden containing a varied assemblage of debris material ranging in size from soil particles to boulders, destroying and carrying with it everything that is lying in its path. The west facing Western Ghats scarps that runs the entire extent of the mountain system is the most prone physiographic unit for landslides (Thampi et al., 1995). These scarp faces are characterized by thin soil (regolith) cover modified heavily by anthropogenic activity.

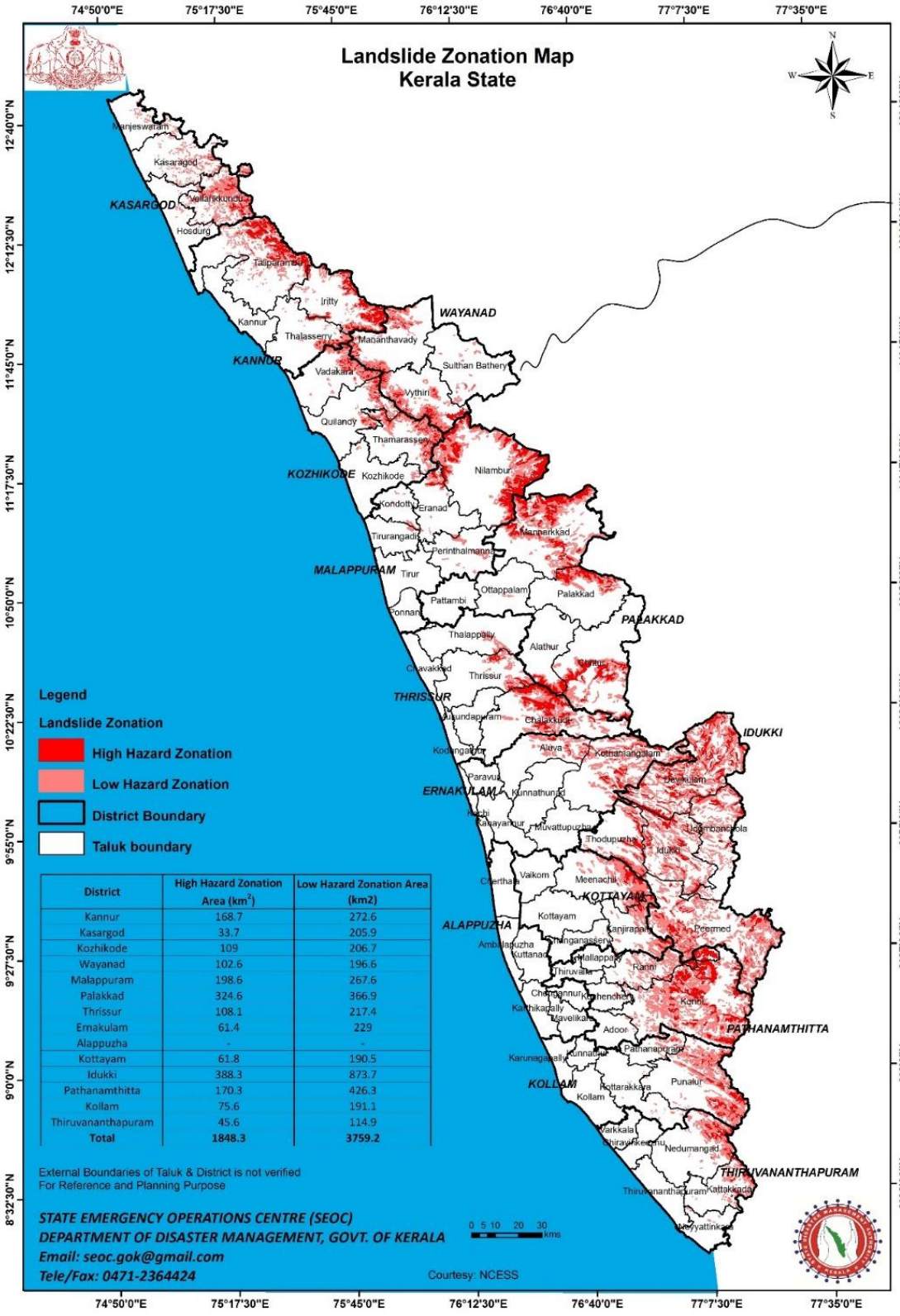
Floods and Landslides in Kerala 2019

Between August 8 and 31, 2019, Kerala experienced flood and landslides yet again. 2019 Monsoon had a weak and delayed start. Onset of monsoon was officially declared by IMD on June 8th, 2019. But Kerala received 32% deficient rainfall till July 31. Normally, June and July are the 'Rainy months' in Kerala. Till 31st July 2019, Wayanad, one of the most affected Districts was marked 55% deficiency in rainfall compared to the long period average (Normal). But due to the influence of low pressure area and depression formed over the Bay of Bengal and strengthening of Monsoon winds, Kerala state received large excess rainfall during the Month of August. During the month of August 2019, Kerala received 123% excess rainfall than the long period average rainfall over the state. In August 2018 it was 96% excess rainfall than the long period average rainfall. Most affected districts in North and Central Kerala were Kozhikode (176%), Wayanad (110%), Malappuram (176%), Palakkad (217%), Thrissur (127%) Ernakulam (140%) which received more than 100% excess rainfall than the normal rain during the month of August. 7 out of 14 Districts from Kasargode to Thrissur received more than 1000 mm rainfall during 1st to 31 August 2019.

In total, 1038 villages were affected by floods and landslides in 2019.

(Source: Govt. of Kerala, 2019. Memorandum – Kerala Floods 2019. 1st August to 31st August 2019; https://sdma.kerala.gov.in/wp-content/uploads/2020/03/Memorandum-pages-deleted-Copy-compressed.pdf)

Landslide Hazard Map of Kerala



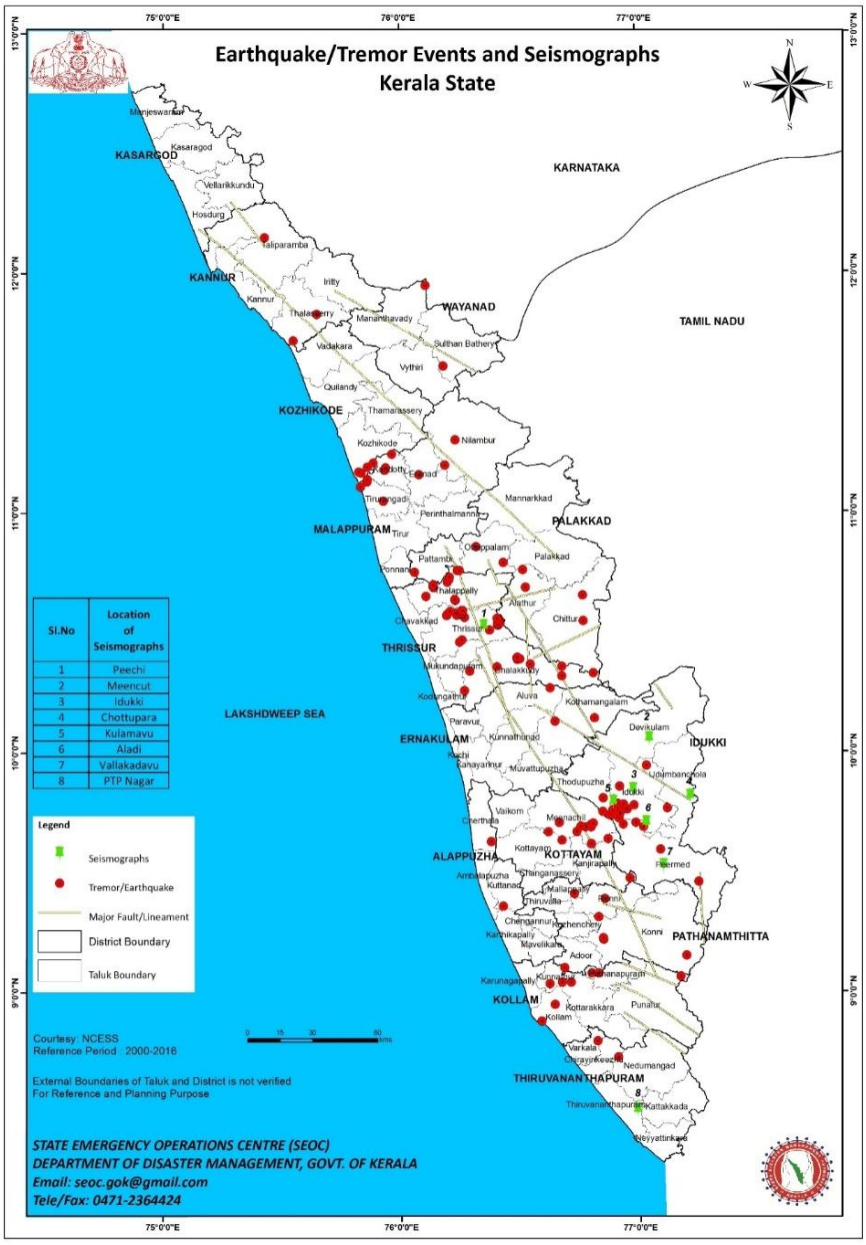
District	High Hazard Zonation Area (km^2)	Low Hazard Zonation Area (km2)
Kannur	168.7	272.6
Kasargod	33.7	205.9
Kozhikode	109	206.7
Wayanad	102.6	196.6
Malappuram	198.6	267.6
Palakkad	324.6	366.9
Thrissur	108.1	217.4
Ernakulam	61.4	229
Alappuzha	-	-
Kottayam	61.8	190.5
Idukki	388.3	873.7
Pathanamthitta	170.3	426.3
Kollam	75.6	191.1
Thiruvananthapuram	45.6	114.9
Total	**1848.3**	**3759.2**

Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.4.3 Earthquake

India has been divided into 4 seismic zones namely zone II, zone III, zone IV and zone V according to the maximum intensity of earthquake expected. The state has been included in the earthquake Zone III. Though the state of Kerala had experienced several occurrences of earthquakes since the historic times, the events that occurred during the past half-century were well documented, because of the availability of seismic records. The historical as well as recent (post-1950) events compiled from various sources record the occurrence of approximately 60 earthquakes (KSCSTE, 2007). An analysis of the seismicity map indicates that most of the well-defined earthquakes have definite spatial association with some of the known faults/lineaments, which is in line with the seismicity of Peninsular shield, where the latter is confined mostly to pre-existing structures/mobile belts.

Earthquake Hazard Map of Kerala

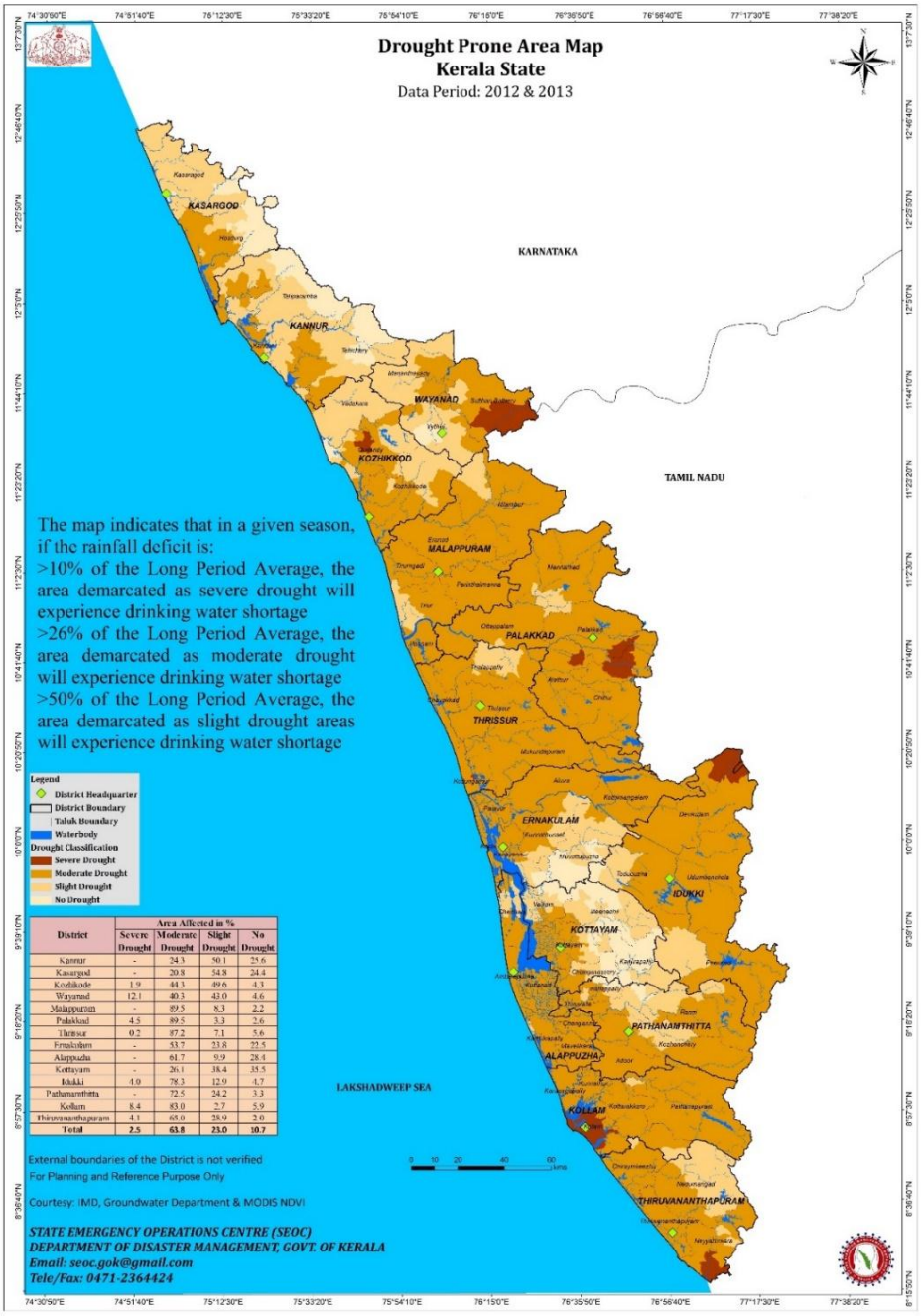


Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.4.4 Drought

The State of Kerala experiences seasonal drought conditions every year during the summer months (KSCSTE, 2007). Even in the years of normal rainfall, summer water scarcity problems are severe in the midland and highland regions. With the implementation of a number of irrigation projects, the idea of drought in Kerala slowly shifted to unirrigated paddy, and upland crops. The water scarcity in summer is mainly reflected in dry rivers and lowering of water table. This adversely affects the rural and urban drinking water supply. In the period 1881 to 2000, Kerala experienced 66 drought years.

Drought Prone Areas of Kerala

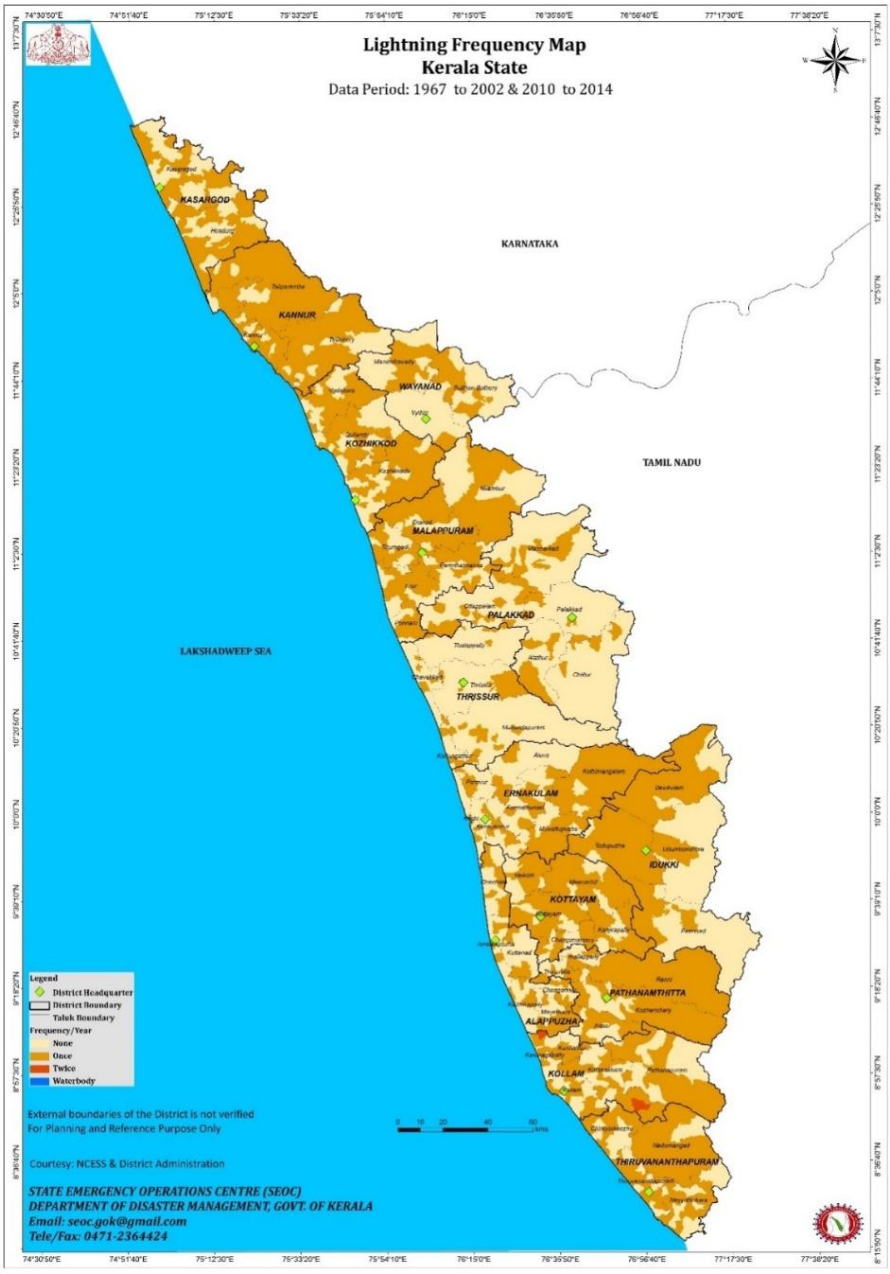


Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.5.5 Lightning

In Kerala, research on lightning has been conducted for over a decade by the National Centre for Earth Science Studies (CESS), Ministry of Earth Sciences, Government of India. The NCESS maintains a regularly updated Geographic Information Systems based database of lighting felt reports which is collected from newspaper reports or compensation claims submitted by the affected to the Department of Revenue, Govt. of Kerala. It is known from studies that Cumulonimbus (Cb) clouds produce lightning. Kerala's typical topography favors frequent Cb formation especially during the months of April-May and October-November (Murali Das, 2007; Vishnu et al., 2010).

Lighting Frequency Map of Kerala

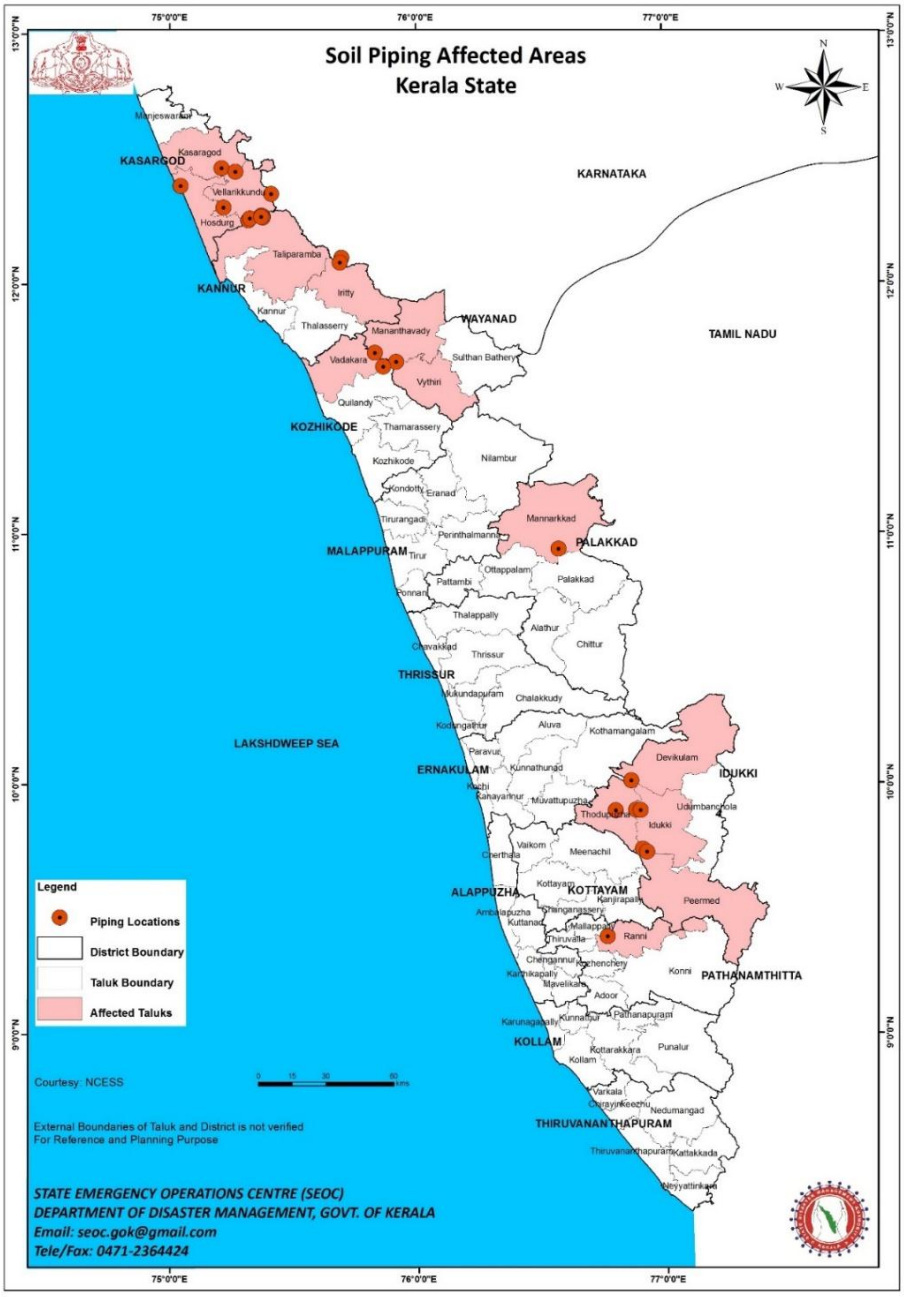


Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.4.6 Soil Piping

Soil piping or “tunnel erosion” is the formation of subsurface tunnels due to subsurface soil erosion. They may lie very close to the ground surface or extend several meters below ground. Once initiated they become cumulative with time, the conduits expand due to subsurface erosion leading to roof collapse and subsidence features on surface. Since it happens in the underground, in many cases the phenomenon goes unnoticed. The cavities or pipes developed below the ground grow with respect to time and affect large extents of land in the form of subsidence thereby making it not suitable for cultivation.

Soil Piping Affected Areas of Kerala

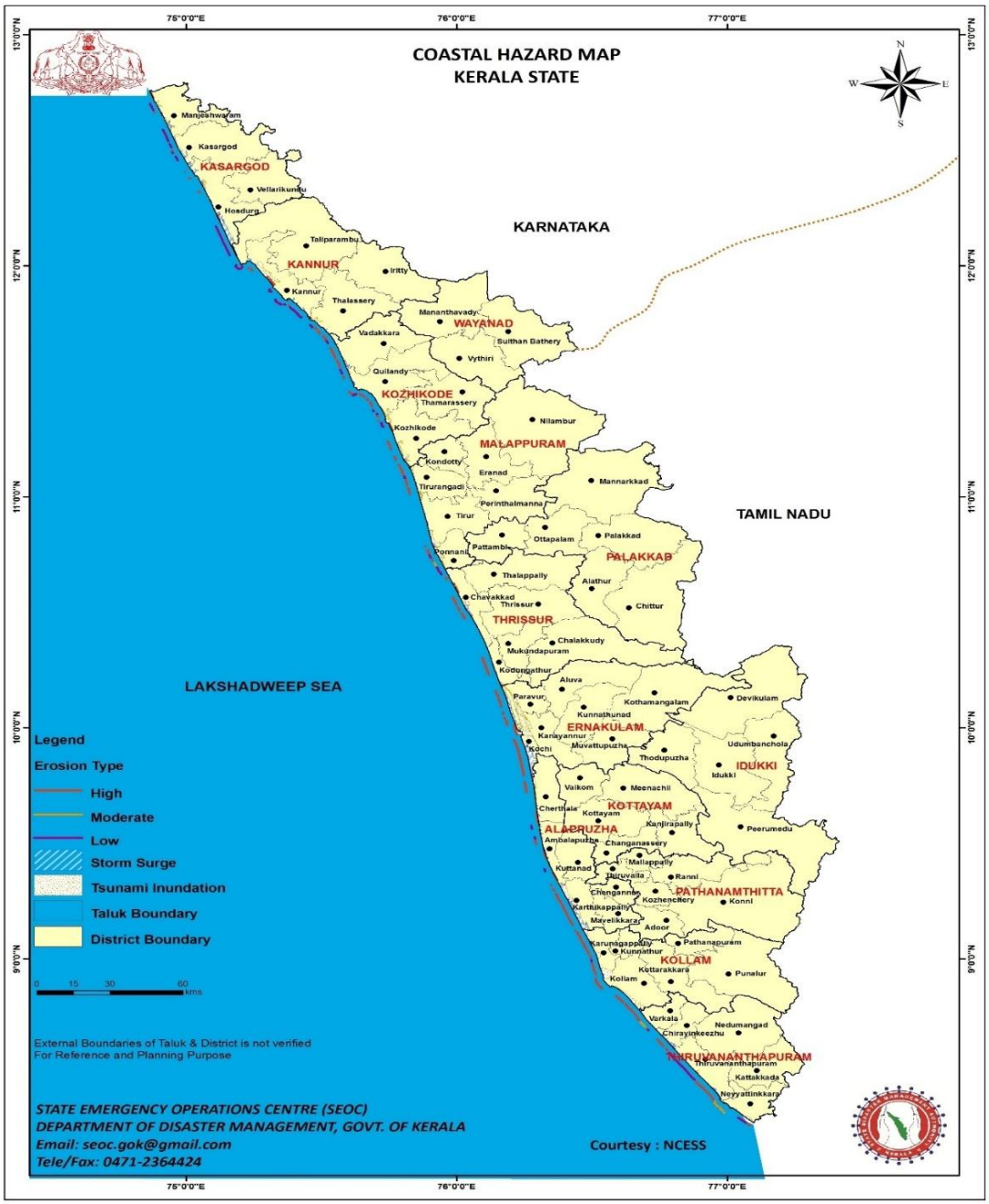


Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.4.7 Coastal Erosion

The 590 km coast of Kerala is one of the most densely populated land areas in the country. This coastline is exposed to high waves, storm surges, 'Kalla kadal' and Tsunami. These natural phenomena in turn results in rampant coastal erosion and consequent beach loss. Coastal erosion results in the loss of life and property of the coastal fisher population who are one of the most downtrodden communities of the state. One of the most apparent losses of property is the damages that come about to the dwelling spaces of the fisher population. Every year hundreds of houses are damaged due to coastal erosion.

Coastal Erosion Map of Kerala

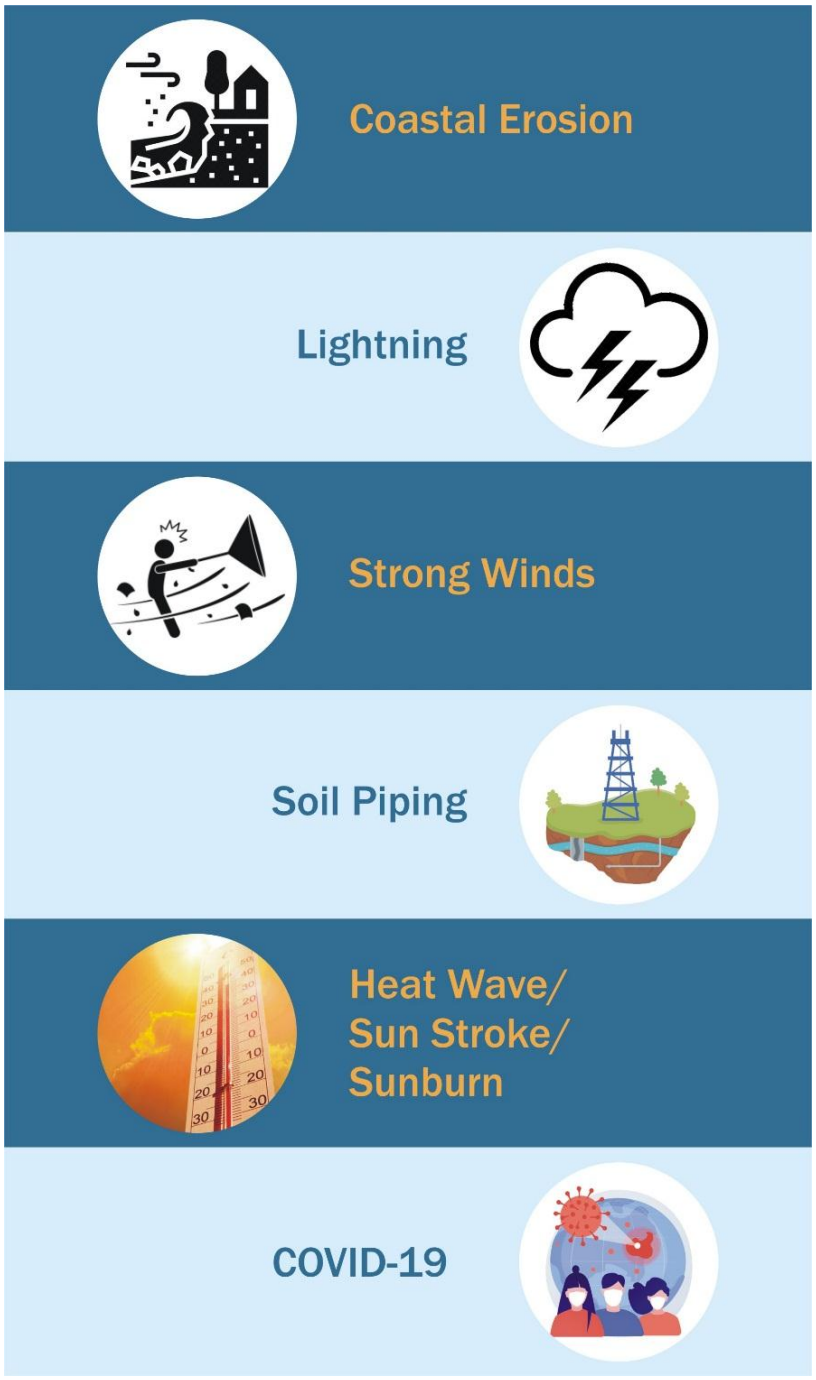


Source: Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.5 List of State Specific Disasters

State specific disasters are those which have been notified by the State Government as falling within the local context for which expenditure on relief measures will be available from State Disaster Relief Fund (SDRF). The disasters like coastal erosion, lightning, strong winds, soil piping, heat wave/Sun stroke/ sunburn have all been declared as state specific disasters, according to notifications issued by the office of the Special Relief Commissioner (SRC).

Similarly, in the wake of the COVID-19 outbreak, the Government of India (GoI) has decided to treat COVID-19 as a notified disaster and has permitted the use of State Disaster Response Fund (SDRF) and has partially modified the norms of assistance from SDRF.



For more information, please visit: https://sdma.kerala.gov.in/notified-disasters/

4.6 Major Anthropogenic Hazards in Kerala[3]

4.6.1 Stampedes

Most of the temples, churches and mosques in Kerala organize annual prayers as festivals. These festivals attract huge crowds even at village level and thus have potential for occurrence of stampedes. Sabarimala pilgrimage, Attukal Ponkala and Thrissur Poram are a few among the major religious gatherings in Kerala. Apart from the religious worships, many of the festivals organize entertainment programmes, free food distribution and pyrotechnic works. Thus the venues of religious festivals become the loci for worship, entertainment and business attracting people from various religious backgrounds. The Temple festivals in Kerala also engage elephants for colorful processions and other rituals. Two major stampedes have occurred in the state in the past, they being Human stampede at hilltop near Pampa at Sabarimala in 1999 which killed 52 pilgrims and stampede on Makarajyothi day at Sabarimala in 2011 which killed 102 pilgrims.

4.6.2 Fire Cracker Explosions

Pyrotechnic displays are colorful attractions of many festival events. The attractive displays can be lethal if adequate precautionary measures are not taken. Fire and explosion at pyrotechnic production units and display points at festivals may develop as source of accidents during mass gatherings. Carelessness, negligence and ignorance from the part of organizer and firework handler can cause fatal accidents. Many casualties have been reported in Kerala related to firework accidents at religious mass gatherings. Illegal storage, manufacturing, usage, unauthorized display agents, ignorance of safety measures etc. were the main causes in previous disasters.

Puttingal Devi Temple Tragedy

On 10 April 2016 at approximately 03:30 AM IST, the Puttingal Temple in Paravur, Kollam, Kerala, India, experienced an explosion and fire after firework celebrations went awry. As a result, 111 people were killed and more than 350 were injured, including some with severe burns. The temple and at least 150 houses in the area of the temple were damaged by the blast. According to local reports and eyewitnesses, the explosion and fire were caused by sparks from a firecracker being used in a competitive fireworks display igniting fireworks in a concrete storehouse.

4.6.3 Petro-chemical Transportation Accidents

Towards the end of 2009, an accident involving a LPG tanker at Karunagapally in Kollam claimed the lives of 12 people. In 2012, 20 people lost their lives when a LPG tanker overturned at Chala in Kannur. In the first 9-month period of 2014, around 20 accidents involving tankers happened in Kerala. Most of the accidents are reported from Malappuram, Kannur and Kozhikode districts due to the frequent transport of petro-chemicals from Mangalore to Kochi. Another hotspot of tanker accidents is the National Highway between Kayamkulam (Alappuzha district) and Karunagapally (Kollam district).

[3] Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

4.6.4 Industrial Accidents

There was toxic release of Cyclohexa-Pentadiene in 1985 in Kochi which affected more than 200 persons. In 2004, a toluene fire was reported from a toluene factory in Ernakulam district. On 24th October 2014, Ammonia leaked from an ice factory near Mattanchery, Ernakulam district. Most of the industrial accidents are primarily due to lack of periodical maintenance of tanks storing gas and the pipelines attached to it. On 21st May 2016, ammonia gas leakage from a barge at Champakara was spotted near Thaikkudam, Vyttila, Ernakulam district. The gas was being taken from Willingdon Island to the factory of Fertilizers and Chemicals Travancore Limited at Eloor via canal. The barge had 96 tons of ammonia. Public within 1 km radius of the leak was evacuated as a precautionary measure and the leakage was later contained. The map below shows the major industrial hazard susceptibility map of Kerala. Besides, a number of small- and large-scale industries are also established in the state which also has the potential to cause a chemical disaster.

4.6.5 Accidental Drowning

Drowning is the second biggest accident killer in Kerala, next to road accidents. According to National Crime Records Bureau about 15.2% of unnatural deaths in Kerala are due to drowning. More than 1,500 people die per year in drowning, which is the highest in India.

4.6.6 Road Accidents

Kerala has eight National Highways which run for about 1523.954 km and 77 State highways which have a length of 3435.717 km. Road traffic in Kerala has been on a rise at a rate of 10 to 11% per year while the carrying capacity of the roads has not increased accordingly due to shortage in availability of land. As per available data, the total number of accidents registered in Kerala in 2015 was 39,014. In 2013 and 2014, around 35,215 and 36,282 accidents were reported in the state. As many as 4,196 people lost their lives in accidents in 2015, while 4,049 perished in 2014. The data till January 2016 has revealed that as many 420 people lost their lives in around 3,688 accidents. Kerala is the third highest in the country in terms of road accidents. Experts point out that unscientific road building and ineffective traffic control system in the state has kept the number soaring. The Public Works Department has identified 216 black spots.

4.7 Early Warning Systems in Kerala

Early Warning Systems for the following phenomena have been set up in Kerala.

Phenomena	Monitoring	Prediction
Weather	Rainfall, Temperature, Wind and Lightning are the phenomena that State Emergency Operations Centre (SEOC) closely monitors on a daily basis. The primary monitoring system of Kerala is that established by India Meteorological Department. This includes 21 Automated Weather Stations, 5 Automated Rain Gauges, 68 Manual Rain Gauges and 2 Doppler Radars. In addition to these, the State Emergency Operations Centre has also	The primary extreme weather event alerts of the State is that of India Meteorological Department. IMD provides colour coded alerts regarding rainfall intensity, amount and expected area to be affected in a district scale. IMD also provides impact-based alerts for Thiruvananthapuram and Kochi City Corporations. In addition to these, the State Emergency Operations Centre has also sourced the Dangerous Thunderstorm Alert from M/S Earth Networks and hyper local weather

Phenomena	Monitoring	Prediction
	sourced the live weather monitoring data from M/S Skymet from the year 2020. M/S Skymet has 94 Automated Weather Stations in Kerala (GO (Rt) No. 531/2020/DMD dated 19-6-2020).	predictions from M/S IBM The Weather Company. M/S Skymet also provides predictions. These predictions are integrated into the decision support system of SEOC. The outputs from the private weather companies are sourced only for experimental purposes. If found useful, these predictions will be utilised for warnings after the technical examination of a technical committee and approval of State Executive Committee (GO (Rt) No. 531/2020/DMD dated 19-6-2020).
Sea State	Sea State and tides are monitored by Indian National Centre for Ocean Information Services (INCOIS).	Prediction and alerts of wave height, tides and Storm Surge are provided by INCOIS.
Rivers	River flows are monitored by Central Water Commission at 38 locations in the State.	Flood forecast is made available by Central Water Commission at the locations monitored with reference to Current Level, Warning Level, Danger Level and Trend of flow at the site.
Reservoirs	Kerala has 20 number of major reservoirs under Irrigation Department, 18 number of major reservoirs under Kerala State Electricity Board and two reservoirs under Kerala Water Authority. They are monitored concurrently and data is given in public domain.	---
Cyclone	Cyclone monitoring in Kerala is provided by the Cyclone Warning Centre, Thiruvananthapuram of India Meteorological Department. The Centre also provide warnings about low pressure systems that develops in the Arabian Sea and Bay of Bengal which may turn dangerous to the fishermen of Kerala.	----
Earthquake	There are two broadband digital seismographs in Kerala, one at Peechi. Thrissur district owned and operated by National Centre for Earth Science Studies and the second one at Thiruvananthapuram owned and operated by India Meteorological Department. The Kerala State Electricity Board and KSEOC co-owns a network of seismographs in Idukki which are maintained by KSEB. Critical Earthquakes of >3 Magnitude are	---

Phenomena	Monitoring	Prediction
	monitored by the National Centre for Seismology and provides near real time data.	
Tsunami	Indian National Centre for Ocean Information Services provides the Tsunami Warnings for Kerala.	---

Source: https://sdma.kerala.gov.in/early-warning-systems/

External References and Reading Material Related with Chapter 4:

1. Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf
2. Kerala State Disaster Management Plan Profile, Kerala State Disaster Management Authority, Government of Kerala, http://www.kerenvis.nic.in/WriteReadData/UserFiles/file/49412317-Kerala-Disaster-Management-Plan-Profile-India.pdf
3. Vulnerability Atlas of India, Third Edition (2019). Building Materials and Technology Promotion Council (BMTPC), https://bmtpc.org/topics.aspx?mid=56&Mid1=180
4. The World Bank (2019), Resilient Kerala Program, http://documents1.worldbank.org/curated/en/428421551979689773/pdf/Concept-Program-Information-Document-PID-Resilient-Kerala-Program-P169907.pdf

5. Introduction to IRS and IDRN

Learning objectives of this chapter

- To introduce the mechanism of Incident Response System (IRS) to the reader
- To provide an overview of the India Disaster Resource Network (IDRN) to the reader
- To highlight the various voluntary mechanisms related with DRR in Kerala including Inter-Agency Group (IAG) and Samoohika Sannadha Sena.

At the end of this chapter, the reader should be able to:

- Understand the need for Incident Response System (IRS)
- Understand how the India Disaster Resource Network (IDRN) works
- Understand how Emergency Response Teams (ERTs) are constituted and their functions.

Key concepts discussed in this chapter

- **Incident Response System (IRS):** The Incident Response System (IRS) is an effective mechanism for reducing ad-hoc measures in response. It envisages a composite team with various Sections to attend to all the possible response requirements. The IRS designates officers to perform various duties and get them trained in their respective roles. It also emphasizes the need for proper documentation of various activities for better planning, accountability and analysis. This will greatly help in reducing chaos and confusion during the response phase. Everyone will know what needs to be done, who will do it and who is in command.
  Kerala State has notified incident response system upto Taluk level vide GO (Rt) No. 280/2019/DMD dated 9-5-2019 and has been laid in the Orange Book of Disaster Management 2 – Monsoon Preparedness and Response Guidelines.

- **India Disaster Resource Network:** India Disaster Resource Network (IDRN) is one of the initiatives under the GOI-UNDP Disaster Risk Management Programme for disaster reduction. It is a nation-wide electronic inventories of essential and specialist resources for disaster response both specialist equipment and specialist manpower resources. The IDRN lists out the equipment and the resources by type and by the functions it performs, and it gives the contact address and telephone numbers of the controlling officers in-charge of the said resources so that the equipment can be promptly mobilized. The IDRN is a live system providing for updating of inventory every year.

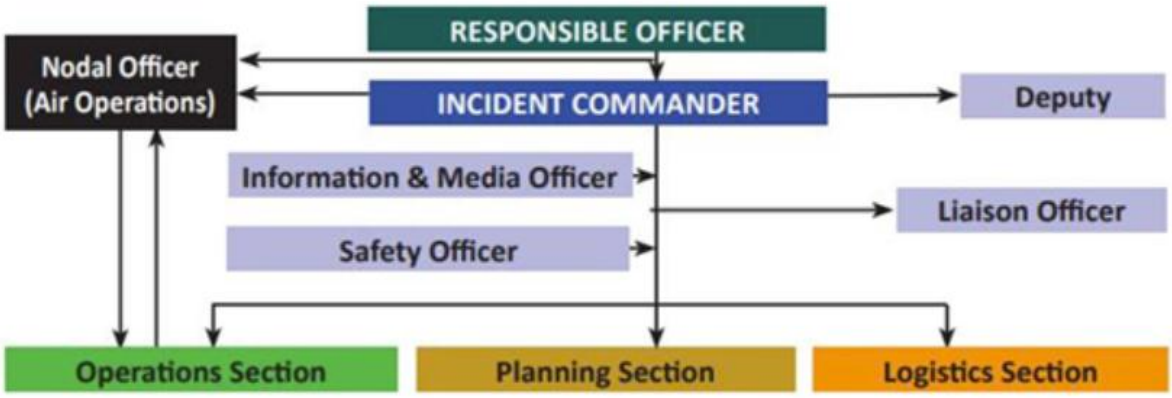
- **Inter-Agency Group (IAG):** Under Section 22 (2) (f), Section 24 (j), Section 30 (xiii) and Section 30 (xxvii) of the Disaster Management Act, 2005 involvement of Non-Governmental Organisations (NGOs) in Disaster Management is essential and a requirement. Hence Kerala has formed Inter Agency Groups (IAG) as a collaboration platform for non-governmental agencies functioning in the State. All Districts have notified Inter Agency Groups in the Districts and ensure close engagement with Non-Governmental Agencies and Civil Society Organisations (CSOs).

5.1 Incident Response System (IRS)

The Incident Response System (IRS) is an effective mechanism for reducing ad-hoc measures in response. It envisages a composite team with various Sections to attend to all the possible response requirements. The IRS designates officers to perform various duties and get them trained in their respective roles. It also emphasizes the need for proper documentation of various activities for better planning, accountability and analysis. This will greatly help in reducing chaos and confusion during the response phase. Everyone will know what needs to be done, who will do it and who is in command.

IRS Organisation

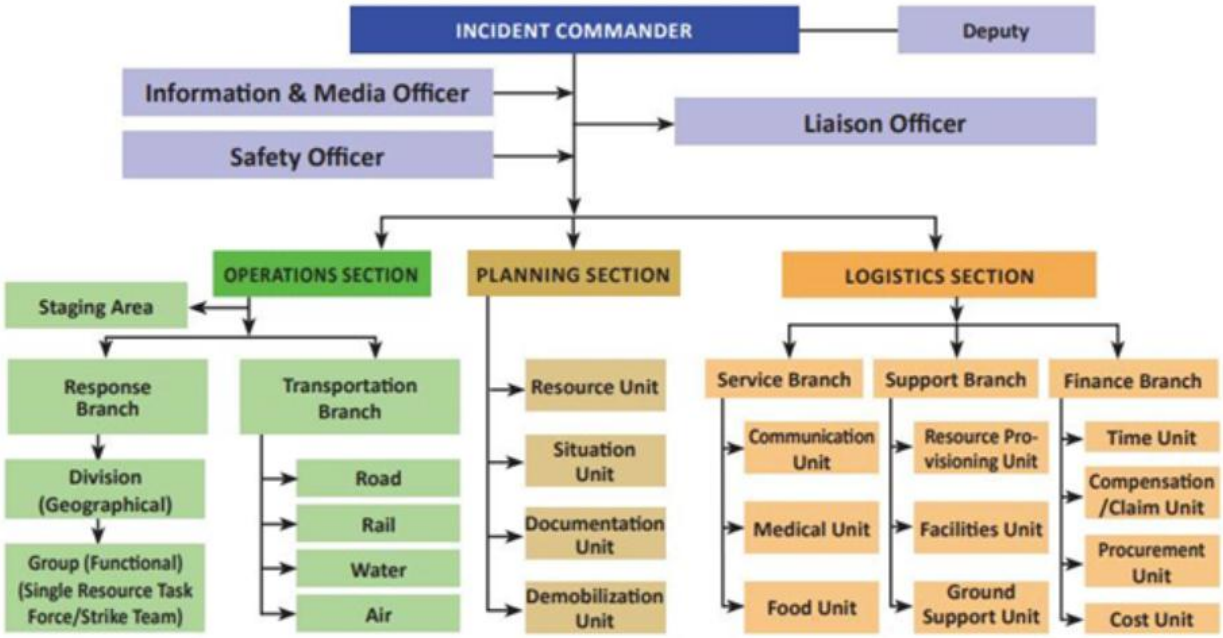
The broad organization of IRS is as under:



Responsible Officers (ROs) have been designated at the State and District level as overall in charge of the incident response management. The Responsible Officer may delegate responsibilities to the Incident Commander (IC), who in turn will manage the incident through Incident Response Teams (IRTs).

Incident Response Teams

The IRT is an entity comprising of all positions of IRS organisation headed by the Incident Commander as shown in the figure below. The Operations Section helps to prepare and execute different tactical operations required in response to the disaster. The Planning Section helps in obtaining information and preparing plans as required. The Logistics Section assesses the availability and requirement of resources and takes action for obtaining them. IRTs will function at State, District, Sub-Division and the Tehsil / Block levels. The IRTs will be pre-designated at these levels and on receipt of Early Warning, the corresponding Responsible Officer will activate them. In case a disaster occurs without any warning, the local IRT will respond and contact the Responsible Officer for further support, if required.



Kerala State has notified incident response system upto Taluk level vide GO (Rt) No. 280/2019/DMD dated 9-5-2019 and has been laid in the Orange Book of Disaster Management 2 – Monsoon Preparedness and Response Guidelines.

The IRS at the State level is notified herein under. The District Disaster Management Authorities shall notify the IRS at District and Taluk level. It is necessary to ensure that such IRS training is provided to officers upto Taluk level for management of emergencies. KSDMA will provide training on IRS to the IRS notified officers every year in the month of April-May. The officers with designated functions for IRS at the State and District Level will be:

State Level		
Sl. No.	**IRS Designation**	**Officer**
1.	Responsible Officer (RO)	Chief Executive Officer of SDMA (Chief Secretary)
2.	Incident Commander (IC)	State Relief Commissioner (Principal Secretary, DM)
3.	Alternate Incident Commander (AIC)	One of the members of the State Executive Committee as decided by the RO to replace IC after 8 hours of continuous work
4.	Deputy Incident Commander (DIC)	Commissioner Land Revenue or Secretary level officer nominated by IC based on need from time to time
5.	Operations Section Chief (OSC)	Additional Director General of Police nominated by State Police Chief
6.	Logistics Section Chief (LSC)	Additional Transport Commissioner nominated by Transport Commissioner
7.	Planning Section Chief (PSC)	Director, Fire and Rescue Services nominated by Director General, Fire & Rescue Services
8.	Liaison Officer (LO)	Head, State EOC (Alternated by the Chief Manager, SDMA after 8 hours of continuous work)

9.	Safety Officer (SO)	Additional Director, Health Services nominated by Director, Health Services
10.	Media Officer (MO)	Additional Director, I & PRD nominated by Director, I & PRD
11.	Information Officer (IO)	Hazard and Risk Analyst, SEOC [Alternated by Hazard Analyst (IT) by 8 hours of continuous work]
District Level		
Sl. No.	**IRS Designation**	**Officer**
1.	Responsible Officer (RO)	Chairperson, DDMA (District Collector)
2.	Incident Commander (IC)	Chief Executive Officer, DDMA (Deputy Collector, DM/ADM)
3.	Deputy Incident Commander (DIC)	Assistant Development Commissioner (General) or District Planning Officer
4.	Operations Section Chief (OSC)	A Dy. SP nominated by District Police Chief
5.	Logistics Section Chief (LSC)	Regional Transport Officer nominated by RO
6.	Planning Section Chief (PSC)	Assistant Divisional Fire Officer nominated by District Fire Officer
7.	Safety Officer (SO)	A Medical Officer nominated by District Medical Officer
8.	Media Officer (MO)	Information Officer (I & PRD) nominated by District Information Officer
9.	Liaison Officer (LO)	Junior Superintendent, Natural Calamity
10.	Information Officer (IO)	Hazard Analyst, DEOC
Taluka Level		
Sl. No.	**IRS Designation**	**Officer**
1.	Responsible Officer (RO)	Deputy Collector or equivalent nominated by Chairperson, DDMA
2.	Incident Commander (IC)	Tahasildar of the Taluk
3.	Deputy Incident Commander (DIC)	Block Development Officer nominated by Assistant Development Commissioner
4.	Operations Section Chief (OSC)	A Circle Inspector of Police nominated by District Police Chief
5.	Logistics Section Chief (LSC)	Motor Vehicles Inspector nominated by Regional Transport Officer
6.	Planning Section Chief (PSC)	Station Officer, Fire and Rescue Services nominated by District Fire Officer
7.	Safety Officer (SO)	A Medical Officer nominated by District Medical Officer
8.	Media Officer (MO)	Information Officer nominated by District Information Officer (I & PRD)
9.	Liaison Officer (LO)	A suitable Village Officer equivalent from the Taluk Office nominated by Tahasildar
10.	Information Officer (IO)	A suitable Village Officer equivalent from the Taluk Office nominated by Tahasildar

5.2 India Disaster Resource Network

When disasters strike, the disaster managers at the district/ State level respond with the resources at their command. The difficulty is that while the Disaster Manager (District Magistrate/ Collector) is generally aware of the resources at his command in the district, he is not aware of the resources available in the neighbouring districts within the State or in the neighbouring States. The disaster manager at the State level [the Relief Commissioner] does not have an inventory of resources available within the State. Therefore, all the resources available within the State are not brought to bear for saving lives, and when some specialist equipment is required, there is a lack of knowledge as to the whereabouts of the equipment either in the neighbouring district or in the neighbouring State. Lives can be lost because of such delays/ lack of required resources. The IDRN addresses this lacuna in our disaster management system.

India Disaster Resource Network (IDRN) is one of the initiatives under the GOI-UNDP Disaster Risk Management Programme for disaster reduction. It is a nation-wide electronic inventories of essential and specialist resources for disaster response both specialist equipment and specialist manpower resources. The IDRN lists out the equipment and the resources by type and by the functions it performs, and it gives the contact address and telephone numbers of the controlling officers in-charge of the said resources so that the equipment can be promptly mobilized. The IDRN is a live system providing for updating of inventory every year.

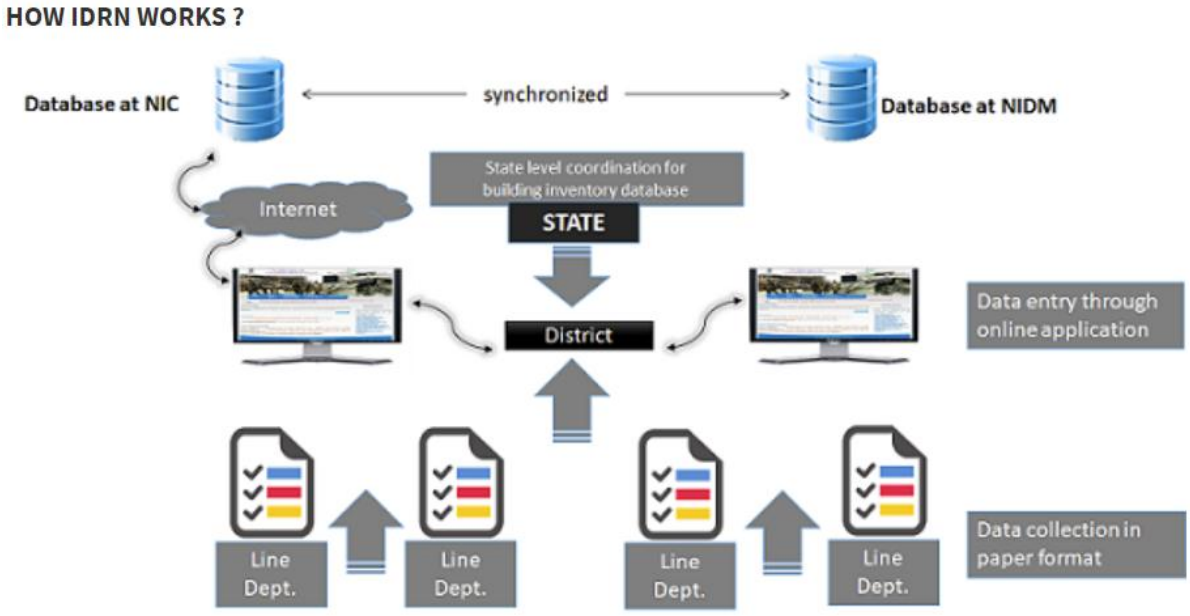
Entries into the inventory are made at two levels – district and State level.

The Objectives of IDRN are:
To collect and collate information on resources available in the country for emergency response. –
To enhance the decision-making capabilities of Government functionaries in quick response to emergencies.

IDRN is accessible to the Emergency officers, District Collectors, Relief Commissioners and other disaster managers at various levels of Government.

The IDRN Network of Ministry of Home Affairs, Government of India provides a platform for creating and updating district wise database of emergency response equipment. Kerala has till date uploaded information regarding 1905 equipment covering all 14 districts. The database is accessible for public at www.idrn.gov.in. SEOC has dedicated human resource with expertise in managing the IDRN platform.

IDRN is a nation-wide electronic inventory of resources that enlists equipment and human resources, collated from districts, states and national level line departments and agencies. IDRN is a web based platform, for managing the inventory of equipment, skilled human resources and critical supplies for emergency response. Primary focus of IDRN portal is to enable the decision makers to find answers on availability of equipment and human resources required to combat any emergency situation. This database will also enable them to assess the level of preparedness for specific disasters.



The online inventory of resources is hosted in the National Informatics Centre (NIC), New Delhi. Only the authorized Government officers have the access to uploaded data in the portal and the district authorities are the officials for facilitating data collection and updation. Data is monitored and maintained at the central level by National Institute of Disaster Management (NIDM). Besides, NIDM is responsible for the overall administration of the portal.

Update Data in IDRN?

District Collectors/Magistrate are the authorized officials to get the latest information about disaster management resources available with various line departments/agencies and uploaded in the portal, using services of District Informatics Officers.

IDRN Portal ID: https://idrn.nidm.gov.in/Home

5.3 Inter-Agency Group

Under Section 22 (2) (f), Section 24 (j), Section 30 (xiii) and Section 30 (xxvii) of the Disaster Management Act, 2005 involvement of Non-Governmental Organisations in Disaster Management is essential and a requirement. Hence Kerala has formed Inter Agency Groups (IAG) as a collaboration platform for non-governmental agencies functioning in the State. All Districts have notified Inter Agency Groups in the Districts and ensure close engagement with Non-Governmental Agencies and Civil Society Organisations.

For more information, please visit: https://sdma.kerala.gov.in/interagency1/

5.4 Civil Defence

Civil Defence is a statutory entity under Civil Defence Act 1968. The Director General, Fire & Rescue Service is the Director General, Civil Defence of Kerala since 2009.

Understanding the requirements for creating a robust Civil Defence system, the State Disaster Management Authority, in the State Disaster Management Plan, 2016 identified 'Community based disaster risk reduction – formation, training and capacity building of civil defence force in districts' as a 5-year plan to be implemented in the period from 2017-22.

In line with the decision of SEC to activate Civil Defence, the Director General Fire and Rescue Services and the Member Secretary, KSDMA visited National Civil Defence College (NCDC), Nagpur on 8th and 9th November 2017. Following this visit a detailed implementation plan was prepared by KSDMA and Fire & Rescue Services and incorporated in the 'Report of the sub-group for Disaster Management constituted vide Order No. 300/2016/AGRI (W10)/SPB dated 21-10-2016 and Updated based on Member Level Discussion held on 6-06-2017 at State Planning Board as part of the 13th Five Year Plan of the State'.

Activation of Civil Defence was placed for the decision of the State Executive Committee held on 20-10-2016 and the Committee decided as follows "Home Secretary is entrusted to create a comprehensive plan for activating the Civil Defence Force and place the matter before the next State Executive Committee. The concept of First Responder shall in detail be examined and adapted to Kerala's specific needs as part of Civil Defence Force". An amount of Rs. 17 lakhs were provided to District Collector, Thrissur for the management of Civil Defence Institute vide Order No. DM/10/2009/SDMA dated 22/4/2017 of SDMA.

The State has vide GO (Ms) No. 132/2019/Home dated 30-8-2019 created Civil Defence under the Fire & Rescue Services. KSDMA provided Rs. 30 lakhs from its own plan funds vide Order No. DM/255/2015 in 2020.

Details of Civil Defence in Kerala may be found in https://www.cds.fire.kerala.gov.in/

5.5 Voluntary Mechanism or Samoohika Sannadha Sena

The potential of volunteers in emergency response was well understood in the floods of 2018. In light of the lessons learned post floods 2018, Hon'ble Chief Minister directed Kerala State Disaster Management Authority to establish a common platform for all volunteers and voluntary organisations in the State to work in tandem with Government functionaries.

Vide GO (Ms) No. 1/2020/GAD dated 1-1-2020 Government created Samoohika Sannadha Sena and established a directorate for the purpose. KSDMA launched the website https://sannadham.kerala.gov.in/ on 25-2-2020 soliciting registration from all civilians and organisations for joining the organisation. The website was handed over to the Directorate of Samoohika Sannadha Sena with effect from 31-3-2020.

Training modules were also facilitated by KSDMA. For details regarding Samoohika Sannadha Sena and their efforts during Covid19 and various other disaster situations please visit https://sannadhasena.kerala.gov.in/

5.6 Emergency Response Teams

The response phase in a disaster focusses on immediate and short-term needs after a disaster. In times of emergencies, it is the local community who will be of immediate help to the affected population and hence it is critical to train the community to prepare for disasters that may affect them. Adequate and appropriate training are needed to enhance their resilience to face natural as well as anthropogenic hazards. Moreover, the community has indigenous knowledge and relevant skills based on the terrain and circumstances they live in. Vide GO (MS) No. 156/2019/LSGD dated 4-

12-2019 all the local self-government bodies are directed to form the emergency response teams in their jurisdiction. There are four domains of emergency response teams viz. First Aid, Shelter management, Search-Rescue-Evacuation, Early Warning Dissemination. The community members, irrespective of gender, are selected and trained in these four thematic areas. The training content was developed by KSDMA and the trainings are being carried out by KILA for those who are already inducted into these teams.

External References and Reading Material Related with Chapter 5:

1. India Disaster Resource Network (IDRN),National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India,https://nidm.gov.in/pdf/iec/IDRN.pdf
2. Orange Book of Disaster Management 1, Standard Operations Procedures (SOP) & Emergency Support Functions Plan (ESFP), Kerala State Emergency Operations Centre (SEOC), Kerala State Disaster Management Authority (KSDMA), Department of Disaster Management, Government of Keralahttps://sdma.kerala.gov.in/wp-content/uploads/2020/06/Orange-Book-of-Disaster-Management-1-2020.pdf
3. Incident Response System (IRS), National Disaster Management Authority (NDMA), Government of India, https://ndma.gov.in/Capacity_Building/Ops_Comm/IRS#:~:text=The%20Incident%20Response%20System%20(IRS)%20is%20an%20effective%20mechanism%20for,trained%20in%20their%20respective%20roles
4. Handbooks by Kerala State Disaster Management Authority (KSDMA), https://sdma.kerala.gov.in/handbooks/

6. Brief Profile of the Fisheries Department

6.1 Background

Kerala, God's own country blessed with 590 km of rich coastline, 44 rivers and innumerable numbers of waterbodies plays an important role in ecological diversity sustenance and livelihood. Many species of fish, invertebrates, plants, algae and other aquatic living organisms occupy a wide variety of habitats along the vast coastline and associated waters. The aquatic biodiversity and fish wealth of Kerala sustain more than 10 lakh fisherfolk and supports numerous additional activities including commercial fishing, aquaculture, tourism, education, recreation etc. The growing population, diverse culture, and expanding economy will continue to place additional demands on the state's marine resources, and make management of these resources increasingly complex.

Kerala fisheries sector contributes around 1.58% to the total GDP and the export of marine products has set ever time record of Rs. 5919.02 Crores during the year 2017-18. Currently, there are 222 fishing villages in the marine and 113 fishery villages in the inland sector, where fishing and relative aspects provide livelihood to a vast majority of the population. The extent of inland water resources of Kerala is highly potential for expanding aquaculture.

The total fish production of Kerala in 2019-20 is 6.8 lakh metric tonnes with a contribution of 4.75 lakh metric tonne from marine sector and 2.05 lakh metric tonne from inland sector. But the growth momentum seen in 2018-19 did not continue in 2019-20. In 2018-19, the total fish production was 8.02 lakh metric tonnes. However, efforts are being made to improve the quality of fish seeds and as a consequence in 2019-20 the area utilised for fish farming in ponds has increased from 5325 ha to 5700 ha, number of cage culture units have increased from 80 to 1800, mussel farming units have increased from 2000 to 3500, recirculatory aquaculture system/aquaponics units have increased from 100 to 500, one paddy one fish farming area has increased from 1620 ha to 2500 ha and zero water exchange shrimp farming was carried out in 200 ha area.[4]

Major Development Schemes and Programmes

The Plan schemes of State Government under Fisheries sector in 2019-20 is broadly classified into the following –

1. Marine fisheries development
2. Inland fisheries development
3. PMMSY – CSS Scheme
4. Extension, Training and service delivery
5. Modernisation of fish markets and value addition
6. Social Security to fisherfolk
7. NABARD Assisted RIDF
8. Development of Fishing Harbours and management
9. Scheme for Kerala University of Fisheries and Ocean studies
10. Coastal Area Development

[4] Kerala State Planning Board, https://spb.kerala.gov.in/sites/default/files/2021-01/English-Vol-1.pdf

6.2 Aim and Vision of the Fisheries Department

Vision

Sustainable utilization and development of fisheries sector, both marine and inland aiming to the economic growth, food & nutritional security and for socio-economic development of fisher folk**.**

Aim

- Fish resource conservation and management
- Development of aquaculture, exploration of new fishing grounds, augmentation of fish production, and value addition in fish produce.
- Ensuring safe fishing
- Increasing livelihood opportunities
- Strengthening social security and welfare measures for fisher folk
- Facilitating improved post-harvest practices and value addition with industrial and market linkages.
- To ensure inclusive development and empower fishers and aqua farmers.

6.3 Organizational Structure of the Department

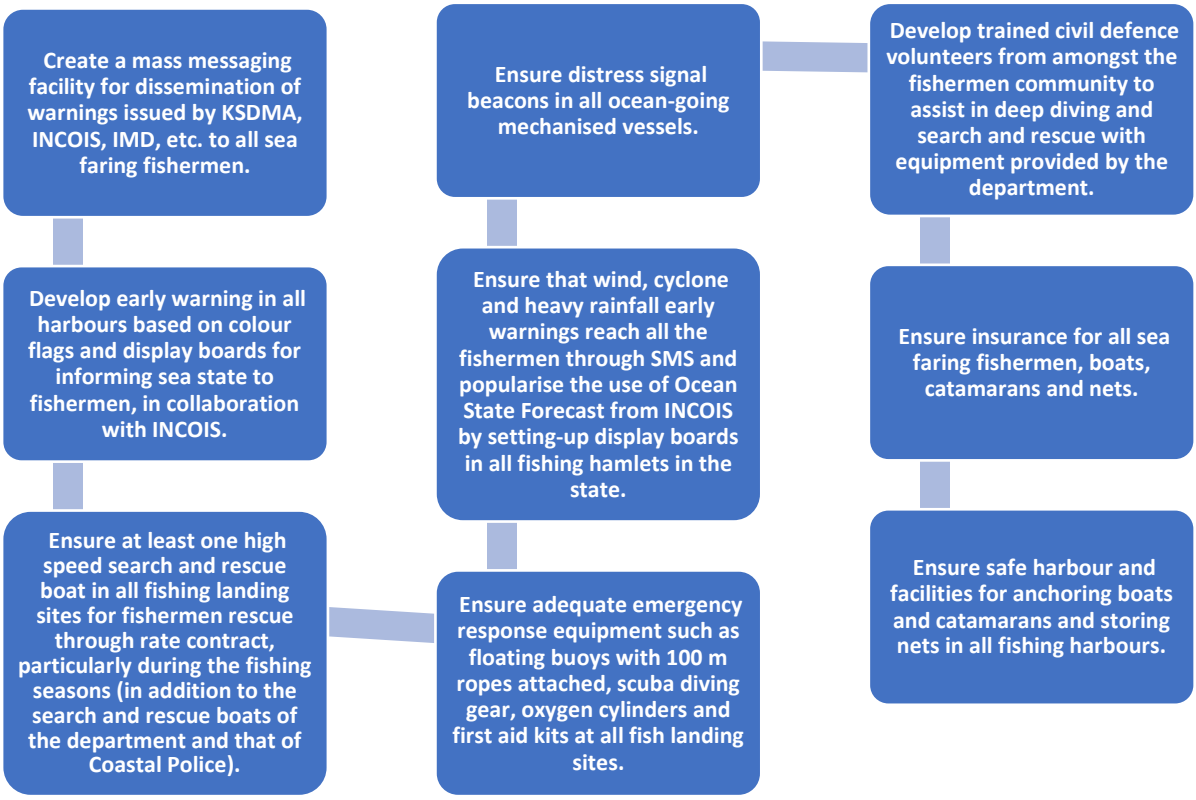
The department of Fisheries is headed by the Director of Fisheries. The Department of Fisheries in the state is structurally stratified and organised under the following Executive Officers.

State Level **Directorate of Fisheries**	Director of Fisheries Addl. Director of Fisheries
Zonal Level **Joint Directorate of Fisheries**	Joint Director of Fisheries (South/Central/North) - 3 Nos.
District Level **Dy. Directorate of Fisheries**	Asst. Director of Fisheries - 4 Nos Dy. Director of Fisheries - 10 Nos.
Panchayat Level **Matsya Bhavans**	Matsya Bhavan Officers- 200 Nos.

Distribution of Departmental Offices Across Kerala

Sl. No.	Name of Office	Number of Offices
1.	Directorate Office	1
2.	District offices	14
3.	Zonal Joint Director Offices	3
4.	Fishery Stations	5
Total		**23**

6.3 Role of Department as mentioned in the State Disaster Management Plan (SDMP)



6.4 Role of Virtual Cadre as Defined in State Disaster Management Plan (SDMP)

The Kerala State Disaster Management Plan (SDMP) 2016 recommends that the State Government shall ensure that there is a professionally trained virtual cadre of officers in all the departments of the State for disaster management. The virtual cadre will principally be 15 selected individuals (one each in each district and one in the State level) with at least 20 years more of service left. The members of this virtual cadre shall be the departmental nodal officers for disaster management who shall be as individuals responsible for supporting the district and state disaster management authorities in disaster management. The KSDMA will ensure that these individuals are adequately trained in matters related to disaster management. These officers shall be trained in rapid damage assessment and certification in the respective sector. The disaster-specific nodal departments through this virtual cadre will ensure liaison and coordination with KSDMA and DDMAs in the smooth implementation of the departmental disaster management plan and with SEOC and DEOCs for ensuring coordinated response to events.

6.5 Alignment of Virtual Cadre with NDMP and SFDRR

The role of virtual cadre officials is determined through SDMP keeping in mind the Sendai Framework (2015-2030), the Disaster Management Act 2005, the National Disaster Management Policy, 2009, the Kerala State Disaster Management Rules, 2007 and the Kerala State Disaster Management Policy, 2010 and the National Disaster Management Plan, 2016. The National Disaster Management Plan 2016 lays down an excellent planning framework for India by aligning with the Sendai Framework for Disaster Risk Reduction 2015-2030, to which India is a signatory. The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the

Sendai Framework for Disaster Risk Reduction 2015-2030, to which India is a signatory. The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework. By 2030, the Sendai Framework aims to achieve 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. The NDMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for DRR. The framework states that to realize this outcome, it is necessary to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. These measures must cover various sectors such as:

Nodal Departments for various hazards

- Revenue and Disaster Management: Hydro-meteorological and Geological disasters
- Home: Road and rail accidents
- Health and Family Welfare: Chemical, biological, radiological and nuclear disasters.
- Factories and Boilers Department, Department of Industries and the Industry: Industrial accidents.
- Agricultural: Pest attacks
- Animal Husbandry: Cattle epidemics
- Water resources: Dam break
- Public works: Building collapse
- Forests: Forest Fire
- Airport: Air accidents

(Kerala SDM Policy, 2010)

- Economic
- Structural
- Legal
- Social
- Health
- Cultural
- Educational
- Environmental
- Technological
- Political
- Institutional

External References and Reading Material Related with Chapter 6:

1. Official website of Fisheries Department, Government of Kerala https://fisheries.kerala.gov.in/home-2
2. Kerala State Disaster Management Plan (2016) https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf

7. Mainstreaming Disaster Risk Reduction in Fisheries Department

Learning objectives of this chapter

- To introduce the points of entry for mainstreaming DRR into the department planning
- To provide an overview of the vulnerability of the fisheries department and sector in Kerala
- To highlight the various roles to be undertaken by the department in various phases of the DM cycle.

At the end of this chapter, the reader should be able to:

- Understand how to mainstream DRR into departmental planning and actions
- Understand the specific roles played by the department in the response, relief, mitigation and preparedness phases
- Understand how to make a departmental disaster management plan.

Key concepts discussed in this chapter

- **Impact of Various Hazards on Fisheries Sector**
  This section highlights the various natural and anthropogenic hazards that make the fisheries sector more vulnerable in Kerala. It is important to understand and address this vulnerability because about 10 Lakh fisherman in Kerala depend on aquatic biodiversity and abundance for their livelihoods.

- **Role of Department in DM Cycle**
  This section discusses the departmental disaster management plan by highlighting the various sections that need to be included in such a plan, viz. response, rehabilitation, mitigation, preparedness, knowledge management, etc.

Major Hazard	State level response needed by Fisheries Department
Flood	Lime and CIFAX, fish seed, feed procurement and supply to district in time.
Cyclone	-do-
Drought	Installation of tube well and bore well.
Tsunami	Lime and CIFAX, fish seed, feed procurement and supply to district in time, drinking water facility.
Tornado/Heat wave/Earthquake	Lime and CIFAX supply Request for sending expert from other state.
Industrial toxicity	Advice regarding specific antidotes to affected fishes.
Swell Surge	Lime and CIFAX, fish seed, feed procurement and supply to district in time, drinking water facility.

7.1 Vulnerability of the Fisheries Department to Various Hazards

i. Floods

Floods are characterized as any high stream flows which overlap natural or artificial banks of a river or a stream that leads to inundation. Sometimes copious monsoon rain combined with massive outflows from the rivers cause devastating flood. Flooding is caused by the inadequate capacity within the banks of the river to contain the high flows brought down from the upper catchment due to heavy rainfall.

Floods are one of the most common natural hazards in Kerala. The state is assailed by regular flooding which can cause a great deal of loss and damage to its productive fisheries sector. For instance, floods can cause wide spread loss and damage to fisheries tanks and ponds, fishermen houses, net and boats and fishing jetties. Infrastructure damage due to flood is a common phenomenon.

During the 2018 Floods in Kerala, inland capture fisheries and the aquaculture activities were badly affected. The combined loss for aquaculture and inland capture fisheries was INR 103 crore and damage, INR 84.5 crore. The loss for aquaculture was INR 88.7 crore and damages were INR 65.8 crore. The loss in inland capture fisheries was INR 10.6 crore and damage was INR 3.5 crore. Government-owned hatcheries, fish farms and field offices suffered losses worth INR 3.8 crore and damages worth INR 15.2 crore. The worst affected districts were Thrissur, Alappuzha, and Ernakulam. Most damages and loss were a result of breaches of bund, overflow, and damage to pumps and other farm equipment.[5]

ii. Cyclones

Although severe cyclones have been a rare occurrence in Kerala, yet they are not entirely unheard of. Though Kerala has had many instances of localised coastal cyclones, the state has relatively been free from severe cyclonic storms. For instance, Cyclone Okchi which left 75 people dead and 137 fishermen missing, and damaged around 3,600 houses -- is considered one of the deadliest cyclones to have hit the state, a Home Ministry report stated Ockhi was the fourth cyclonic storm to have developed over the Comorin Sea that lies to the south of Kanyakumari and to the west of Sri Lanka. Loss of lives of fishermen and fish farmers is compounded by the loss of fish crops and agricultural crops. The threat of cyclones is especially amplified on the fisheries sector in the coastal districts of Kerala.

iii. Droughts

The drought is a condition arising out of scarce rain fall. Kerala is vulnerable to moderate to severe droughts. Climate change is adding to the uncertainty and erratic nature of rainfall patterns, thereby amplifying the state's vulnerability to droughts. The prolonged drought situation reduces the water level in tanks and ponds which in turn affects the growth rate of fish and seed production.

iv. Fires

Most of the fishermen villages in Kerala are thickly populated. The houses are also made of straw, palm leaves and bamboos which are very much prone to fire. It has been noticed in

[5] Kerala Post Disaster Needs Assessment report, https://sdma.kerala.gov.in/wp-content/uploads/2019/03/PDNA-report-FINAL-FEB-2019_compressed.pdf

the past years even the entire fishermen villages were burned on fire causing wide spread loss of property and other domestic assets. Sometimes, the mechanized fishing vessels are also set on fire due to electrical short circuit and burst of Gas cylinder which causes much financial loss and loss of life of the crew members.

v. **Industrial Hazards**

Generally, most of the industries of our state are located near the river or sea. Apart from discharging a large quantum of industrial effluents these industries release lethal gases to the air and water bodies due to accident or normal process. It causes a serious health hazards on the lives of the fisher folk living near the shore areas as well as on the fishes. Release of toxic or noxious materials that can kill, damage or taint wild fish and aquaculture stocks, and represent a possible threat to human health. Moreover, the possible tainting or contamination of seafood products from industrial disasters may have serious impacts on market confidence, resulting in reduced demand in both local and overseas markets, which may be long-term unless handled intelligently.

vi. **Tsunami**

Although Tsunamis are a rare phenomenon in Kerala, they nonetheless represent a very real threat. The Indian Ocean Tsunami of 2004 became a very real reminder of this threat in Kerala. In particular, the tsunami caused loss of life and heavy damage on some parts of the Kerala coast in southwest India. The tsunami travelled west, south of Sri Lanka, and some of the tsunami energy was diffracted around Sri Lanka and the southern tip of India and moved northward into the Arabian Sea. Thus, such tsunamis can be devastating such events can be, in human, economic and environmental terms.

vii. **Swell surge**

Kallakadal/Swell surge are flash-flood events that take place without any noticeable advance change in local winds or any other apparent signature in the coastal environment. It is derived from a Malayalam word literally meaning 'sea-thief'. Kallakkadal event is considered as one of the major societal problems along the Indian coasts and these are caused by high swell waves, without any sign in the local winds, sometimes cause severe flooding.

7.2 Preparation of Departmental Disaster Management Plan

i. **Introduction**

The departmental disaster management plan should be comprehensive and spell out the roles of the departments that are responsible to manage the disasters related to them in each phase of the disaster (during normal times, pre-disaster, during and post-disaster phase).

ii. **Pre-disaster Phase**

Pre-disaster prevention and mitigation activities should be carried out with the normal staff while post-disaster rescue, relief and recovery will need outside resources. Normally in disaster management plans pre-disaster activities are ignored or given less importance. A brief outline of the activities to be undertaken are provided without clearly providing for

funds or spelling out the responsibilities. The mitigation plan should consist of the objectives and goals and the necessary strategy to be adopted along with a realistic time frame.

The sub-activities and the agencies responsible should also be mentioned in the plan. The plan should also identify the necessary policy and legal framework, which provides the agency the mandate to carry out such activities. If they need a new policy or a legal framework it should also be identified and the time frame with in which such a framework will be provided should also be worked out and mentioned in the plan. It is administrative orders wherever required should be issued.

The most important aspect of the mitigation plan should be provision of funds for the activity and how it will be provided. Disaster mitigation plan cannot be a stand-alone activity. The plan should also mention how mitigation will be integrated with the normal working of the ministry and the special programs or projects undertaken will be integrated with the normal activity of the ministry and made sustainable. The plan should also provide for a monitoring mechanism and monitoring indicators. The plan should also have a provision for evaluation and mid-term correction.

iii. Preparedness and post-disaster response

The second part of the plan should focus on the preparedness and emergency response. Preparedness is simply keeping the manpower and equipment required for response in a state of readiness. This manpower and equipment resource base should contain what is readily available with government and what should be requested from outside. As part of the preparedness measure the existing resources should be identified and augmentation of the same if required should also be worked out.

Training, capacity building and maintenance and responsible agencies should also be mentioned. The budget for the same should also be provided in the plan. The sources outside the government will include non-governmental agencies, private industrial houses, neighbouring states, volunteers and international community. The database of what is available in private with in the country; the list of NGOs with their expertise and details about mobilization of volunteers should also be part of the plan. Disasters are of two types, those that have a warning such as floods, cyclones etc., and those, which strike without warning such as earthquakes and flash floods etc.

Many disasters are of seasonal nature such as floods, cyclone etc. depending on whether a disaster is seasonal or not, the role and duties of the department should be worked out for pre-disaster stage. If the disaster has a prior – warning stage the various activities to be undertaken should be mentioned. For example, cleaning of drains or water channels before the rainy season or vaccination or immunization before rainy or flood season etc. If the disaster has a warning stage then the method of altering the administrative machinery, volunteers and the communities should be mentioned in the plan along with an evacuation plan if necessary.

The method of moving or shifting the response teams etc. near to the area where rescue is need should be pre identified. The main thrust area of the response portion of the plan is post-disaster search, rescue and relief. What should be done, who will do it, when and how

it will be done should be clearly covered in the plan. (If necessary one can use a matrix). Though this portion varies from ministry to ministry there are certain general details, which should be covered in every plan such as mobilization of resources, co-ordination with the EOC, reporting system etc. for the purposes of emergency response a SOP should be evolved which should become part of the plan. A matrix which spells out what should be done up to 72 hours starting from zero hour (the time of receipt of information about the disaster) with increasing time intervals starting from 15 mins will be of help.

Some of the annexure required are

- The hazard, vulnerability and risk map
- Contact numbers
- Details of outside resources

iv. Mock-drills and testing and revision and updating the plan

Periodic mock drills should be conducted, and the plan should be tested. The plan should be revised after each mock drill taking in to account the lessons learnt from the drill. Apart from the revision done the plan should also be updated on a periodic basis. An ideal plan should also contain details about when and how this plan will be tested and updated.

v. Contents required in Departmental Disaster Management Plans as per National Guidelines

Chapter 1: Prevention, Mitigation and Preparedness Plan

1. Brief profile of the department
2. Measures necessary for prevention of disasters, mitigation, preparedness and capacity building in accordance with the guidelines laid down by the National Authority and the State Authority.
3. Integration into its development plans and projects, the measures for prevention of disaster and mitigation in the departmental annual plan.
4. Provision of funds for prevention of disaster, mitigation, capacity- building and preparedness from the respective departmental budget head
5. Drawing up mitigation, preparedness and response plans, capacity-building, data collection and identification and training of personal in relation to disaster management
6. Review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness
7. Provision of emergency communication in the affected areas for the department
8. Such other actions as may be necessary for disaster management

Chapter 2: Response plan

1. Mechanism for early warning and dissemination thereof based on warnings issued by IMD, State Emergency Operations Centre or the District Control Rooms
2. Trigger Mechanism for response – who in the department will alert the concerned officers in the department and if alerted what triggers are to be initiated by the concerned officer
3. Response plan for responding effectively and promptly to any threatening disaster situation or disaster in accordance with the State plan, and in accordance with the

guidelines or directions of the National Executive Committee and the State Executive Committee and the State Government and the SDMA

4. Appointment of Nodal Officers to perform Emergency Support Functions (ESFs)/roles in emergency in the format already circulated by the State Government. Constitution of the incident Response Teams (IRTs) at all levels with provision of delegation of authority
5. Reporting procedures and formats
6. Role of NGOs and Voluntary Sector and coordination thereof
7. System of assessing the damage from any disaster
8. Roles and responsibilities and coordination mechanism for the department
9. Disaster Specific Response Plan – Response plan for major disasters such as earthquake, flash flood/cloud burst, snow avalanche, landslide etc. in which State level response would be needed
10. Identification of suppliers for departmental supplies and pre-contracting for supplies in case of emergencies

Sl. No.	Major Disaster	State level response needed
1.	Flood	Lime and CIFAX, fish seed, feed procurement and supply to district in time.
2.	Cyclone	-do-
3.	Drought	Installation of tube well and bore well.
4.	Tsunami	Lime and CIFAX, fish seed, feed procurement and supply to district in time, drinking water facility.
5.	Tornado/Heat wave/Earthquake	Lime and CIFAX supply Request for sending expert from other state.
6.	Industrial toxicity	Advice regarding specific antidotes to affected fishes.
7	Swell Surge	Lime and CIFAX, fish seed, feed procurement and supply to district in time, drinking water facility.

Chapter 3: Relief, Rehabilitation and Reconstruction

1. Norms of relief if applicable
2. Minimum Standards of relief
3. Rehabilitation Plan
4. Financial mechanism
5. Action plan for reconstruction – 'Building back better'
6. Please mention schemes of insurance and relief packages available in the department. Norms of the National /State Disaster Response Fund may be mentioned separately

Chapter 4: Knowledge Management

1. Documentation of losses in the animal husbandry & dairy sector for every department
2. Documentation of lessons learnt

3. Documentation of best practices and uploading of the same in the departmental websites

Chapter 5: Review, updating and Dissemination of Plan

1. DM Plan is a "living document" – would require regular improvement and updating – at least once a year
2. System of updating – who, when and how?
3. Dissemination of Plan to stakeholders – how? – Printing of document, uploading in departmental website, meetings, seminars etc.

Annexures

1. Important contact details – National, State, local level of the department etc.
2. Resource list (available with Department) with contact persons details (kindly follow IDRN Format) www.idrn.gov.in
3. Resources available with National Govt. level
4. Detailed Standard Operating Procedures (SOPs) for all phases of disasters – before, during and after
5. List of NGOs/INGOs/CBOs working in the field of the department
6. List of suppliers relevant for the department

7.3 Standard Operating Procedures for Fisheries Department

7.3.1 Roles and Responsibility of the Department

a. Awareness of people on precautionary measures/
b. Provision of both preventive and curative measures should be undertaken
c. Liaison with SRC / District authority for relief operation such as provision of input, medicine, fish feed etc.
d. Post facto disease surveillance in affected fish pond/ tank.
e. The mobile advisories will be utilized to inform and aware the fish farmers / fishermen.

7.3.2 Preparedness and Preventive Measures

Among the 14 districts of Kerala / Sub-division / Block / G.P./ Village those are prone for various disasters will be demarcated as (a) Flood prone (b) Drought Prone (c) Cyclone prone (d) Multi-disaster-prone area. Basing on the type of disaster the block level and district level officials will make a preliminary assessment of fisheries resources / fishing equipment /boat & net etc. every year in the prescribed format.

7.3.3 Pre-Disaster Planning (Preparedness)

Pre-disaster planning is crucial for ensuring an efficient response at the time of a disaster. A well planned and well-rehearsed response system can deal with exigencies of calamities and also put up a resilient coping mechanism, optimal utilization of scarce resources for rescue relief and rehabilitation during time of crisis is possible only with detailed planning and preparation.

- Fishes are affected with various diseases due to flood. Therefore, necessary medicines like CIFAX and lime are to be assessed before flood with the concerned District Fisheries Officers of flood prone areas, List of suppliers of medicines and lime should be available with the Department.

- Fish seed and feed scarcity is seen during flood. District fisheries officers should ensure to supply the same from non-affected district. If required, the same may be provided from outside State. Necessary collaboration should be made with District Administration for transportation and distribution of fish seed, medicines, lime and feed to the affected fish farmers.

7.3.4 Information, Communication and Education Activities

IEC materials are to be prepared and distributed to public regarding measures to be taken in case of disaster. The community volunteers be trained regarding carcass disposal. Awareness meeting be organized in disaster prone villages by the Fisheries Officers/ NGOs / CBOs to discuss the steps to be taken in case of disaster with the fisheries activities. The fish farmers are instructed to strengthen their pond embankment and liming of ponds for prevention of diseases. The fishermen are advised to shift their fishing equipment to a safer place.

7.3.5 During Disaster (Response)

- Assessment of loss/ damage
- Rescue of fish farmers/ fishermen
- Memorandum will be prepared for submission to Special Relief Commissioner
- The influx of flood water which is rich in nutrients and organic matter make the pond water either acidic or alkaline
- The entry of heavy suspended solid along with pollutant make pond water un suitable for pisciculture and invite disease problem
- Entry of flood water causes the pond water in hospitable for survival and growth of fish
- biomass
- Entry of flood water brings many unwanted weed fishes as well as predatory fishes which affect fish growth
- The natural calamity some time breached out the pond dyke and wash away the entire fish stock which creates severe loss to fish farmers
- Natural calamity sometimes take the life of those are residing near the farm side and sea shore and especially the Marine fishermen
- The compensation amount should be disbursed
- Loss and damaged to infrastructure should be restored
- Lesson learnt will be documented for introspection
- Reconstruction Action Plan will be prepared for rehabilitation of fishermen

7.3.6 Post-Disaster

- Role of PFCS's/ NGO's/SHG's/ Voluntary Sector and coordination thereof
  a) Community mobilization
  b) Awareness Programme
  c) Caracas disposal
  d) Distribution relief
- Systematic assessment of the damage from any disaster by statistical enumerator and Revenue Officials etc.
- Providing logistical and operational support for coordination of department in the aftermath of a disaster

External References and Reading Material Related with Chapter 7:

1. Orange Book of Disaster Management – Kerala, Standard Operating Procedures & Emergency Support Functions Plan Kerala (2019), Kerala State Emergency Operations Centre (SEOC), Kerala State Disaster Management Authority, Department of Disaster Management, Govt. of Kerala https://sdma.kerala.gov.in/wp-content/uploads/2019/08/Orange-Book-of-Disaster-Management-1-2019.pdf

2. Kerala Post Disaster Needs Assessment report, https://sdma.kerala.gov.in/wp-content/uploads/2019/03/PDNA-report-FINAL-FEB-2019_compressed.pdf

8. Financial Arrangements

As per the sub-section (2) of Section (40) of the DM act, every department of the state government while preparing the Departmental Disaster Management Plans shall make provision for financing the activities specified therein.

8.1 State Disaster Response Fund (SDRF)

As per the provisions of Disaster Management Act, 2005 sub-section (1)(a) of Section (48) and based on the recommendation of the 15th Finance Commission, the Government of Odisha has constituted the State Disaster Response Fund (SDRF) replacing the Calamity Relief Fund (CRF). The amount of corpus of the SDRF determined by the 15th Finance Commission for each year the Finance Commission period 2015-20 has been approved by the Central Government. The Central Government contributes 75% of the said fund. The balance 25% matching share of contribution is given by the State Government. The share of the Central Government in SDRF is released to the State in 2 instalments in June and December respectively in each financial year. Likewise, the State Government transfers its contribution of 25% to the SDRF in two instalments in June and December of the same year.

As per the Guidelines on Constitution and Administration of the State Disaster Response Fund (SDRF) laid down by the Ministry of Home Affairs, Government of India, the SDRF shall be used only for meeting the expenditure for providing immediate relief to the victims of cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst and pest attack. The State Executive Committee (SEC) headed by the Chief Secretary, SEC decides on all matters connected with the financing of the relief expenditure of immediate nature from SDRF.

8.2 National Disaster Mitigation Fund

As per Section 47 of the DM Act 2005, Central Government may constitute a National Disaster Mitigation Fund for projects exclusively for the purpose of mitigation. This Section has not been notified by the Government so far. As mentioned earlier, the FC-XV restricted its recommendation to existing arrangements on the financing of the already constituted funds (National Disaster Response Fund and State Disaster Response Fund) only, as per its terms of reference. The FC-XV did not make any specific recommendation for a mitigation fund.

8.3 Recommendations of the Fifteenth Finance Commission

In regard to grants for disaster management, Fifteenth Finance Commission (FC-XV) has the following recommendations:

- Mitigation Funds should be set up at both the national and State levels, in line with the provisions of the Disaster Management Act. The Mitigation Fund should be used for those local level and community-based interventions which reduce risks and promote environment-friendly settlements and livelihood practices.
- For SDRMF, XVFC has recommended the total corpus of Rs. 1,60,153 crore for States for disaster management for the duration of 2021-26, of which the Union's share is Rs. 1,22,601 crore and States' share is Rs. 37,552 crore.

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

8.4 Allocation by Ministries and Departments

Section 49 provides for Allocation of funds by Ministries and Departments. It states that:

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

(2) The provisions of sub-section (1) shall, mutatis mutandis, apply to departments of the Government of the State."

8.5 Flexi Funds as Part of Centrally Sponsored Schemes (CSS)

Flexi Funds as a part of Centrally Sponsored Schemes As per Department of Expenditure, Ministry of Finance, O.M No. 55(5)/PFII/2011 dated 6.1.14, all Central Ministries shall keep at least 10% of their Plan budget for each CSS as flexi-fund (except for schemes which emanate from a legislation or schemes where the whole or a substantial proportion of the budgetary allocation is flexible). In the year 2016, as per the instructions of the NITI Aayog, Government of India vide its O.M dated 06.09.2016 have raised flexi-funds available in each CSS to 25% of the overall annual allocation under each scheme. States may use the flexi-funds for the CSS to meet the following objectives:

a) Provide flexibility to States to meet local needs and requirements within the overall objective of each program or scheme;
b) Pilot innovations and improve efficiency within the overall objective of the scheme and its expected outcomes;
c) Undertake mitigation /restoration activities in case of natural calamities in the sector covered by the CSS;

External References and Reading Material Related with Chapter 8:

1. Disaster Management Act (2005), https://www.ndmindia.nic.in/images/The%20Disaster%20Management%20Act,%202005.pdf
2. Fifteenth Finance Commission Report, https://fincomindia.nic.in/ShowContent.aspx?uid1=3&uid2=0&uid3=0&uid4=0&uid5=0&uid6=0&uid7=0

9 Consolidated List of Resources

1. Kerala State Disaster Management Authority (KSDMA) Template: Departmental Disaster Management Plan.https://sdma.kerala.gov.in/disaster-management-plans/
2. Economic Review 2020 (January 2021, Vol. I), Kerala State Planning Board, Government of Kerala, https://spb.kerala.gov.in/sites/default/files/2021-01/English-Vol-1.pdf
3. Kerala Post Disaster Needs Assessment - Floods and Landslides (October 2018), Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2019/03/PDNA-report-FINAL-FEB-2019_compressed.pdf
4. Kerala State Disaster Management Plan (2016), Kerala State Disaster Management Authority, Government of Kerala, https://sdma.kerala.gov.in/wp-content/uploads/2018/11/Kerala%20State%20Disaster%20Management%20Plan%202016.pdf.
5. Orange Book of Disaster Management – Kerala, Standard Operating Procedures & Emergency Support Functions Plan Kerala (2019), Kerala State Emergency Operations Centre (SEOC), Kerala State Disaster Management Authority, Department of Disaster Management, Govt. of Kerala https://sdma.kerala.gov.in/wp-content/uploads/2019/08/Orange-Book-of-Disaster-Management-1-2019.pdf
6. Terminology, United Nations Office for Disaster Risk Reduction, https://www.undrr.org/terminology
7. National Institute of Disaster Management (NIDM), Government of India, https://nidm.gov.in/
8. National Disaster Management Authority (NDMA), Government of India, https://ndma.gov.in/
9. Fifteenth Finance Commission Report, https://fincomindia.nic.in/ShowContent.aspx?uid1=3&uid2=0&uid3=0&uid4=0&uid5=0&uid6=0&uid7=0
10. Official website of Fisheries Department, Government of Kerala https://fisheries.kerala.gov.in/home-2

Annexure 1: Guidelines for Preparing Departmental Disaster Management Plans

Relevant Sections of the act: Section 40 (1)

A. Every department of the State Government, in conformity with the guidelines laid down by the State Authority, shall prepare a disaster management plan which shall lay down the following:

I. the types of disasters to which different parts of the state are vulnerable
II. integration of strategies for the prevention of disaster or the mitigation of its effects or both with the development plans and programmes by the department,
III. the roles and responsibilities of the department of the State in the event of any threatening disaster situation or disaster and emergency support function it is required to perform,
IV. present status of its preparedness to perform such roles or responsibilities or emergency support function under sub-clause (iii)
V. the capacity building and preparedness measures proposed to be put into effect in order to enable the ministries or departments of the Government of India to discharge their responsibilities under section 37

B. Annually review and update the plan referred to in clause (a) and

C. Furnish a copy of the plan referred to in clause (a) or clause (b) as may be to the State Authority

(2) Every department of the State Government, while preparing the plan under sub-section (1) shall make provision for financing the activities specified therein

(3) Every department of the State Government shall furnish an implementation status report to the State Executive Committee regarding the implementation of the disaster management plan referred to in sub-section (1)

Kindly note that unless this statutory requirement is met, the Ministry of Home Affairs, Govt. of India may restrain from even considering the requests of the State for relief assistance or response assistance.

The Emergency Support Functions plan of the State as approved by the State Executive Committee held on 29th January 2015 is also attached in the email. Kindly refer to the same for planning

Contents required in Departmental Disaster Management Plans

Chapter 1: Prevention, Mitigation and Preparedness Plan

1. Brief profile of the department
2. Measures necessary for prevention of disasters, mitigation, preparedness and capacity building in accordance with the guidelines laid down by the National Authority and the State Authority –*The major types of disasters for which the departments needs to plan in Kerala are given in Section 3.27 of the Kerala State Disaster Management Plan, 2016*

3. Integration into its development plans and projects, the measures for prevention of disaster and mitigation in the departmental annual plan
4. Provision of funds for prevention of disaster, mitigation, capacity-building and preparedness from the respective departmental budget head and Centrally Sponsored Schemes –*Under Section 39(c) of the Disaster Management Act 2005 (Central Act 53) "It shall be the responsibility of every department of the Government of a State to allocate funds for prevention of disaster, mitigation, capacity building and preparedness".*
5. Drawing up mitigation, preparedness and response plans, capacity-building, data collection and identification and training of personnel in relation to disaster management
6. Review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness
7. Provision of emergency communication in the affected areas for the department
8. Such other actions as may be necessary for disaster management

Chapter 2: Response Plan

1. Mechanism for early warning and dissemination thereof based on warnings issued by IMD, State Emergency Operations Centre or the District Emergency Operations Centres
2. Trigger Mechanism for response –who in the department will alert the concerned officers in the department and if alerted what triggers are to be initiated by the concerned officer
3. Response plan for responding effectively and promptly to any threatening disaster situation or disaster in accordance with the State Plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee and the State Government and the State Disaster Management Authority
4. Appointment of Nodal Officers to perform Emergency Support Functions (ESFs)/roles in emergency in the format already circulated by the State Government v. Constitution of the Incident Response Teams (IRTs) at all levels with provision of delegation of authority
5. Reporting procedures and formats; vii. Role of NGOs and Voluntary Sector and coordination thereof
6. System of assessing the damage from any disaster
7. Roles and responsibilities and coordination mechanism for the department
8. Disaster Specific Response Plan –Response plan for major disasters such as earthquake, flash flood/cloudburst, snow avalanche, landslide etc. in which state level response would be needed
9. Identification of suppliers for departmental supplies and pre-contracting for supplies in case of emergencies

Chapter 3: Relief, Rehabilitation and Reconstruction

1. Norms of relief (If applicable) –*please refer the latest National Disaster Response Fund norms*
2. Minimum Standards of relief
3. Rehabilitation Plan

4. Financial mechanism v. Action Plan for Reconstruction –'Building back better'

Please mention schemes of insurance and relief packages available in the department.

Chapter 4: Knowledge Management

1. Documentation of losses in the animal husbandry & dairy sector for every department
2. Documentation of lessons learnt
3. Documentation of best practices and uploading of the same in the departmental websites.

Chapter 5: Review, Updation & Dissemination of Plan

1. DM Plan is a "living document" –would require regular improvement and updation –at least once a year
2. System of updation –who, when and how?
3. Dissemination of Plan to stakeholders –how? –Printing of document, uploading in departmental website, meetings, seminars, etc.

Annexures

1. Important contact details –National, state, local level of the department, etc.
2. Resource list (available with Department) with contact persons details (kindly follow IDRN Format) www.idrn.gov.in
3. Detailed Standard Operating Procedures (SOPs) for all phases of disasters –before, during and after
4. List of NGOs/INGOs/CBOs working in the field of the department
5. List of suppliers relevant for the department
6. Damage Assessment Formats
7. Reporting formats

After completing the preparation of the plan, this may formally be submitted to Principal Secretary, Department of Disaster Management (Revenue K) for consideration of the State Executive Committee. Technical advice required for plan preparation may be sought from State Emergency Operations Centre, KSDMA.

KERALA STATE DISASTER MANAGEMENT AUTHORITY

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